Intensive Care Medicine Experimental _####################_
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Intensive Care Medicine Experimental

ABSTRACT **Open Access**

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Best Abstracts

000132

Hallucinations and disturbed behaviour in the critically ill: incidence, patient characteristics, associations, trajectory, and outcomes

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Introduction: Hallucinations are perceptual disturbances frequently occurring in critically ill patients, often alongside disturbed behaviour, potentially reflecting neurocognitive dysfunction associated with critical illness. ICU research on hallucinations has previously examined relatively small patient cohorts and utilised post-discharge recall, which is prone to inaccuracies. Natural language processing (NLP) offers a novel, unbiased method for real-time detection by analysing contemporaneously recorded clinical notes.
Objectives: This study aimed to use NLP to determine the incidence of hallucinations in ICU patients, characterise their clinical trajectory, and assess associations with behavioural disturbances, medication use, patient characteristics, and outcomes.
Methods: We conducted a non-interventional, observational study in three medical-surgical ICUs, including adult patients admitted from July 2016 to May 2022. NLP was employed to detect hallucinations and disturbed behaviour (NLP-Dx-BD) [1][2] from clinical progress notes. We conducted a nested cohort analysis of patients with available electronic medication records. Patient demographics, clinical data, and outcomes were sourced from the Australian and New Zealand Intensive Care Society Adult ICU Patient Database. Statistical analysis involved logistic regression and Cox proportional hazards models, adjusted for age, type of admission and ANZROD mortality prediction model [3].
Results: Of 7,525 ICU patients, 625 (8.31%) experienced hallucinations, nearly all (99.7%) having NLP-Dx-BD, compared with 47.4% without hallucinations ($p < 0.001$). Hallucinations typically emerged within the first three ICU days, resolving after a median of 15 h. Patients with hallucinations were younger, had greater acute illness severity, and more frequently had cirrhosis, hepatic failure, acute kidney injury, or psychiatric histories. Visual hallucinations predominated (69.1%), followed by auditory (14.1%), and combined (16.8%). In the nested cohort (n = 2,904), hallucinations occurred in 252 (8.7%) patients, with antipsychotic medications administered to 23.8%, compared with 5.5% without hallucinations ($p < 0.001$). Ketamine use was significantly higher in patients with hallucinations (25.4% vs 6.9%, $p < 0.001$), 96.9% received ketamine before their first hallucination episode. Despite these associations, there were no significant differences in hospital mortality (6.9% vs 9.3%) or 28-day mortality (4.5% vs 8.3%).
Conclusions: Hallucinations affect approximately one in 12 ICU patients and typically occur early during ICU admission. They correlate with subsequent disturbed behaviour and increased antipsychotic medication use. Hallucinations may represent a distinct phenotype of neurocognitive dysfunction associated with critical illness. NLP provides an effective and scalable method for real-time detection, facilitating future research and early interventions aimed at preventing or reducing hallucinations and limiting progression to behavioural disturbance.

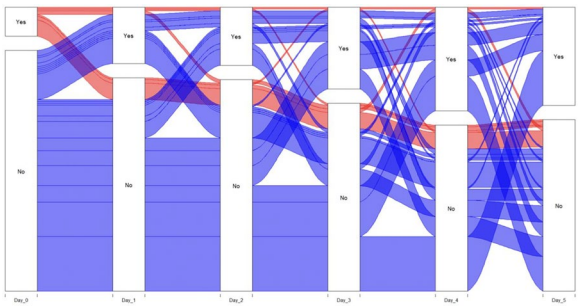


Fig. 1 (abstract 000132) Alluvial plot illustrating the trajectory of hallucinations in ICU patients. Patients without hallucinations on day 0 are shown in blue, and patients experiencing hallucinations on day 0 are shown in red.

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Topic: Sedation, analgesia and delirium

000311

Sex as an influencing factor for intraoperative hypotension: a systematic review with individual patient data meta-analysis

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Introduction: Intraoperative hypotension (IOH) is a significant risk factor for severe postoperative organ dysfunction [1]. However, the individual patient characteristics contributing to an increased risk of IOH remain insufficiently understood, particularly with regard to sex differences [2]. Previous studies have already highlighted the importance of incorporating sex-specific factors into therapeutic decision-making [3, 4]. The aim of this systematic review is to identify sex as a potential risk factor for IOH and to assess its impact on the incidence of IOH.
Methods: The protocol for this systematic review was registered on PROSPERO [5]. A systematic literature search was conducted in the following databases from inception until March 2, 2024: Embase, MEDLINE (via Ovid), and the Cochrane Library. Additionally, relevant references and newly published studies after the screening period were manually included.
Odds ratios (OR) for the incidence of IOH were pooled using a random-effects model. Whenever available, ORs were extracted directly from the studies. If ORs were not reported, they were independently calculated based on individual patient data, provided that sufficient information was available.
Subgroup analyses were conducted for studies that exclusively investigated either general anesthesia or spinal anesthesia. Studies that included both anesthetic techniques or focused solely on regional anesthesia were categorized as 'Other'.
Inter-study heterogeneity was assessed using the I^2 statistic. Statistical significance was defined as $p < 0.05$.
Results: Of the 6,575 screened studies, 65 met the inclusion criteria and were included in the statistical analysis.
Sex-specific analysis revealed that women had a 15% higher likelihood of developing IOH (OR 1.15; 95% CI 1.07–1.23) (see Fig. 1). This association remained significant in the subgroup analysis of studies focusing on general anesthesia (OR 1.14; 95% CI 1.02–1.28; 40 studies). Overall heterogeneity was classified as high, with an I^2 value of 83%.
Conclusions: Female sex was identified as a relevant risk factor for the occurrence of IOH. Further research is needed to evaluate whether sex-specific therapeutic strategies can reduce the incidence of IOH in women and thereby improve patient outcomes.

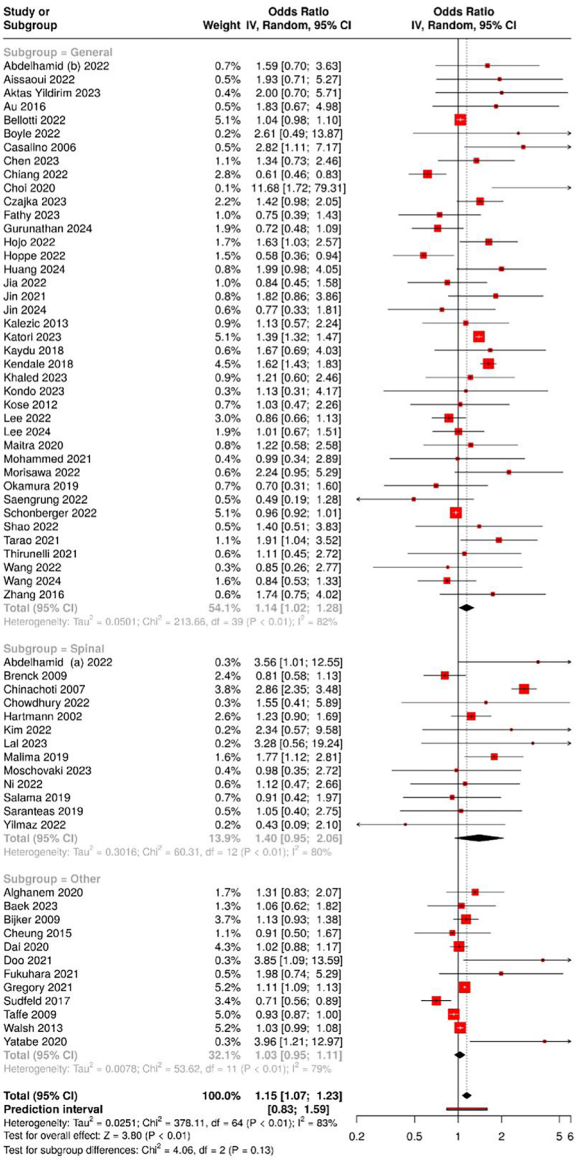


Fig. 1 (abstract 000311) Influence of sex on the probability of intraoperative hypotension occurrence Subgroups were defined as studies that exclusively investigated general anesthesia, those that focused solely on regional anesthesia, and studies that included both anesthesia techniques or purely regional procedures. The latter were categorized under "Other".

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Topic: Perioperative care

000345

A nurse-led, interprofessional family support intervention to improve quality of family care in adult ICUs: The FICUS cluster-randomized trial

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Introduction: To extend the evidence base on family-focused ICU care, we developed and tested a multicomponent family support intervention (FSI) that combined family engagement and coordinating practices with nurse-therapeutic family conversations in addition to structured, interprofessional communication (Naef et al., 2022). These intervention components are delivered by dedicated ICU family nurses in close collaboration with the ICU team from patient admission through to the post-ICU phase. The FSI was introduced on ICUs using a trailed implementation strategy (Verweij et al., 2023).
Objectives: To examine the effectiveness of the FSI on family satisfaction, quality of communication, and cognitive/emotional support provided to families of critically ill adults
Methods: Multicenter, cluster-randomized trial with 1:1 assignment of 16 Swiss ICUs to intervention (= implementation of FSI) and control arm (= usual care) (Naef et al., 2022). Participants were family members of critically ill adults with an expected ICU stay of ≥ 48 h and high risk of an adverse course of illness, enrolled between May 2022 and January 2024. The quality of care outcomes were assessed once after discharge (-1 / + 90d), namely family satisfaction as the primary outcome (FS-ICU-24R, 0-100 = high satisfaction), quality of clinician-family communication (QQPPI, 1-5 = high quality), and cognitive/emotional nurse support to family (FPSQ, 14-70 = high support). Linear mixed-effects models were used to analyze data of all participating family members (von Felten et al., 2024
Results: A total of 885 family members (n = 412 intervention, n = 473 control) were enrolled (42.7 enrollment rate), and 91% completed the follow-up. Almost half (48%) were partners of patients with a median SAPS-2 score of 55.8, and 64% were women. Fidelity to the pre-specified minimal intervention dose ranged between 90.8% (patient admission) and 43.9% (follow-up care within 4 weeks, 92.0% if no time limit was applied). The intervention improved family satisfaction with care by a mean difference (MD) of 2.39 (95% CI: 0.31 to 4.47, p = 0.024). Sensitivity analyses adjusting for ICU, patient, and family member baseline characteristics and with multiple imputation confirmed this result. A strong intervention effect was noted for satisfaction with involvement in decision-making (MD: 2.84, 95% CI: 0.71 to 4.98, p = 0.0090), communication (MD 0.37, 95% CI: 0.16 to 0.58, p = 0.0019), and cognitive/emotional support (MD 8.71, 95% CI: 4.71 to 12.71, p = 0.00034).
Conclusions: A nurse-led, interprofessional family support intervention in adult ICU increased family satisfaction to a small extent. A relevant improvement was found for family satisfaction with involvement in decision-making, communication, and cognitive/emotional support to families. The intervention's effectiveness on family functioning and family mental health is still under investigation. Nonetheless, incorporating the intervention as standard component of ICU care seems to be of value.

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Topic: Health Services Research and Outcome

000349

Random Forest and LASSO model for factors associated with nosocomial low respiratory tract infections (NLRTI) caused by *Pseudomonas aeruginosa*: a secondary analysis from The European Network For ICU-Related Respiratory Infections (ENIRRIs) study

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Introduction: Nosocomial lower respiratory tract infections (NLRTIs) are among the most frequent infectious complications in Intensive Care Unit (ICU) patients. Ventilator-associated pneumonia (VAP), ventilator-associated tracheobronchitis (VAT), ICU-acquired pneumonia (ICU-HAP), and hospital-acquired pneumonia (HAP) remain persistent public health challenges despite widespread preventive measures. Gram-negative bacteria, especially *Pseudomonas aeruginosa* (PA), are the predominant causative agents of NLRTIs. However, accurately identifying patients who require empirical antipseudomonal treatment remains a clinical challenge.
Objectives: To identify risk factors associated with PA-related NLRTIs and describe the affected patients' main clinical outcomes.
Methods: This prospective cohort study included ICU-admitted patients with confirmed NLRTIs across 12 countries on two continents, from May 9, 2016, to August 16, 2019. Clinical and microbiological data were collected per local protocols. Patients were categorized based on the isolation of PA or non-PA pathogens. A Random Forest algorithm and LASSO (Least Absolute Shrinkage and Selection Operator) regression were applied to determine variable importance, followed by multivariable logistic regression. Results are reported as odds ratios (ORs)

with 95% confidence intervals. Analyses were conducted in R Studio (version 2023.09.1 + 495).

Results: 1,059 patients were included; 74% were male, with a median age of 64 years (IQR 49–73). The most frequent comorbidities were diabetes, heart disease, and COPD. PA was isolated in 14.4% of patients. Differences in comorbidities, complications, and outcomes were observed between PA and non-PA groups (Table 1). The predominant pathogens were *P. aeruginosa*, *Staphylococcus aureus*, and *Klebsiella spp*. Among PA cases, VAP was the leading NLRTI diagnosis. Notably, 64.6% of non-PA patients received antipseudomonal therapy unnecessarily, while 28.8% of PA-infected patients were not treated with antipseudomonal agents. PA resistance to carbapenems was observed in 11.1% of cases (Fig. 1). The machine learning models demonstrated > 80% accuracy in predicting PA-related NLRTIs. The final multivariable analysis identified the following factors independently associated with PA NLRTI: COPD Gold D (OR 3.44, 95% CI 1.37–8.15, p = 0.01), active autoimmune disease (OR 2.58, 95% CI 1.35–4.72, p < 0.01), acute kidney injury on day 1 (OR 1.95, 95% CI 1.23–3.05, p < 0.01), and renal compromise (OR 1.89, 95% CI 1.10–3.19, p = 0.01)(Fig. 2).

Conclusions: Over half of the patients without PA infection received unnecessary antipseudomonal treatment, while a substantial proportion of PA-infected patients did not receive adequate therapy. COPD Gold D, active autoimmune disease, early acute kidney injury, and renal compromise were significantly associated with PA-related NLRTIs. Interestingly, standard severity scores were not predictive. These findings underscore the need for improved clinical tools to guide empirical therapy and reduce inappropriate antimicrobial use.

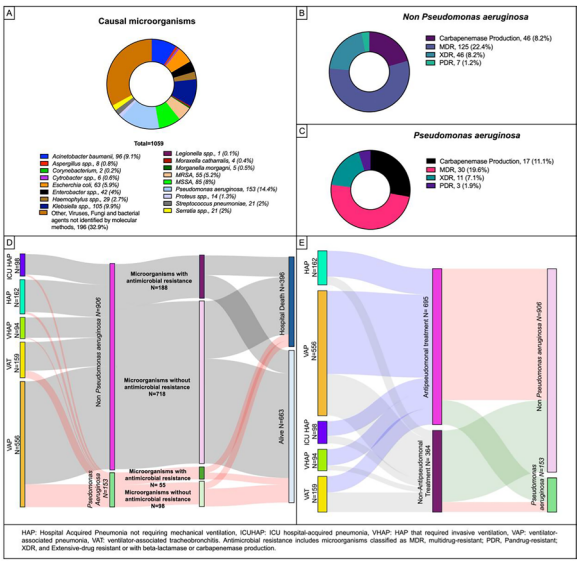


Fig. 1 (abstract 000349) A. Prevalence of causal microorganisms. **B.** Resistance in *non-Pseudomonas aeruginosa*. **C.** Resistance in *non-Pseudomonas aeruginosa*. **D.** Sankey diagram for mortality **E.** Sankey diagram *Pseudomonas aeruginosa* Vs. *non-Pseudomonas aeruginosa* NLRTI-diagnosed patients according to antipseudomonal treatment.

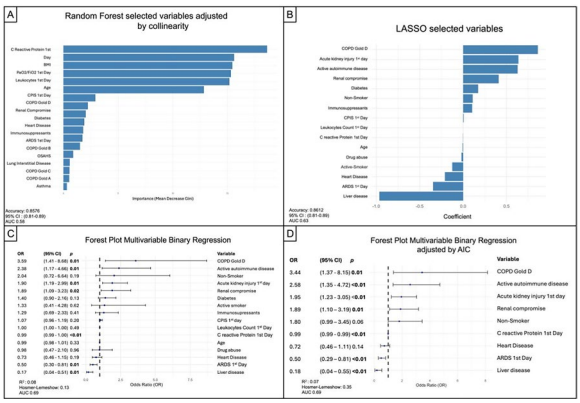


Fig. 2 (abstract 000349) A. Random Forest model **B.** LASSO model **C.** Multivariable binary regression for association with PA NLRTI with all variables identified by Random Forest and LASSO **D.** Optimized multivariable binary regression for association with PA NLRT

Table 1 (abstract 000349) SCharacteristics of patients with *Pseudomonas aeruginosa* **identification Vs non-***Pseudomonas aeruginosa* **identification.**

	Whole Cohort n=1059 (%)	Patients with *Pseudomonas aeruginosa* LRTI n=153 (%)	Patients with Non-*Pseudomonas aeruginosa* LRTI n=906(%)	p- Value
Demographic Characteristics				
Male	768 (272.5)	113 (73.9)	655 (72.3)	0.68
Age, median (IQR)	64 (50-74)	64 (49-73)	64 (50-74)	0.63
Weight, median (IQR)	75 (65-85)	75 (65-85)	75 (65-86)	0.28
Height, median (IQR)	170 (165-175)	170 (160-175)	170 (160-175)	0.29
BMI, median (IQR)	25.9 (23.1-29.3)	25.4 (22.9-29.3)	25.9 (23.1-29.3)	0.79
Diagnosis				
HAP	152 (14.4)	9 (5.9)	143 (15.7)	**<0.01**
ICU-HAP	98 (9.3)	7 (4.6)	91 (10)	**0.03**
VHAP	94 (8.9)	4 (2.6)	90 (9.9)	**<0.01**
VAP	556 (52.5)	101 (66)	455 (50.2)	**<0.01**
VAT	159 (15.0)	32 (20.9)	127 (14)	**0.02**
Comorbidities				
Diabetes	214 (20.2)	38 (24.8)	176 (19.4)	0.12
Chronic renal failure	119 (11.2)	27 (17.6)	92 (10.2)	**<0.01**
Chronic renal failure requiering dialysis	15 (1.4)	2 (1.3)	13 (1.4)	0.89
Heart disease	285 (26.9)	38 (24.8)	247 (27.3)	0.53
Heart failure	166 (15.7)	25 (16.3)	141 (15.6)	0.8
Liver disease	66 (6.2)	3 (2)	63 (7)	**0.01**
Cirrhosis	36 (3.4)	3 (2)	33 (3.6)	0.26
Chronic obstructive Disease (COPD)	166 (15.7)	32 (20.9)	134 (14.8)	**0.05**
COPD Gold A	14 (1.4)	3 (2)	11 (1.2)	0.47
COPD Gold B	42 (4.1)	7 (4.6)	35 (3.9)	0.67
COPD Gold C	27 (2.6)	4 (2.6)	23 (2.5)	0.95
COPD Gold D	27 (2.5)	9 (5.9)	18 (2)	**<0.01**
Interstitial Lung Disease	23 (2.2)	3 (2)	20 (2.2)	0.84
Sleep Apnea	29 (2.7)	4 (2.6)	25 (2.8)	0.91
Asthma	18 (1.7)	3 (2)	15 (1.7)	0.78
Active smoke	60 (5.7)	7 (4.6)	53 (5.8)	0.52
Ex-Smoker	68 (6.3)	8 (5.2)	60 (6.6)	0.51
Drug abuse	208 (19.6)	26 (17)	182 (20.1)	0.37
Alcoholism	94 (8.9)	10 (6.5)	84 (9.3)	0.27
Active solid neoplasia	149 (14.1)	24 (15.7)	125 (13.8)	0.53
Active haematoid neoplasia	31 (2.9)	2 (1.3)	29 (3.2)	0.19
Bone Marrow Transpalant	6 (0.6)	0 (0)	6 (0.7)	0.31
Any Auto-Immune Diseases	57 (5.4)	16 (10.5)	41 (4.5)	**<0.01**
Rheumatic Disease Treatment	37 (3.4)	10 (6.5)	27 (3)	**0.02**
Immunosuppressant Status	100 (9.4)	21 (13.7)	79 (8.7)	**0.05**
HIV infection	10 (0.9)	1 (0.7)	9 (1)	0.68
Taking Corticoids	43 (4.0)	10 (6.5)	33 (3.6)	0.09
Taking Immunosuppressant Drugs	28 (2.6)	9 (5.9)	19 (2.1)	**<0.01**
Neutropenia	4 (0.4)	1 (0.7)	3 (0.3)	0.54
AIDS	4 (0.4)	1 (0.7)	3 (0.3)	0.54
Induction of Immunosuppression	19 (1.8)	6 (3.9)	13 (1.4)	**0.03**
Chemotherapy while Hospitalisation	49 (4.6)	4 (2.6)	45 (5)	0.19
Chemotherapy in the last 30 days	23 (2.2)	3 (2)	20 (2.2)	0.84
Laboratory studies				
Leukocytes 1st Day, median (IQR)	12.8 (9.3-17.5)	12.6 (9.5-17.5)	12.8 (9.3-17.5)	0.99
Procalcitonin 1st Day, median (IQR)	0.7 (0.2- 3.3)	0.7 (0.3-3.7)	0.8 (0.2-3.3)	0.31
C- Reactive Protein 1st Day, median (IQR)	24.6 (9.5-137.5)	20.0 (9.8-40.1)	27.0 (9.5-149.4)	**0.02**
PO2/FiO2 1st Day, median (IQR)	190.0 (138.0-266.0)	207.0 (145.0-293.5)	189.0 (136.0-262.0)	**<0.01**
Severity Scores				
Saps II ICU Admission, median (IQR)	47.0 (36.0-58.0)	46 (39-57)	47 (35-58)	0.72
Saps II LRTI Diagnosis, median (IQR)	44.0 (34.0-56.0)	44 (34-54)	45 (34-57)	0.64
SOFA ICU Admission, median (IQR)	7.0 (5.0-10.0)	8 (5-10)	7 (5-10)	0.89
SOFA LRTI Diagnosis, median (IQR)	7.0 (5.0-10.0)	7 (5-9)	7 (5-10)	0.31
CPIS 1st Day, median (IQR)	6.0 (4.0- 7.0)	6 (4-7)	6 (4-7)	0.25
Treatment				
Antipseudomonal treatment	695 (65.6)	109 (71.2)	586 (64.6)	0.11
Non-Antipseudomonal treatment	364 (34.4)	44 (28.8)	320 (35.4)	0.11
Complications				
Acute Kidney Injury 1st day	178 (16.8)	37 (24.2)	141 (15.6)	**<0.01**
Acute Respiratory Distress Syndrome 1st day	229 (21.6)	22 (14.4)	207 (22.8)	**0.01**
Multi-Organ Failure 1st day	103 (9.7)	15 (9.8)	88 (9.7)	0.97
Septic Shock 1st day	258 (24.4)	40 (26.1)	218 (24.1)	0.57
Outcomes				
ICU length of Stay, median (IQR)	20.0(11.0-34.0)	27.5 (17.2-47.7)	19 (11-32)	**<0.01**
Hospital Length of Stay, median (IQR)	38.0 (22.0-65.0)	44.0 (26.0-74.7)	37 (21-63)	**<0.01**
ICU Death	325 (30.7)	46 (30.1)	279 (30.8)	0.85
Death after ICU discharge	71 (6.7)	8 (5.2)	63 (7)	0.43
Total Death	396 (37.4)	54 (35.3)	342 (37.7)	0.56

HAP: Hospital Acquired Pneumonia not requiring mechanical ventilation, ICUHAP: ICU hospital-acquired pneumonia, VHAP: HAP that required invasive ventilation, VAP: ventilator-associated pneumonia, VAT: ventilator-associated tracheobronchitis, HIV: Human Immunodeficiency Virus, AIDS: Acquired Immunodeficiency syndrome, ICU: Intensive Care Unit, SAPS II: Simplified Acute Physiology Score II, SOFA: Sequential Organ Failure Assessment, CPIS: Clinical Pulmonary Infection Score.

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Topic: Infections and prevention

000558

Long-term outcome of ultra-low tidal volume ventilation for COVID-19 ARDS: a randomized controlled trial

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Intensive care Medicine Experimental 2025* 13(1):*000558

Introduction: Ultra-low tidal volume ventilation, by reducing tidal volume (VT) at or below 4 ml/kg predicted body weight (PBW) has potential to minimize ventilator-induced lung injury in patients with acute respiratory distress syndrome (ARDS), but may be associated with an increase in arterial carbon dioxide (PaCO2) without extracorporeal CO2 removal (ECCO2R) techniques. We recently published the short-term results of the VT4-COVID trial, a randomized controlled trial comparing ultra-low tidal volume ventilation with protective ventilation in COVID-19 ARDS.
Objectives: The aim of this study was to evaluate whether ultra-low tidal volume ventilation without ECCO2-R impacts long-term secondary outcomes at day-365 from inclusion.
Methods: VT4-COVID was an open labelled multicentric randomized controlled study performed in 10 French intensive care units. Eligible patients were ARDS patients with COVID-19 pneumonia and a PaO2/FiO2 ratio ≤ 150 mmHg, and were randomized in two arms: an ultra-low tidal volume arm ventilated with VT 4 ml/kg PBW, and a control arm under protective ventilation with VT 6 ml/kg PBW. The following outcome criteria were evaluated at day-365 from inclusion: all-cause mortality, cognitive status assessed with the MOCA-5 min score, quality of life assessed with the SF-36 score, and post-traumatic stress disorder assessed with the IES-R score. Scores were presented as median [interquartile range], and a hazard ratio with its 95% confidence interval (CI95%) was computed to evaluate the impact of study arm on mortality. The study was referenced at clinicalTrial.gov under the reference NCT04349618.
Results: Two hundred and fifteen patients were included and randomized in the ultra-low tidal volume arm (n = 106) or in the control arm (n = 109) between April, 2020 and April, 2021. Four patients were lost to follow-up at day 365. Mortality at day 365 was not significantly different between arms (47/102[46%] vs. 44/106[42%], hazard ratio 1.194 (IC95%: 0.79 à 1.80). The others secondary outcomes were evaluated in 39/55 [71%] patients in the ultra-low tidal volume arm, and in 44/62 [71%] patients in the control arm. The MoCA 5-min score was significantly lower in the ULTV arm (26 [20-28] vs. 28 [25-29], p < 0.05), with a median difference amounting to -1 [CI95%:-4-0]. This difference was related to a significant decrease of the memory-learning component of the score (4 [4-5] vs 5 [5-5], median difference -1 [CI95%: -1-0], p < 0.05). There was no significant difference between groups regarding the 9 domains of the SF-36 score. The IES-R score was not statistically different between groups (19 [9 – 35] in the ULTV arm vs. 15 [8 – 36] in the control arm (p = 0.35), with a median difference amounting to 4 [CI95%: -4-12].
In univariate analyses, the MOCA 5-min score was significantly associated with maximal PaCO2 during ARDS management (p < 0.01), but not with minimal PaO2/FiO2 (p = 0.48).
Conclusions: Ultra-low tidal volume ventilation without ECCO2R has no detectable impact on mortality at day-365 in COVID-19 ARDS patients, but is associated with a small but significant decrease in cognitive status possibly related to increased PaCO2.

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Topic: Acute respiratory failure and mechanical ventilation

000602

Efficacy and safety of ciprofol for long-term sedation in critically ill patients receiving mechanical ventilation in ICU: a single-center, retrospective, observational study

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Intensive care Medicine Experimental 2025* 13(1):*000602

Introduction: Critically ill patients requiring mechanical ventilation often need sedation to alleviate discomfort. Current sedatives carry risks like hypotension and respiratory depression. Ciprofol (HSK3486), a propofol analog and GABA receptor agonist, shows comparable short-term efficacy to propofol with fewer side effects, as evidenced by prior studies. However, evidence regarding its suitability for prolonged sedation in intensive care settings remains limited. This study aimed to evaluate the efficacy, safety, and hemodynamic effects of ciprofol compared with propofol for long-term sedation in mechanically ventilated patients.
Methods: We conducted a single-center, retrospective cohort study of mechanically ventilated patients admitted to the ICU of the First Affiliated Hospital of Sun Yat-sen University between January 2022 and September 2024 who received continuous sedation with either ciprofol or propofol for > 24 h. The primary outcome was the achievement of target sedation (RASS score + 1 to -4). Secondary outcomes included safety parameters (hepatic/renal function biomarkers, oxygenation index) and hemodynamic stability (MAP, SBP/DBP, HR, and vasopressor requirements). Continuous variables were analyzed using t-tests or Mann–Whitney U tests, while categorical variables were assessed with Fisher's exact test (P < 0.05 considered statistically significant).
Results: The study included 302 patients (ciprofol: n = 188; propofol: n = 114) with comparable baseline characteristics (mean SOFA: 8.67 ± 3.96; APACHE II: 20.43 ± 7.54). Sepsis/septic shock was the primary admission diagnosis (63.6%). Both agents demonstrated equivalent sedation efficacy at all time points (6 h, 24 h, 48 h, and 72 h; P > 0.05), with no differences in ICU and hospital length of stay or ICU mortality. Notably, ciprofol required significantly lower initial doses (0.18 [0.11-0.28] *vs.* 1.18 [0.66-1.72] mg/kg/h; P < 0.001) and demonstrated superior early hemodynamic stability (ΔMAP: + 3.67 *vs.* -3.5 mmHg; ΔSBP: + 7 vs. -4 mmHg; both P < 0.001) with reduced vasopressor requirements (P = 0.012). At 72 h, while blood pressure parameters were comparable between groups, ciprofol maintained significantly lower vasopressor needs (0.14 [0.02-0.5] *vs.* 0.3 [0.07-0.75] mcg/kg/min; P = 0.019). Subgroup analysis of vasopressor-dependent patients revealed ciprofol's advantages in maintaining higher MAP (84.00 ± 10.87 *vs.* 79.85 ± 14.31 mmHg; P = 0.036) and SBP (129.62 ± 15.24 *vs.* 121.62 ± 23.30 mmHg; P = 0.017) while reducing vasopressor demand (P = 0.019).
Conclusions: In critically ill patients undergoing mechanical ventilation, ciprofol demonstrated comparable sedation success rates to propofol while requiring significantly lower initial doses to achieve ICU sedation targets and exhibiting a superior safety profile. Notably, in critically ill patients requiring vasopressor support, ciprofol showed distinct advantages over propofol in maintaining hemodynamic stability and reducing vasopressor demand. The findings support further prospective investigation of ciprofol in critical care sedation protocols.

Topic: Sedation, analgesia and delirium

000673

Association of oliguria with acute kidney injury, chronic kidney disease and mortality: determining the optimal threshold in critically ill patients

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Intensive care Medicine Experimental 2025* 13(1):*000673

Introduction: Oliguria is a key indicator in the diagnosis of acute kidney injury (AKI), yet the consensus definition of < 0.5 ml/kg/hour is increasingly questioned(1, 2). Recent studies suggest that the risk of AKI and increased mortality occurs at lower urine output thresholds than previously recognized(3, 4). However, to our knowledge, no study has evaluated the optimal threshold in relation to chronic kidney

disease (CKD). Moreover, existing studies evaluating the association between oliguria, AKI and mortality vary widely in methods, study population and population size.

Objectives: We aimed to determine the optimal threshold of minimal average urine output (mUO) associated with subsequent AKI, CKD and death using a large, high-quality, retrospective ICU dataset.

Methods: We included adult patients (≥ 18 years) admitted to the general ICU at Uppsala University Hospital between 2017 and 2024. Hourly urine output and clinical characteristics were extracted from electronic medical records. Patients with preexisting CKD were excluded. For each patient, mUO was calculated over 3, 6, 12 and 24 h (mUO3h, mUO6h, mUO12h, mUO24h) in accordance with previous publications(4). Multivariable logistic regression models were fitted for each time window, adjusting for SAPS 3 estimated mortality ratio and sex. Outcomes were: (1) AKI within 7 days of mUO, based on the KDIGO creatinine criteria; (2) CKD after ICU discharge; and (3) mortality following ICU care. We then fixed all covariates except mUO and visualized the multivariable models to determine a threshold for mUO in the range 0.0-1.0 ml/kg/h.

Results: 5006 patients were included in the analysis. mOU3h was not associated with mortality ($p < 0.156$). All other mOU time frames were significantly associated with AKI, CKD and death (mOU6h with mortality $p = 0.011$, all other models $p = < 0.0001$). In the visualized models with fixed covariates, the lowest risk of AKI, CKD and death was observed at mOU at 0.5 ml/kg/h or above. The mOU thresholds for a significant increased risk of AKI compared to the point of lowest risk were 0.54 (mUO3h), 0.48 (mUO6h), 0.41 (mUO12h), and 0.54 (mUO24h) (Fig. 1). For CKD, the corresponding thresholds were 0.20 (mUO3h), 0.24 (mUO6h), 0.31 (mUO12h) and 0.43 (mUO24 h), respectively (Fig. 2). For mortality, no significant thresholds were identified for mUO3h or mUO6h, while thresholds of 0.32 (mUO12h) and 0.21 (mUO24h) were observed (Fig. 3).

Conclusions: Although the current oliguria threshold of ≤ 0.5 ml/kg/h appears to align with the estimated AKI threshold in our models, more restrictive limits may offer improved prediction of long-term kidney outcomes, as suggested by associations with CKD and mortality. Our findings indicate that lower oliguria thresholds could be considered when the objective is to identify patients at risk of sustained kidney injury.

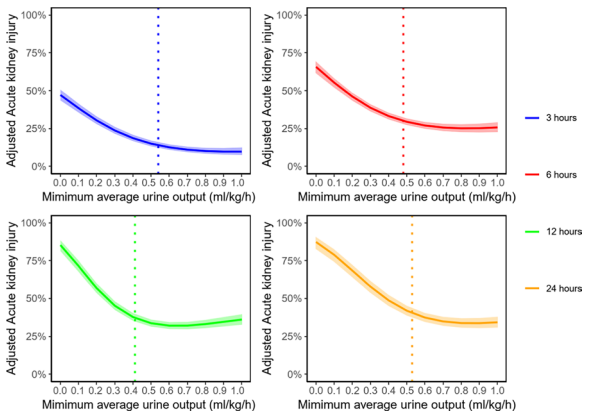


Fig. 1 (abstract 000673) Adjusted risk of acute kidney injury as a function of minimum average urine output over 3, 6, 12, and 24 h. Plot showing regression line, with 95% confidence intervals. Different colors represent different time windows as shown on the graph. The dashed line represents a statistical difference from minimal risk. Regression carried out with fixed predictors at median (i.e., male, and SAPS 3 estimated mortality ratio of 27.6).

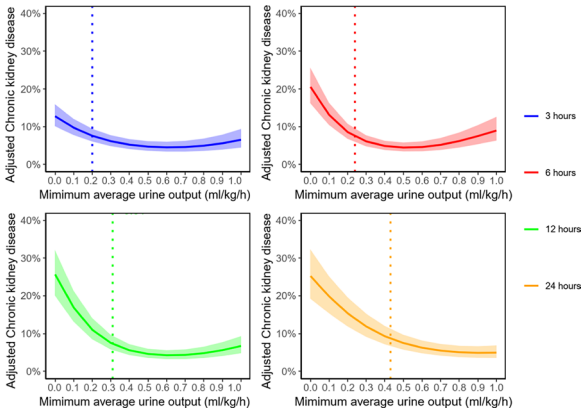


Fig. 2 (abstract 000673) Adjusted risk of chronic kidney disease after ICU-care as a function of minimum average urine output over 3, 6, 12, and 24 h. Plot showing regression line, with 95% confidence intervals. Different colors represent different time windows as shown on the graph. The dashed line represents a statistical difference from minimal risk. Regression carried out with fixed predictors at median (i.e., male, and SAPS 3 estimated mortality ratio of 27.6).

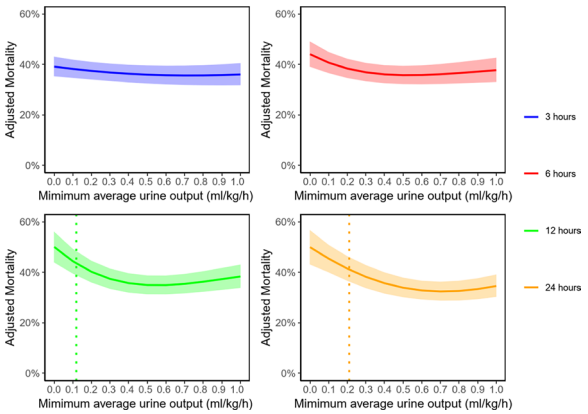


Fig. 3 (abstract 000673) Adjusted mortality as a function of minimum average urine output over 3, 6, 12, and 24 h. Plot showing regression line, with 95% confidence intervals. Different colors represent different time windows as shown on the graph. The dashed line represents a statistical difference from minimal risk. Regression carried out with fixed predictors at median (i.e., male, and SAPS 3 estimated mortality ratio of 27.6).

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Topic: Acute Kidney Injury and haemofiltration

000901

TREM-1 causes sepsis-associated acute kidney injury by mediating NLRP3 inflammasome activation to inhibit autophagy

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Intensive care Medicine Experimental 2025* 13(1):*000901

Introduction: Sepsis triggers a rapid pathophysiological cascade leading to multiorgan failure, with the kidney often being the first affected organ. Epidemiologic data show sepsis-associated AKI (SA-AKI) occurs in 30-70% of critically ill patients, with mortality rates reaching 40-60%. Early detection and mechanistic understanding of SA-AKI are crucial for improving outcomes.
The inflammatory cascade and immune dysregulation drive sepsis pathogenesis. As a metabolic, excretory, and immunomodulatory organ, the kidney plays a central role in sepsis-induced multiorgan failure. Triggering receptor expressed on myeloid cells-1 (TREM-1) amplifies inflammation via the TREM-1/DAP12 pathway upon LPS stimulation. Soluble TREM-1 (sTREM-1) in urine shows diagnostic potential for SA-AKI, though its exact mechanisms remain unclear.
SA-AKI pathophysiology involves tubular injury, vascular dysfunction, and programmed cell death (apoptosis, pyroptosis, autophagy). While autophagy maintains renal homeostasis, TREM-1 appears to suppress autophagy while promoting apoptosis via NF-κB. Pyroptosis—mediated by caspase-1 and NLRP3 inflammasome activation—releases proinflammatory cytokines (IL-1β, IL-18). We hypothesize TREM-1 exacerbates tubular damage by activating NLRP3 while disrupting autophagy balance, creating a vicious cycle of inflammation and kidney injury.
Methods: To investigate the role of TREM-1 in sepsis-associated kidney injury, we generated TREM-1 knockout mice using CRISPR/Cas9 technology targeting the functional coding region of the TREM-1 gene. Twelve-week-old male C57BL/6J mice were subjected to cecal ligation and puncture (CLP) to establish a sepsis model, with experimental groups including wild-type controls, CLP-only, CLP with NLRP3 inhibitor (MCC950), TREM-1 knockout controls, knockout CLP, and knockout CLP with NLRP3 activator (nigericin).
We cultured HK-2 human renal tubular epithelial cells and manipulated TREM-1 expression using siRNA knockdown and cDNA overexpression, followed by LPS stimulation to mimic septic conditions. Kidney tissues from experimental mice were analyzed through histopathological scoring of tubular injury, while molecular analyses included qRT-PCR for TREM-1 expression, Western blotting for NLRP3 inflammasome components (caspase-1, gasdermin D) and autophagy markers (LC3B, Atg5, beclin-1), and ELISA for inflammatory cytokines. Serum creatinine and BUN levels were measured to assess renal function. Statistical analysis of triplicate experiments was performed using ANOVA with SPSS software, with $p < 0.05$ considered significant.
Results: We observed that TREM-1 deficiency alleviated kidney damage, as evidenced by reduced tubular injury, lower serum creatinine and blood urea nitrogen levels, and decreased proinflammatory cytokine expression. Moreover, TREM-1 activation was associated with enhanced NLRP3 inflammasome activity, promoting pyroptosis and apoptosis, while inhibiting autophagy.
In vitro, HK-2 renal tubular epithelial cells treated with lipopolysaccharide (LPS) demonstrated that TREM-1 upregulation increased inflammasome activation and cytokine release, suppressing autophagy and exacerbating apoptosis. Conversely, TREM-1 silencing reversed these effects, suggesting a regulatory role for TREM-1 in balancing inflammasome activity and autophagy. The interplay between NLRP3 and autophagy was further validated through pharmacological manipulation with MCC950 (inhibitor) and nigericin (activator).
Conclusions: In summary, TREM-1 may mediate the inflammatory response caused by the NLRP3 inflammasome by reducing the level of autophagy and kidney damage. This study provides a theoretical basis for sTREM-1 as a marker for the early diagnosis of AKI and for the use of TREM-1 as a new target in the treatment of AKI, which will help direct the study of new interventions and treatments of AKI in the future.

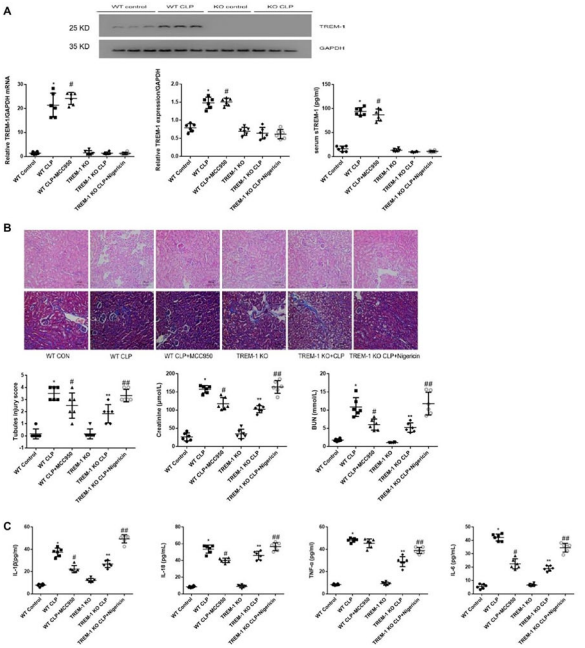


Fig. 1 (abstract 000901) AKI model, established by CLP, in TREM-1-KO and WT control mice. The effects of NLRP3 deletion (MCC950) and activation (nigericin) on the NLRP3 inflammasome in CLP-AKI mice were also examined. A Kidney TREM-1 protein and mRNA expression and serum sTREM-1 concentration in the different groups determined by Western blotting, PCR and ELISA (n = 6 per group). B Effect of renal injury after CLP on renal morphology. Representative micrographs showing kidney injury in the different groups of mice (original magnification is × 200). The kidney sections were subjected to HE and Masson staining. The kidney injury scores were quantitatively determined. The effect of renal injury on serum creatine and BUN levels was assessed (n = 6 per group). C TREM-1 mediates the production of inflammatory cytokines (IL-1β, TNF-α, and IL-6) in the different groups (n = 6 per group). The data are presented as the means ± SDs. One-way ANOVA (normal distributions) or nonparametric tests (not normal distributions) were used for comparisons among the different groups. * indicates $P < 0.05$ vs. the WT control group; # indicates $P < 0.05$ vs. the WT + CLP group; ** indicates $P < 0.05$ vs. the TREM-1 KO group; and ## indicates $P < 0.05$ vs. the TREM-1 KO + CLP group

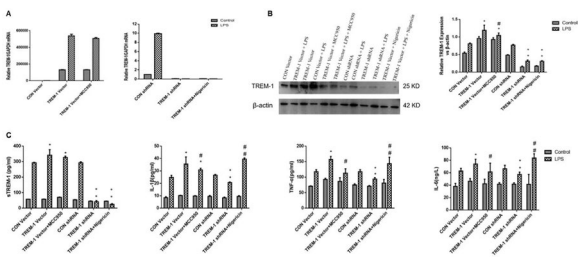


Fig. 2 (abstract 000901) Effect of TREM-1 on inflammasome activation, autophagy and apoptosis changes in the kidneys of CLP-AKI mice (n = 6). A-C: Representative Western blots and quantitative determination of the levels of proteins related to inflammasome activation, autophagy and apoptosis are presented. The data are presented as the means ± SDs. One-way ANOVA (normal distributions) or nonparametric tests (not normal distributions) were used for comparisons among the different groups. * indicates $P < 0.05$ vs. the WT control group; # indicates $P < 0.05$ vs. the WT + CLP group; ** indicates $P < 0.05$ vs. the TREM-1 KO group; and ## indicates $P < 0.05$ vs. the TREM-1 KO + CLP group

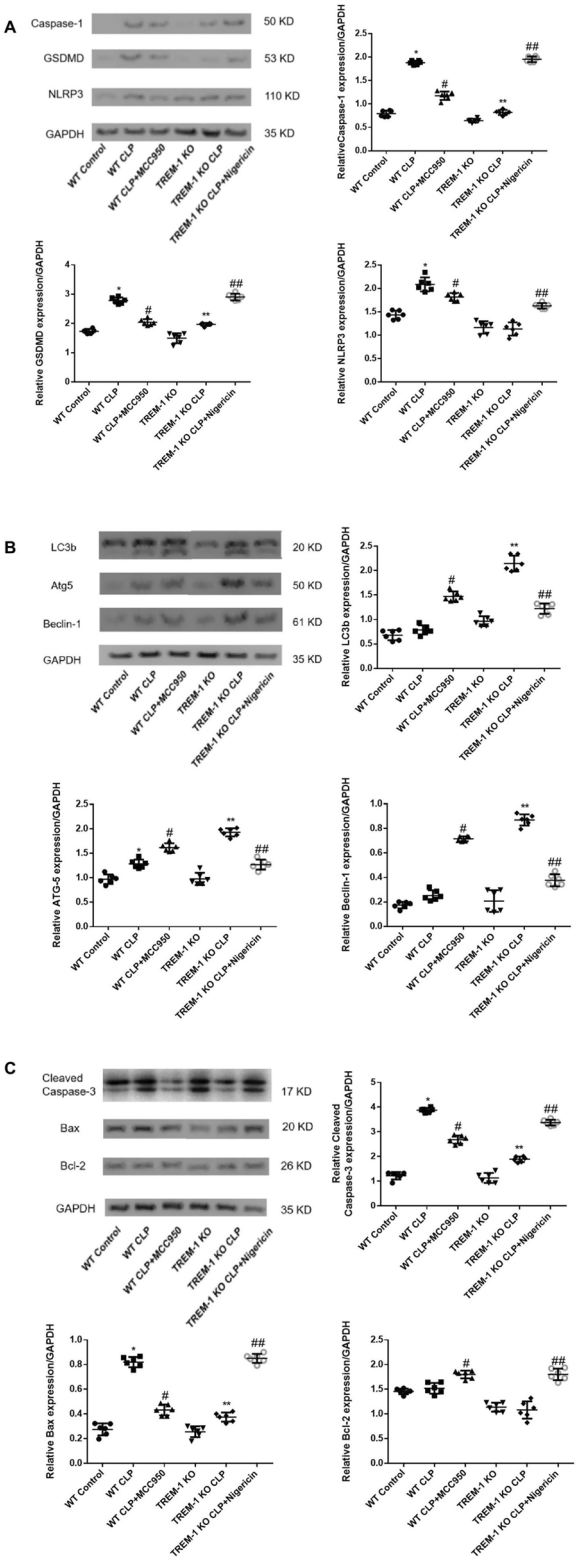


Fig. 3 (abstract 000901) Activation or silencing of TREM-1 expression in HK-2 cells by transfection of TREM-1 vector or shRNA and treatment with or without LPS. HK-2 cells were transfected with a plasmid containing the negative control vector/TREM-1 gene or negative control shRNA/TREM-1 shRNA and then exposed to LPS (100 ng/mL). Additionally, an NLRP3 inhibitor (MCC950) and an NLRP3 activator (nigericin) were administered to HK-2 cells. **A** Representative qRT-PCR and quantification of TREM-1 in the different groups. **B** Western blotting analysis and quantification of TREM-1 in the different groups. **C** Inflammation and cytokine expression, including sTREM-1, IL-1β, TNFα, and IL-6, in HK-2 cell supernatants. Three samples were included per group. The data are presented as the means ± SDs. One-way ANOVA (normal distributions) or nonparametric tests (not normal distributions) were used for comparisons among the different groups. * indicates $P < 0.05$ vs. the CON vector group; # indicates $P < 0.05$ vs. the TREM-1 vector group; ** indicates $P < 0.05$ vs. the CON shRNA group; ## indicates $P < 0.05$ vs. the TREM-1 shRNA group

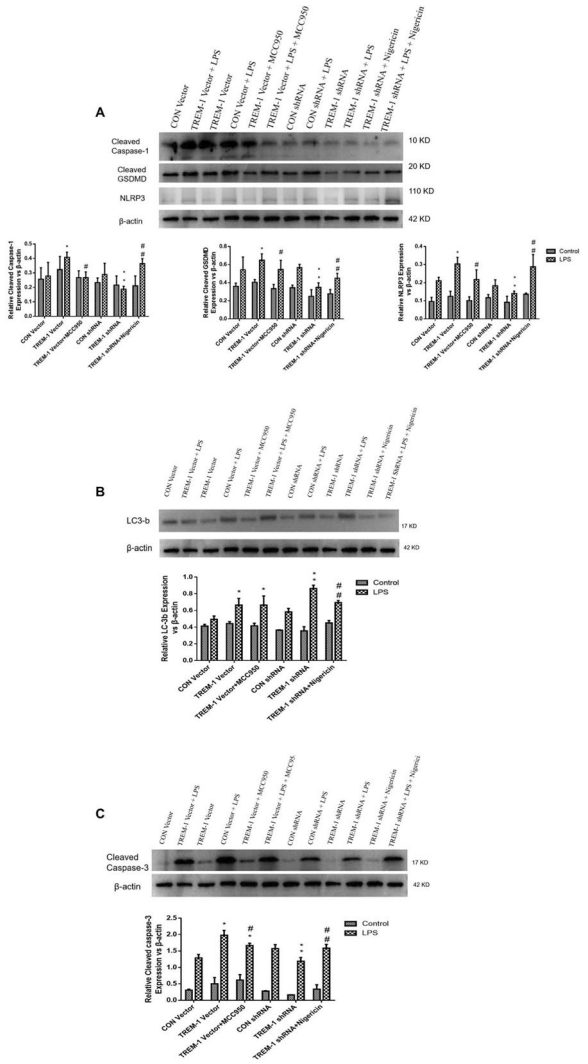


Fig. 4 (abstract 000901) LPS-induced HK-2 cell inflammasome, autophagy, and apoptosis mediated by TREM-1. HK-2 cells were transfected with a plasmid containing the negative control vector/TREM-1 gene or negative control shRNA/TREM-1 shRNA and then exposed to LPS (10 μg/mL). Additionally, an NLRP3 inhibitor (MCC950) or an NLRP3 activator (nigericin) were administered to HK-2 cells. **A-C** Representative Western blots and quantitative determination of protein levels are presented. Three samples were included per group. The data are presented as the means ± SDs. One-way ANOVA (normal distributions) or nonparametric tests (not normal distributions) were used for comparisons among the different groups. *

indicates P < 0.05 vs. the CON vector group; # indicates P < 0.05 vs. the TREM-1 vector group; ** indicates P < 0.05 vs. the CON shRNA group; and ## indicates P < 0.05 vs. the TREM-1 shRNA group

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Topic: Acute kidney injury and haemofiltration

000994

Temporal robustness of biomarker-based classification algorithms for sepsis

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Intensive care Medicine Experimental 2025* 13(1):*000994

Introduction: Heterogeneity of the host response in sepsis presents major challenges to finding effective treatments.[1] Several immunobiologically distinct subgroups (i.e. subphenotypes or endotypes) have been identified over the past decade, most commonly through data-driven analyses of single-timepoint biomarker data.[2] However, the dynamic biology of sepsis, together with methodological limitations of unsupervised clustering approaches, raises concerns regarding the temporal stability of these subphenotypes and their potential as therapeutic targets.
Objectives: This study investigates the temporal robustness of subphenotypes derived through biomarker-based clustering approaches in critically ill patients with sepsis.
Methods: We analyzed high-resolution longitudinal biomarker data from 345 sepsis patients enrolled in two Dutch ICU cohorts. Thirty biomarkers related to inflammation, endothelial injury, and coagulation were measured in plasma every 8 h for up to day 7 (3852 samples total). Latent profile analysis was used to identify immunobiological subphenotypes upon admission, and subsequently re-classify patients at later timepoints. Temporal stability was assessed by (1) between-subphenotype transition rates over time, and (2) subphenotype cohesion (regardless of label) as quantified by the Rand index.
Results: At ICU admission, three subphenotypes were identified: Profile A (128 patients, 37%) represented T-cell activation with high IL-4, IL-5, IL-7, IFN-γ, and GM-CSF); Profile B (92 patients, 27%) represented a hyperinflammatory profile with high IL-6, IL-8, IL-10, IL-1Ra, and low protein C; and Profile C (125 patients, 36%) exhibited overall suppressed levels of inflammation (Fig. 1). Within 48 h, the relative prevalence of profiles A and B declined to 29% and 10%, respectively, while C increased to 61%. Group reassignment occurred at least once in 82% of patients initially classified in profile A, 71% in profile B, and 43% in profile C. On average, across all successive time intervals, Profile A showed the highest rate of reassignment, followed by Profiles B and C (Fig. 2A). Lastly, an average of 55% of patients remained consistently grouped together or apart at later timepoints, as measured by the Rand index (Fig. 2B).
Conclusions: Sepsis patients assigned to biologically plausible subphenotypes based on latent profile analysis of comprehensive biomarker data at ICU admission were frequently reclassified at subsequent closely spaced time points, and overall, only about half of patients remained consistently grouped together over time. This instability raises concerns about the robustness and clinical applicability of such biomarker-derived endotypes.

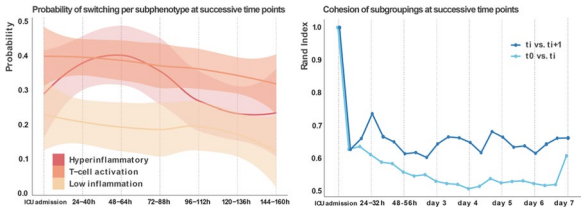


Fig. 2 (abstract 000994) Panel A. Probability of subphenotype transitions at successive time points. Lines represent locally estimated smoothing curves (LOESS), with shaded ribbons indicating the standard error. Transition probabilities were averaged across three consecutive time points prior to plotting. Panel B. Proportion of patients consistently grouped together or apart at each time point, as measured by the Rand index.

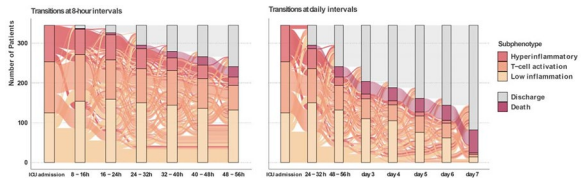


Fig. 1 (abstract 000994) Subphenotype transitions over time. Alluvial plots depicting patient subphenotype allocations at each time point based on a latent profile analysis (LPA) model derived at ICU admission (t0) using 30 biomarkers and a posterior probability cutoff of 0.5. Lines represent individual patient trajectories, with line colors indicating the subphenotype assigned at t0. Stacked bars reflect the proportion of patients assigned to each subphenotype at the respective time points. ICU: intensive care unit

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3. NA

Topic: Sepsis

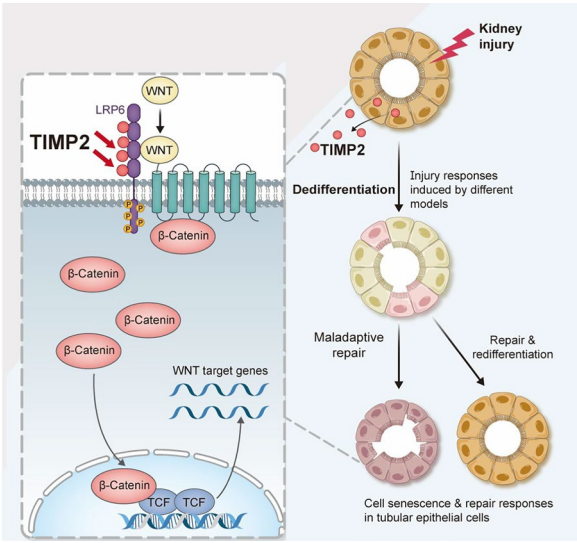
001376

Tissue inhibitor of metalloproteinase-2 (TIMP2) drives cellular senescence and maladaptive repair in the AKI-CKD transition through Wnt/β–catenin axis

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Intensive care Medicine Experimental 2025* 13(1): *001376

Introduction: Acute kidney injury (AKI) frequently progresses to chronic kidney disease (CKD), yet the underlying mechanisms driving this transition remain largely unclear. Here, we investigated the role of tissue inhibitor of metalloproteinase-2 (TIMP2), an established AKI biomarker, in the AKI-to-CKD transition.
Methods: We utilized mouse models of AKI-CKD induced by ischemia–reperfusion (IR), unilateral ureteral obstruction (UUO), or cisplatin (CP). Conditional renal tubule-specific TIMP2 knockout mice and AAV-mediated TIMP2 overexpression were employed in vivo. In vitro studies used primary tubular cells and HK-2 cells with TIMP2 knockdown or treatment with recombinant wild-type or MMP-inactive mutant TIMP2. Analyses included histology, molecular biology (Western blot, IHC, IF,

qPCR), protein interaction assays (Co-IP, molecular docking), and Wnt/β-catenin signaling assessment (luciferase reporter assays).
Results: TIMP2 expression was significantly upregulated in renal tubules across diverse AKI-CKD models. Tubule-specific TIMP2 deletion attenuated cellular senescence, maladaptive repair processes, and tubulointerstitial fibrosis following AKI. Mechanistically, TIMP2 promoted senescence and dedifferentiation independent of its MMP-inhibitory activity. We discovered that TIMP2 directly interacts with the Wnt co-receptor LRP6, enhancing LRP6 phosphorylation and activating downstream β-catenin signaling. Consequently, TIMP2 deficiency inhibited Wnt/β-catenin activation in vivo and in vitro. Conversely, TIMP2 overexpression in vivo exacerbated cellular senescence, maladaptive repair, and kidney injury in an IR model.
Conclusions: TIMP2 promotes the AKI-to-CKD transition by directly activating Wnt/β-catenin signaling through interaction with LRP6, independent of its MMP-inhibitory function. Our findings establish TIMP2 as a key mediator in kidney disease progression and identify it as a potential therapeutic target to prevent CKD following AKI.



Schematic diagram of TIMP2-mediated pathways in tubular epithelial cell injury and repair
Following AKI, there is loss of tubule epithelial cells by cell death followed by adaptive dedifferentiation and proliferation of the surviving cells. Once the surviving cells divide to repair the damaged epithelium, they dedifferentiate into a normal epithelium. TIMP2 interacts with the Wnt coreceptor low-density lipoprotein receptor-related protein 6 (LRP6), which enhanced LRP6 phosphorylation and mediated β-catenin activation. TIMP2 exacerbate cellular senescence and maladaptive repair through β-catenin signaling, thereby worsening kidney disease.

Topic: Acute Kidney Injury and haemofiltration

e-Posters

000009

A novel and simplified method for assessing mean systemic pressure using superior vena cava Doppler flow

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Intensive care Medicine Experimental 2025* 13(1):*000009

Introduction: Mean systemic pressure (MSP) plays a crucial role in venous return. Traditionally, MSP has been assessed using two methods: (1) via radial artery catheterization, where the pressure is measured at the nadir after a rapid occlusion of the humeral artery (MSPa), and (2) through a complex mathematical equation (MSPeq).
We propose a simpler method to estimate MSP using central venous pressure (CVP) combined with Doppler flow assessment of the superior vena cava (SVC). By analyzing SVC flow, we measured the mean pressure gradient (MPGsvc), which we assume to represent the pressure gradient between MSP and CVP.
Methods: We conducted this study in ICU patients under mechanical ventilation with shock. CVP was measured, and MSP was assessed using the two conventional methods (MSPa and MSPeq). Additionally, using a supraclavicular window, we evaluated SVC flow with color Doppler and recorded it using pulsed Doppler with a sample volume placed in the SVC near the right atrium. The mean pressure gradient (MPGsvc) of this flow was measured, allowing us to calculate MSP using the following equation:
$MSPsvc = CVP + MPGsvc$
Results: Thirteen patients were included (age: 55 ± 17 years, mean arterial pressure: 75 ± 11 mmHg).
The measured values were:
CVP: 10 ± 5 mmHg
MSPa: 17 ± 6 mmHg
MSPeq: 19 ± 5 mmHg
MSPsvc: 15 ± 5 mmHg
Correlation analyses showed:
An excellent correlation between MSPa and MSPeq ($r^2 = 0.82$, $p < 0.01$).
A good correlation between MSPa and MSPsvc ($r^2 = 0.40$, $p < 0.01$).
A strong correlation between MSPeq and MSPsvc ($r^2 = 0.63$, $p < 0.01$).
Conclusions: MSP can be accurately estimated using CVP measurement combined with the mean pressure gradient of SVC Doppler flow. This novel and simplified method may provide a practical alternative for bedside hemodynamic assessment in critically ill patients.

Topic: Cardiovascular issues in ICU

000012

ReprodICU: bridging ICU data silos for rapid, reproducible critical care research

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Intensive care Medicine Experimental 2025* 13(1)**: ***000012

Introduction: Reproducibility remains a recognized challenge in research [1]. Generating robust evidence from real-world clinical data requires both high-quality data and international collaboration. Seven open-access intensive care unit (ICU) databases—AmsterdamUMCdb [2], eICU-CRD [3], HiRID [4], MIMIC-III [5], MIMIC-IV [6], NWICU [7], and SICdb [8]—have each facilitated the development of clinical prediction models. Yet, heterogeneity in data structures, terminology, and clinical practices across sources limits generalizability. BlendedICU [9] and ricu [10] have harmonized subsets of these databases, while INDICATE [11] targets pan-European standardization. However, a fully integrated, harmonized, and internationally representative ICU database remains unavailable.
Objectives: The objective of this study was to develop a harmonized database from seven public ICU databases to support

reproducible observational research in critical care and facilitate collaboration between clinicians and researchers.

Methods: The reprodICU database was built by harmonizing 136 time series variables and 153 active drug ingredients from seven ICU databases (Fig. 2). Established clinical vocabularies—SNOMED [12], LOINC [13], RxNorm [14], and OMOP [15]—were used for standardization aligning broadly with modules from the German Medical Informatics Initiative [16,17], ensuring architectural consistency and interoperability. Minimal preprocessing was applied to preserve source fidelity. Variables were selected to enable rapid application of complex cohort definitions, and a replication pipeline currently under development supports reproducible study designs.

Results: The reprodICU database encompasses 469,822 ICU admissions from 2001 to 2022, spanning four countries across Europe and the United States. Substantial variation was observed in data collection practices, drug exposures, and outcomes. ICU mortality ranged from 3.6% (SICdb) to 22.7% (NWICU). Additional heterogeneity was identified in unit types, admission categories, and case mix.

Time series granularity varied considerably: mean vital sign measurement rates ranged from 26.1 (NWICU) to 2093.9 (HiRID) per day, while mean lab value availability ranged from 14.7% (eICU-CRD) to 98.8% (AmsterdamUMCdb).

Our pipeline replicated the cohort from Lam et al. [18] in under 5 min on a standard workstation, demonstrating rapid external validation potential.

Conclusions: The reprodICU database provides an open, harmonized, international resource to enhance reproducibility and generalizability in critical care research. Leveraging established standards, the framework preserves source-level fidelity while supporting rapid replication of study designs.

While heterogeneity across databases highlights the importance of external validation, potential biases introduced by the harmonization process warrant further investigation.

Code, accompanying tools, and documentation are publicly available [19], offering a foundation for future robust, reproducible research in critical care.

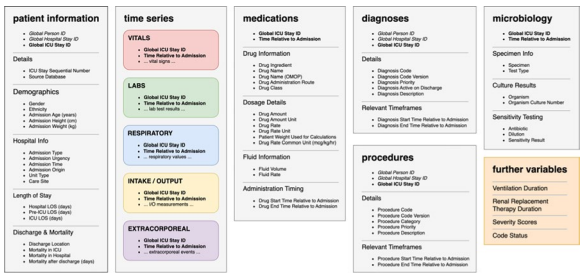


Fig. 1 (abstract 000012) Database overview showing the contents of the harmonized reprodICU dataset

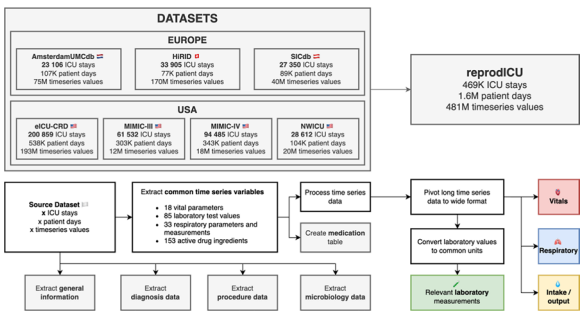


Fig. 2 (abstract 000012) Database creation pipeline overview showing the transformation flow from raw source databases to the harmonized reprodICU database

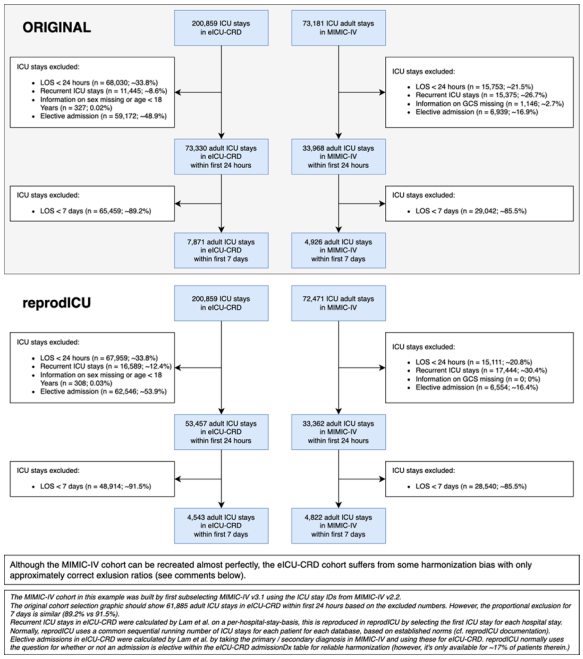


Fig. 3 (abstract 000012) Study replication overview demonstrating the framework's ability to efficiently reproduce complex patient selection criteria across multiple databases. (Cohort selection from Lam et al. [18])

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Topic: Information systems and Data Science

000014

Evaluation of Toraymyxin® in postoperative septic shock: a prospective study on endotoxin removal and clinical outcomes in elderly patients

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Intensive care Medicine Experimental 2025* 13(1)**: ***000014

Introduction: Septic shock, a life-threatening condition characterized by systemic inflammation and multi-organ dysfunction, remains a significant challenge in postoperative patients, particularly in the elderly. The management of septic shock requires timely intervention and effective antimicrobial treatment. Toraymyxin®, a polymyxin B-based hemoperfusion therapy, has emerged as a promising therapeutic option for the removal of endotoxins in sepsis, potentially improving outcomes in critically ill patients. This study aims to evaluate the effectiveness of Toraymyxin® in 12 postoperative patients aged 58 to 78 years old diagnosed with septic shock.
Objectives: The primary objective of this study was to assess the safety and efficacy of Toraymyxin® in reducing endotoxin levels and improving clinical outcomes in postoperative patients with septic shock. Secondary objectives included evaluating the impact of Toraymyxin® on vital signs, organ function, and overall survival rates.
Methods: This prospective observational study included 12 postoperative patients (aged 58–78 years) diagnosed with septic shock, who received Toraymyxin® treatment as part of their standard care. Inclusion criteria were patients experiencing septic shock after surgery, with endotoxin levels above 0.6 EU/mL and failure to respond to conventional antibiotic therapy. Toraymyxin® was administered via hemoperfusion for 2 to 4 h. Clinical data, including vital signs (blood pressure, heart rate, respiratory rate), organ function (renal, hepatic, cardiovascular), and endotoxin levels, were recorded before, during, and after treatment. The primary endpoint was the reduction in endotoxin levels, and secondary endpoints included improvement in hemodynamic stability, organ function, and 30-day mortality.
Results: Of the 12 patients, 10 experienced a significant reduction in endotoxin levels within 24 h of Toraymyxin® treatment. The mean endotoxin reduction was 75% ($p < 0.05$). Clinically, 9 patients showed marked improvement in hemodynamic parameters, including a significant increase in mean arterial pressure and a reduction in lactate levels. Organ function, particularly renal and hepatic, improved in 8 patients, with a 50% reduction in renal replacement therapy requirements post-treatment. The overall 30-day survival rate was 83%, with 10 patients surviving and 2 experiencing fatal outcomes due to multi-organ failure despite treatment. Adverse events associated with Toraymyxin® were minimal, with no major complications reported during or after therapy.
Conclusions: Toraymyxin® appears to be a promising adjunctive therapy for the management of septic shock in postoperative patients, demonstrating significant reductions in endotoxin levels and improvements in clinical outcomes, including hemodynamic stability and organ function. The treatment was well-tolerated, with a favorable safety profile. Further large-scale randomized controlled trials are warranted to confirm these findings and establish more comprehensive guidelines for its use in septic shock.

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2. We would like to express our sincere gratitude to Dr. Dario Galante for his remarkable guidance and tireless contribution to the growth and professional development of anesthesiologists and resident

Topic: Sepsis

000015

Intubated patients with chronic obstructive pulmonary disease with and without ventilator-associated pneumonia: why early prediction of risk factors are important for patient outcomes?

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Introduction: Chronic obstructive pulmonary disease (COPD) is a major risk factor for the development of nosocomial lower respiratory tract infections, as the patient's immune system may be weakened by prolonged corticosteroid use and reduced microbial clearance. During the natural course of the disease, exacerbations and infections are common in patients with COPD, the management of which requires assisted ventilation and hospitalization. Patients requiring prolonged duration of mechanical ventilation in the intensive care unit (ICU) have a particular risk of developing ventilator-associated pneumonia (VAP). Since both COPD and VAP adversely affect lung function, a combination of both disorders may have serious impact on patient outcomes
Objectives: The purpose of the present study was to evaluate the influence of VAP to the patient outcomes in intubated patients with COPD and early prediction of risk factors and their modification for improving patient outcomes.
Methods: Our study was retrospective and we have conducted the electronic based medical history data of 159 patients with COPD who have been intubated due to failure of non-invasive mechanical ventilation and severe hypercapnic respiratory failure, at the department of pulmonary and critical care medicine of university hospital from January 2016 to December 2024.
Results: In 57 of 159 (35.8%) patients have developed VAP after 48 h of mechanical ventilation. The results of our retrospective analysis indicated that the presence of VAP significantly increased the mortality of patients with COPD (risk ratio[RR]:2.14,95%CI:1.11-2.98;$p = 0.003$). The duration of intensive care unit (ICU) stay was significantly longer in patients with COPD and VAP as compared with that of patients with COPD without VAP (mean difference MD:3.46,95%CI:0.69-7.24,$p = 0.01$). Our study also indicated that the presence of VAP in patients with COPD significantly increased the duration of

mechanical ventilation (MD:7.24, 95%CI:2.46-13.65,p < 0.001). Independent risk factors for mortality in patients were: presence of septic shock at ICU admission (3.49[0.84-7.54];p < 0.001); higher SOFA score > _8(2.82[0.81-5.40]; p < 0.004); the presence of acute respiratory distress syndrome (ARDS) (3.14[1.14-5.47];p < 0.001); and VAP due to MDR Acinetobacter baumannii bacteria (2.02[0.89-4.14];p < 0.01).
Risk factors associated with development of VAP in intubated COPD patients were: kidney failure (2.48[0.91-4.88]'p < 0.004); use of steroids prior to intubation (2.86[0.85-5.16]; p < 0.002); use of antibiotics prior to intubation (3.41[1.25-7.21]; p < 0.001); presence of shock before admission to ICU department (4.25[1.12-7.56]; p < 0.001); PaO2/FiO2 ratio < 250 at the time admission to ICU department (2.76[0.84-5.16]; p < 0.003);previous history of lung tuberculosis (2.08[0.77-3.88]; p < 0.01); and concomitant to COPD bronchiectasis (2.17[0.81-4.16]; p < 0.007).
Conclusions: Our study indicated that the development of VAP in COPD patients is associated with significantly increased patient mortality, duration of mechanical ventilation and the duration of ICU stay. Several independent risk factors may predict mortality in these patients. Early identification of such risk factors predicting development of VAP in COPD patients and evaluation of independent risk factors for morality may be useful in term on the possibility their modification and improving of patient outcomes.

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Topic: Acute respiratory failure and mechanical ventilation

000016

Incidence of nasogastric tube related pressure injury in ICU and internal ward

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Introduction: Incidence of medical device-related pressure injuries (MDR-PI) related to nasogastric tubes (NGT) is under-investigated. This is particularly significant in Intensive Care Units (ICUs) and internal wards because those patients are highly susceptible to MDR-PI development.
Objectives: To conduct ongoing monitoring of patients with NGT in ICU and internal ward to ascertain the incidence of NGT MDR-PI in both settings.
Methods: Prospective cohort study. Inclusion criteria: adult ICU/internal ward patients with NGT inserted during ICU/internal ward stay or shortly before the admission. Exclusions: patients with facial injuries/wounds/ulcers. Research team conducted daily monitoring for the NGT-MDR-PI. Upon PI detection, its location and stage documented.
Results: Data collection conducted from July 2022 to July 2024 in an 18-bed general ICU and a 30-bed internal ward of a large medical center resulted in the recruitment of 136 patients (88 from the ICU and 48 from the internal ward). The incidence of NGT-MDR-PI was 4.5% (4/88) in the ICU and 27% (13/48) in the internal ward. No correlation was found between the development of NGT-MDR-PI and factors such as albumin levels at admission, patient age, gender, or the number of follow-up days (total of 1288). The regression model (p < 0.0001) revealed statistically significant associations with the hospitalization site (ICU vs. internal ward, p < 0.001) and Charlson comorbidity score at admission (p = 0.022). The model explained 19.3% (R^2 = 0.193) of the variance in NGT-MDR-PI development.
Conclusions: To the best of our knowledge, this is the first prospective long-term study dedicated solely to the incidence of NGT-MDR-PI in both the ICU and internal ward. The incidence of NGT-MDR-PI is lower in the ICU compared to the internal ward. This may be due to several factors: more intensive nursing care in the ICU, and a higher Charlson comorbidity score in the internal ward, which indicates that more chronically ill patients are hospitalized there rather than in the general ICU. Another possible explanation is the different types of fixation used: simple plaster in the ICU and special plaster for NGT fixation in the internal ward. Further research is needed to clarify these findings.

Topic: Nursing care and physiotherapy

000017

Critical care organization of an eight-bed intensive care unit: enhancing patient outcomes through individualized rooms and infection prevention

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Introduction: Intensive Care Units (ICUs) are pivotal in the management of critically ill patients, and their design plays a crucial role in optimizing patient outcomes. Traditionally, ICUs consist of multiple beds within a shared space, which can contribute to the risk of cross-contamination and hospital-acquired infections (HAIs). Recent trends emphasize the need for innovative ICU designs that prioritize both patient care and infection control. Our ICU, consisting of eight beds, is uniquely organized with individual rooms for each patient. This configuration aims to reduce the transmission of infections, enhance privacy, and improve overall clinical care. This study explores the impact of this design on patient outcomes, infection rates, and staff efficiency.
Objectives: This study aims to:

- Evaluate the effect of individual patient rooms on the incidence of hospital-acquired infections.
- Assess patient outcomes, including length of stay, mortality rates, and recovery times, in comparison to traditional open ICUs.
- Investigate staff satisfaction and workflow efficiency in a critical care unit with a design that offers greater patient separation.

Methods: A retrospective cohort study was conducted in our eight-bed ICU, which is designed with separate individual rooms, each equipped with specialized monitoring and ventilation systems. Data on infection rates (both HAI and ventilator-associated pneumonia), patient outcomes (mortality rates, length of stay, discharge status), and staff workflow were collected over a 12-month period. Comparisons were made with data from two traditional open ICUs within the same hospital network, with similar patient demographics and severity of illness. Statistical analysis was performed to determine the significance of observed differences using Chi-square tests for categorical variables and t-tests for continuous variables.
Results: Preliminary results indicate a significant reduction in the incidence of hospital-acquired infections in the single-room ICU compared to the traditional open-ward design (p < 0.05). Specifically, the rates of ventilator-associated pneumonia and central-line-associated bloodstream infections were lower by 30% in the individual-room ICU. Mortality rates, while not significantly different, showed a trend toward improved outcomes in the individual room cohort, with a slightly lower average length of stay (2.5 days fewer). Staff surveys indicated increased satisfaction with the workflow, citing improved privacy for patients and better management of clinical tasks.

Conclusions: The design of an ICU with individual rooms offers significant advantages in terms of infection prevention and control, supporting a safer environment for critically ill patients. While patient outcomes, including mortality and length of stay, did not show drastic differences, the reduction in infection rates was substantial. Staff satisfaction was also notably higher, suggesting that the organizational structure of the ICU contributes to a more efficient and effective care environment. Future studies should explore long-term clinical outcomes and the financial implications of such ICU designs.

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2. We would like to thank Dr. Dario Galante for his dedication to anesthesiologists and residents and his support in this study and research.

Topic: Health Services Research and Outcome

000018

The use of dexmedetomidine in the intensive care unit: efficacy, safety, and strategies to mitigate hypotension and bradycardia

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Introduction: Sedation in the Intensive Care Unit (ICU) is essential for patient comfort, compliance with mechanical ventilation, and overall management of critical conditions. Dexmedetomidine, a selective alpha-2 adrenergic agonist, has emerged as a preferred sedative due to its unique pharmacological profile, offering sedation without respiratory depression. Despite its benefits, the drug is associated with adverse effects such as hypotension and bradycardia, which can complicate patient management, particularly in critically ill populations. Understanding how to balance these benefits and risks is crucial for its optimal use in the ICU.
Objectives: This study aims to evaluate the efficacy of dexmedetomidine compared to other sedative agents in the ICU, focusing on its impact on sedation quality, duration of sedation, and the management of undesirable side effects, particularly hypotension and bradycardia. Additionally, we seek to identify strategies for mitigating these adverse effects during dexmedetomidine administration.
Methods: A retrospective cohort study was conducted in a mixed ICU setting, reviewing patient data from January 2023 to December 2024. Patients were stratified based on the sedative agent used: dexmedetomidine, propofol, or benzodiazepines. Primary outcomes included the incidence of hypotension and bradycardia, as well as the duration of mechanical ventilation and the need for vasopressor support. Secondary outcomes included sedation depth (measured by Richmond Agitation-Sedation Scale scores), duration of ICU stay, and the occurrence of any other adverse effects. Data were analyzed using multivariate regression to adjust for potential confounders.
Results: Among the 162 patients analyzed, dexmedetomidine was associated with a significantly higher incidence of bradycardia (25%) and hypotension (19%) compared to propofol (bradycardia 10%, hypotension 12%) and benzodiazepines (bradycardia 8%, hypotension 10%). However, when managed with careful titration and the use of vasopressors in the event of hypotension, these adverse effects were largely mitigated, with no significant differences in the duration of mechanical ventilation or ICU stay between groups. The sedation quality, as measured by Richmond Agitation-Sedation Scale, was comparable across all agents, but patients receiving dexmedetomidine showed a shorter median time to extubation and a lower incidence of delirium.
Conclusions: Dexmedetomidine provides effective sedation in the ICU with a favorable impact on delirium and extubation time. However, it is associated with an increased risk of hypotension and bradycardia compared to other sedative agents. These side effects can be managed with careful titration, close monitoring, and the strategic use of vasopressors. Clinicians should be aware of these risks when choosing dexmedetomidine for sedation in critically ill patients and should have protocols in place to address these potential complications.

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2. We would like to thank Dr. Dario Galante for his commendable support to anesthesiologists and residents.

Topic: Sedation, analgesia and delirium

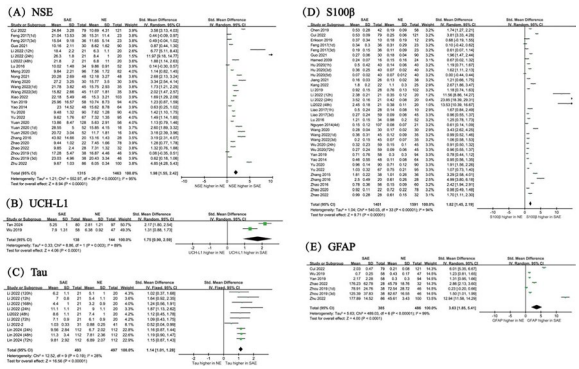
000020

Decoding neurogenic biomarkers for the differentiation between septic patients with or without encephalopathy: an updated meta-analysis

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Introduction: Sepsis-associated encephalopathy (SAE) is characterized by brain dysfunction in the context of sepsis and frequently leads to significant cognitive and neurological impairments, as well as an elevated risk of mortality. Accurate diagnosis of SAE is crucial for the timely initiation of optimal treatment and appropriate patient management. Neurogenic biomarkers hold promise as reliable serum diagnostic tools for the detection and longitudinal monitoring of SAE. This meta-analysis seeks to evaluate the diagnostic and prognostic utility of serum neurogenic biomarkers in patients with SAE.
Methods: The study protocol was registered in the PROSPERO database (CRD42023408312) and conformed to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A meta-analysis was conducted to comprehensively and critically evaluate the existing body of evidence regarding the use of serum neurogenic biomarkers: neuron-specific enolase (NSE), ubiquitin C-terminal hydrolase-L1 (UCH-L1), Tau, S100 calcium binding protein β (S100β), and glial fibrillary acidic protein (GFAP) for the diagnosis and risk assessment of fatality in SAE. We conducted a systematic search of electronic bibliographic databases, including PubMed, Web of Science, Embase, Cochrane databases, CNKI, CQVIP, and WFSD. The quality and risk of bias of the selected studies were assessed using the QUADAS-2 tool. For biomarkers reported in two or more studies, pooled standardized mean differences and 95% confidence intervals were calculated. Heterogeneity among the included studies was examined using the I^2 statistic and random-effects model was applied owing to large heterogeneity.
Results: Forty-two studies were included in our meta-analysis. As showcased in Figure, the levels of serum neurogenic biomarkers were significantly higher in patients with SAE as compared to septic patients with no-encephalopathy (NE): NSE [standardized mean difference (SMD) 1.98 (95% CI 1.55–2.42), $P < 0.00001$]; UCH-L1 [SMD 1.75 (95% CI 0.90–2.59), $P < 0.0001$]; Tau [SMD 1.14 (95% CI 1.01–1.28), $P < 0.00001$]; S100β [SMD 1.82 (95% CI 1.45–2.19), $P < 0.00001$] and GFAP [SMD 3.63 (95% CI 1.85–5.41), $P < 0.0001$]. In addition, the

significantly lower serum neurogenic biomarkers levels were noted in septic patients with survivors as compared to non-survivors (Figure not shown): NSE [SMD -1.87 (95% CI -2.43– -1.32), $P < 0.00001$]; UCH-L1 [SMD -1. 71 (95% CI -2.24– -1.19), $P < 0.00001$]; Tau [SMD -0.57 (95% CI -0.79– -0.35), $P < 0.00001$]; S100β [SMD -1.34 (95% CI -1.88– -0.80), $P < 0.00001$]. However, no significant differences in serum GFAP levels [SMD -7.98 (95% CI -22.23–6.27), P = 0.27] were found between the surviving and non-surviving groups.
Conclusions: The increased serum neurogenic biomarkers may be predictive of SAE and mortality for septic patients, which are expected to be applied as a reliable blood-based diagnostic tool for detection and longitudinal monitoring in SAE patients. However, results should be interpreted with caution due to the high heterogeneity among studies.



Forest plot evaluating the association between serum neurogenic biomarkers levels and SAE (A: NSE; B: UCH-L1; C: Tau; D: S100β; E: GFAP).

Reference
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Topic: Sepsis

000022
Creating a prediction model for invasive candidiasis in the intensive care unit using a case control design: a European multicentre approach
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Introduction: Invasive candidiasis (IC) has a high attributable morbidity and mortality in patients in the intensive care unit (ICU). Current diagnostic tools lack sensitivity, introduce delay or have not been validated for regular use. As early treatment has proven vital for survival, multiple prediction models have been proposed, but have not been validated for multinational implementation. In this study we propose to find factors predisposing the ICU patient to develop IC. We hope to develop an alternative prediction model using a large international dataset.
Methods: Using ICU-acquired IC as primary endpoint we retrieved retrospective information about 285 cases and 285 matched controls from the EUCANDICU database. Data about comorbidities, severity of illness and known risk factors for IC were available. We identified 31 independent risk factors using univariate analysis. A random subset of 80% of the observations were used to find the optimal prediction model. The selection of predictors was done using the LASSO technique, using λ = 1SE as regularization parameter. This choice for λ implies that a small amount of precision of the prediction is sacrificed to improve the external validity. The remaining 20% of cases were used to assess the predictive performance of the model.
Results: Among other factors SAPS II score, SOFA score, past infection, renal impairment and the presence of multiple *Candida* colonization sites were all independently associated with an increased risk of developing IC. We incorporated 22 of 31 variables in a LASSO regression analysis which showed an AUROC of 0.7433.
Conclusions: Predicting which ICU patient will develop invasive candidiasis remains challenging, despite using an alternative methodology in a large multinational database. The performance of this prediction model is not good enough to be used in clinical practice. Therefore, early diagnosis with subsequent early treatment is still a clinical case-by-case decision and of utmost importance.

Topic: Infections and prevention

000023
Comparative analysis between patients with medical sepsis and surgical sepsis
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Introduction: According to some authors, sepsis in surgical patients is different from those in non-surgical patients because of the immune function modulation that occurs as a result of surgery and anesthesia applied. We consider important to characterize surgical sepsis in order to have a better undertanding.
Objectives: To know differential characteristics between medical sepsis and surgical sepsis.
Methods: Retrospective study of patients with sepsis admitted to the ICU from May 2021 to April 2024. Sepsis was defined according to the Sepsis-3 definitions. Variables collected included age, sex, comorbidities, number of organ failures, pathogens isolated, anatomic focus of infection, the use of adjunctive therapies such as mechanical ventilation and renal replacement techniques, patients´ severity at admission as APACHE II score and SOFA score. Continuous variables are expressed as means and standard deviations and categorical variables as percentages. The Mann–Whitney U test was used to compare quantitative variables and Chi-square test for categorical variables.
Results: During the study period, 182 patients were admitted to the ICU with sepsis, 67,7% (122 patients) were medical sepsis. The mean age of patients with surgical sepsis was higher than patients with medical sepsis [79,9 years (SD 10,6) vs 68 years (SD 11,6), p = 0,007]. 66,6% were male. 62,5% were medical sepsis in male sex and 75,8% in female sex; p = 0,032. Atrial fibrillation (25%) and hypertension (65%) were more common in surgical sepsis. The most common site of infection causing medical sepsis was the genitourinary (36,9%) while the intraabdominal (85%) was more frequent in surgical sepsis; p < 0,001. Respiratory dysfunction was predominant in both of them, especially in medical sepsis (37,7% vs 29,1%; p < 0,001). Gram-negative were the pathogens more frequent in medical sepsis and negative culture in surgical sepsis (46,7%); p < 0,001. In most cases the antibiotic was appropriate in medical sepsis (71,3% vs 53,3% in surgical sepsis; p = 0,01. Bacteremia was predominant in medical sepsis (42,6% vs 13,3%; p < 0,001). Septic shock was more frequent in surgical sepsis (83,3% vs 64,8%; p = 0,01). The proportion of patients receiving mechanical ventilation was higher in surgical sepsis (81,7% vs 36,9%; p < 0,001) as well as renal replacement therapy (23,3% vs 9%; p = 0,01). The mortality in the ICU was higher in surgical sepsis (33,3% vs 14,8%; p = 0,004)
Conclusions: Our analysis shows that surgical sepsis occur in older people and patients have more comorbidities. The main focus of infection in surgical sepsis is the intraabdominal. Although APACHE II and

SOFA score at admission did not differ between groups, patients with surgical sepsis had septic shock more frequent, and they also required invasive mechanical ventilation and renal therapy more often than patients with medical sepsis. Finally, the mortality was higher in surgical sepsis.

Topic: Sepsis

000024

ICU admission characteristics and mortality among elderly and very elderly patients

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Introduction: There is a growing population of older adults requiring admission to the ICU. In addition, their remaining life expectancy is often limited. So, elderly patients have less to gain from ICU treatment thann young patients. It is therefore important to carefully consider the proportionality of ICU treatment. On the other hand, the effect of advanced age on the short survival of older patients remains unclear.
Objectives: To analyze the characteristics of elderly patients admitted to the ICU.
Methods: A retrospective study was carried out from January 2022 to May 2024. Patients were divided into two groups: 75-80 years and > 80 years. Variables collected included age, sex, reason for ICU admission, severity at ICU admission, therapeutic procedures, in addition to the limitations of care.
Results: During the study period, 274 patients were admitted to the ICU (65,3% male and 34,7% female). 55,8% were 75-80 years and 44,2% were above 80 years. The most common indications for ICU admission were: 20,4% sepsis, 10,6% polytraumatism, 7,3% cardiac disorders and 61,7% others. Vasopressors were used in 43,4%, mechanical ventilation in 42%, dialysis machine in 7,3% and 4,4% tracheostomy. APACHE II at admission was 19,5 (SD 7,9). The length of ICU stay was 5,1 days (SD 8,7) and the hospital stay was 16,7 days (SD 19,4). Treatment limitations were performed in 21,2% of cases. The mortality in the ICU was 20,4% and the hospital mortality was 6,9%. When patients were divided into 75-80 years and over 80 years, there was no difference in sex between the two groups. Male sex was predominant in both of them. Neither the reason for admission nor the use of vasopressors, mechanical ventilation or renal therapy differed between groups. Nevertheless, the proportion of patients who received tracheostomy was significantly lower in patients over 80 years (1,7% vs 6,5%; p = 0,05). There was no difference in ICU-mortality, but the hospital mortality was higher in patients over 80 years (11,6% vs 3,3%; p = 0,007).
Conclusions: Elderly patients are admitted to ICU in most cases for sepsis. Patients are mainly male. Taking into account the age, there was a higher conservative management in the very old patients. Some interventions such as tracheostomy was less common in patients above 80 years. All in all, older adults might benefit from life-sustaining treatment. Patients older than 75 should be regarded as a risk factor for mortality.

Topic: Ethics and end of life care

000026

Shortening antibiotic therapy duration for hospital-acquired bloodstream infections in critically ill patients: a causal inference model from the international EUROBACT-2 database

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Intensive care Medicine Experimental 2025* 13(1):*000026

Introduction: Hospital-acquired bloodstream infections (HA-BSIs) are severe and require antibiotic therapy. While adequate early antibiotic therapy improves outcomes, unnecessary antibiotic use is frequent and exposes to complications.
Several studies and meta-analyses showed that in non-complicated BSIs in hemodynamically stable patients, shortened therapy reduces side effects without compromising efficacy. Recently, a large international randomized controlled trial (RCT) showed the safety of a short treatment in BSIs, however, ICU patients represented only a half of the studied population and difficult-to-treat (DTR) microorganisms were poorly represented. Therefore, the impact of shortened antibiotic therapy in HA-BSI critically ill patients without indication of prolonged therapy requires further evaluation.
Objectives: We conducted this study including a population with higher severity of illness to investigate the impact of the antibiotic therapy duration on treatment failure in ICU patients with HA-BSI.
Methods: Using the international prospective EUROBACT-2 cohort, we compared shortened (7–10 days) versus long (14–21 days) treatment durations in ICU patients eligible for shortened therapy. Patients without antibiotic therapy within 3 days after HA-BSI occurrence or requiring prolonged therapy (due to infection source, microorganism, or clinical deterioration) were excluded.
Treatment failure, defined as death, persistent infection, or subsequent infectious complications by Day 28, was assessed using an inverse-probability of treatment weighted (IPTW) logistic regression. We performed a sensitivity analysis with a PS-matched population, several explanatory subgroup analyses (according to immune status, microorganisms (*Staphylococcus aureus* vs. other microorganisms), antimicrobial resistance (DTR); source of infection (catheter vs. others); delta SOFA score between days 1 and 7), and lastly, an a posteriori analysis on subgroups of hemodynamically stable and unstable patients.
To minimize center effect bias, we excluded centers that only used long antibiotic courses, as the large number of countries and centers made mixed effects analysis not statistically valid.
Results: Among 2600 patients, 550 were eligible for shortened treatment and with a reliable treatment's duration calculation. Among them, 213 received short, and 337 received long treatment (Fig. 1). The most common infection source was intravascular catheters (n = 180, 33%), most common microorganisms were *Enterobacterales* (n = 212, 39%).
Patients with long treatment were more frequently infected with *Staphylococcus aureus* (11% vs. 5.6%, p = 0.025) or difficult-to-treat microorganisms (23% vs. 7%, p < 0.001), and received more commonly combination therapy (46% vs. 30%, p < 0.001).
Short treatment reduced 28-day treatment failure (OR 0.64, 95% CI 0.44–0.93, p = 0.019), mainly due to reduction in subsequent infectious complications (OR 0.58, 95% CI 0.37–0.91, p = 0.018). Mortality (OR 0.92 [95% CI 0.59, 1.43], p = 0.7) and persistent infection rates (OR 0.47 [95% CI 0.17, 1.14], p = 0.12) were similar (Fig. 2).
The benefit of short therapy was more pronounced in non-immunocompromised patients (OR 0.51 [95%IC 0.33, 0.79], p = 0.003), in HA-BSIs other than SAB (OR 0.57 [95%IC 0.38, 0.85], p = 0.006), and in patients with a decreased SOFA score at day 7 (OR 0.39 [95%IC 0.23, 0.65], p < 0.001).

Conclusions: In selected critically ill patients with HA-BSI without indication of prolonged therapy, a shortened therapy (7-10 days) reduced 28-day treatment failure as compared to prolonged therapy (14-21 days) mostly due to a reduction of subsequent infectious complications.

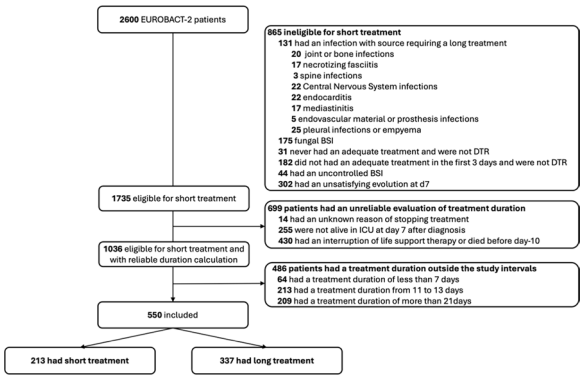


Fig. 1 (abstract 000026) Flowchart

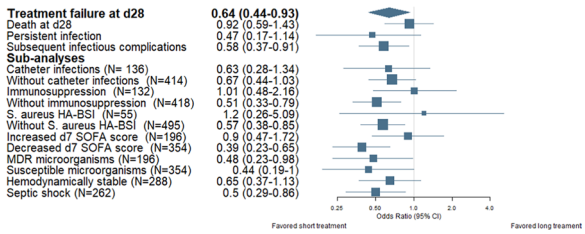


Fig. 2 (abstract 000026) Forest plot of the primary, secondary outcomes (550 patients) and sub-analyses in various subgroups according to the source of infection, the immunosuppression status, the responsible microorganism and its antimicrobial susceptibility, the SOFA score evolution at Day 7 and the initial hemodynamical status

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Topic: Infections and prevention

000027

A prospective observational study of patient handover process in post-operative care unit

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Intensive care Medicine Experimental 2025* 13(1)*:000027

Introduction: The 2011 Accreditation Council of Graduate Medical Education (ACGME) has laid the requirement of hand-off communication as a residency skill.1 In US, the Joint Commission has emphasized on the role of standardization of handover in improving quality of communication.2
Objectives: Primary objective
To assess adequacy of patient handover (PHO) by anaesthesia resident to healthcare worker (HCW) in post-anaesthesia care unit (PACU) using a pre-defined checklist including 31 parameters (7 preoperative, 15 intraoperative and 9 postoperative).
Secondary objectives
To compare the adequacy of PHO in patients belonging to ASA physical status I and II, in patients undergoing surgery under general anaesthesia to those undergoing surgery under neuraxial block and in first fifty patients with last fifty patients enrolled in the study.
Methods: After approval from IEC (IEC-INT/2023/MD-953) and written informed consent, a prospective observational study was conducted two hundred patients over a period seven months. Using computer randomization, two days of each week were randomly selected and divided into four slots of 2 h each. One patient handover was observed in each of the slots and a total of four patients were enrolled on each observation day.
In PACU, the process of PHO by anaesthesia resident to HCW was directly observed for the parameters in checklist. Documentation in anaesthesia chart and recovery room proforma was verified. If any parameter was not communicated in any form, it was considered to have been missed. To avoid bias, all anaesthesia residents and HCWs in PACU were blinded to the observation process and the content of checklist.
Results: Any parameter for which this adequacy percentage was less than 85% was considered inadequate handover. The data of adequacy of PHO (in percentage) were compared between ASA I and II patients, in patients receiving GA with those receiving neuraxial block and between the first fifty and last fifty patients was compared using Chi-square and Fisher exact test.
The preoperative parameters included patient name, age and gender (100%), underlying diagnosis (99.5%), ASA physical status (94.5%), allergies (85.7%), airway details (96%), past medical history (88.7%) and past surgical history (39.4%). The intraoperative parameters included name of procedure (99.5%), duration of surgery (78%), anaesthesia technique (99.5%), anaesthesia drugs administered (91%), airway management (96.8%), haemodynamic fluctuation (98.5%), IV fluids given (96%), blood loss (82%), blood and blood product transfusion (58.9%), IV access (99.5%), urine output (73.5%), drains/catheters in situ (91.7%), drug infusions on flow (81.6%), intraoperative events (98.9%), any blood investigations done (100%). The postoperative parameters included monitoring required (99.5%), oxygenation (99.5%), IV fluids (99%), drug infusions (87.5%), plan of analgesia (98.5%), oral intake (100%), investigations required (63.6%) and disposition details (100%).
No statistically significant difference was found when comparing adequacy of PHO between ASA I and II patients. When comparing PHO

between patients receiving GA with those receiving neuraxial, a statistically significant difference was found for drug infusions on flow (P value 0.0067). The comparison of PHO between first fifty and last fifty patients showed statistically significant difference for handover of past surgical history (P value 0.01), duration of surgery (P value 0.04), intraoperative blood loss (P value 0.04), urine output (P value 0.03) and drains/catheters in situ (P value 0.04).
Conclusions: The adequacy of PHO observed in 200 patients undergoing elective surgery showed more than 85% adequacy in majority of parameters except past surgical history, duration of surgery, intraoperative urine output, blood loss, blood and blood product transfusion, drug infusions on flow and postoperative investigations. A significant improvement in adequacy was observed in all these parameters except blood and blood product transfusion.

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3. None.

Topic: Perioperative care

000029

Impact of oral MIDODRINE to liberate ICU patients from vasopressor infusion in septic shock: a prospective randomized controlled trial

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Intensive care Medicine Experimental 2025* 13(1)*:000029

Introduction: Septic shock remains a leading cause of morbidity and mortality in critically ill patients worldwide, with vasopressors often required to maintain adequate mean arterial pressure. However, prolonged vasopressor therapy can be associated with adverse effects including vasopressor-related complications and delayed mobilization. Midodrine, an oral alpha-1 agonist, has shown promise in reducing intravenous vasopressor requirements, potentially facilitating earlier transfer out of intensive care units (ICUs).
Objectives:

- **Primary outcome:** Time taken to de-escalate to a single low-dose vasopressor (noradrenaline ≤ 0.15 μg/kg/min).
- **Secondary outcomes:** VIS trend (recorded every 6 h), maximum VIS during ICU stay, time taken for complete vasopressor weaning, length of ICU stay, ICU mortality, and incidence of bradycardia (heart rate < 50/min). Laboratory values such as serum cortisol and thyroid function tests (T3, T4, TSH) were also recorded.

Methods: In this prospective randomized controlled trial, 102 adult patients (aged > 18 years) with septic shock requiring vasopressors were enrolled. Participants were allocated equally into two groups: midodrine (n = 51) or placebo (n = 51). The primary endpoint was the time taken to de-escalate to a single low-dose vasopressor (defined as noradrenaline ≤ 0.15 μg/kg/min). Secondary endpoints included the Vasoactive Inotropic Score (VIS) trend, maximum and mean VIS, time to complete vasopressor wean, length of ICU stay, and ICU mortality. Statistical analyses included t-tests, Mann–Whitney U tests, Chi-square/Fisher's exact tests, and Kaplan–Meier survival analysis. A p-value < 0.05 was considered statistically significant.
Results: Both groups were comparable in baseline demographics, illness severity scores (APACHE II and qSOFA), and comorbidities. The mean time to single low-dose vasopressor was 17.80 ± 7.09 h in the Midodrine group vs. 19.33 ± 9.13 h in the Placebo group (p = 0.347). No significant differences were found in maximum VIS or overall mortality rates. However, the Midodrine group had a significantly higher incidence of bradycardia episodes (33.3% vs. 17.6%) and a longer ICU stay (7.94 ± 5.59 vs. 6.08 ± 3.02 days, p = 0.039).
Conclusions: Oral midodrine did not significantly reduce the time to de-escalate to a single low-dose vasopressor in patients with septic shock. Although there was a transient reduction in VIS at one time point, the Midodrine group experienced more frequent bradycardia and longer ICU stays. Larger, multi-center trials are warranted to better delineate midodrine's role in vasopressor weaning for septic shock.

Topic: Cardiovascular issues in ICU

000030

Predictive ability of hypotension prediction index for predicting hypotension in septic shock patients in the intensive care unit

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Intensive care Medicine Experimental 2025* 13(1)*:000030

Introduction: The hypotension prediction index (HPI) is a predictive model derived from arterial pressure waveform for predicting future hypotension. The HPI provides good performance for predicting hypotension in intraoperative surgical patients, however, limited study in critically ill patients admitted in the ICU.
Objectives: To evaluate the performance of HPI for predicting hypotension as original study and modify MAP gray zone (65-75 mmHg) was included in the non-hypotensive group.
Methods: This is a prospective observation study in septic shock patients admitted in ICU. The area under the receiver-operating characteristic curve (AUC) was used to evaluate the performance of HPI. Hypotension defined as MAP < 65 mmHg for at least 1 min. Non-hypotensive events included MAP > 75 mmHg for primary outcome as original study and all MAP value (> 65 mmHg) for secondary outcome. A positive event was chosen for the sample at 5, 10 and 15-min before the hypotensive events.
Results: A total of 30 septic shock patients with 293,315 data points were included. There were 645 hypotensive events with a median of 14.5 [8-31] events per patient and the median time was 3.2 [2.5-4] mins. The receiver operating characteristic curve (ROC) of the HPI at 5, 10 and 15 min before events for predicting hypotension are shown in Fig. 1. The AUC of HPI at 5 and 10 min before hypotensive event was significantly higher than that of HPI at 15 min before the event (Table 1, p = 0.002 and p = 0.01, respectively). However, the predictive ability of HPI 5 min was not differ from HPI 10 min before hypotensive event (p = 0.05). HPI for all time points had a significant higher ability for predicting hypotension than other hemodynamic variables (MAP, SBP, CI, SVV, PPV, HR, CVP, Eadyn, dP/dtmax). However, when included MAP gray zone in the non-hypotensive events, the ability of HPI declines as Table 1 and Fig. 2 and was not differ from MAP for predicting hypotension for all time points (AUC 0.817 vs. 0.786, p = 0.28 for 5 min before event, 0.787 vs. 0.761, p = 0.4 for 10 min before event and 0.753 vs. 0.720, p = 0.31 for 15 min before event).

Table 1 (abstract 000030) The performance of the hypotension prediction index

	Time to event (min)	AUC	Sensitivity (%)	Specificity (%)	Cutoff
Primary outcome (non-hypotensive events included MAP > 75 mmHg)					
HPI	5	0.953 (0.936–0.956)	89.4	89.1	37

	Time to event (min)	AUC	Sensitivity (%)	Specificity (%)	Cutoff
	10	0.934 (0.913–0.956)	87.2	85.8	36
	15	0.919 (0.895–0.942)	85.4	84.3	35
Secondary outcome (non-hypotensive events included MAP > 65 mmHg)					
HPI	5	0.817 (0.782–0.852)	71.9	71.9	58
	10	0.787 (0.748–0.825)	70.1	70.4	56
	15	0.753 (0.713–0.794)	66.1	66.8	53

Conclusions: HPI presents excellent performance for predicting future hypotension in septic shock patients in the ICU. However, the ability of HPI decreased when all MAP values were included in non-hypotensive events. HPI algorithm needs further revisions to improve predictive ability.

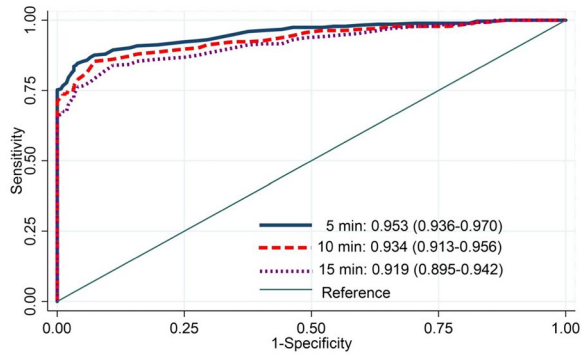


Fig. 1 (abstract 000030) The ROC of HPI for predicting hypotension in primary outcome

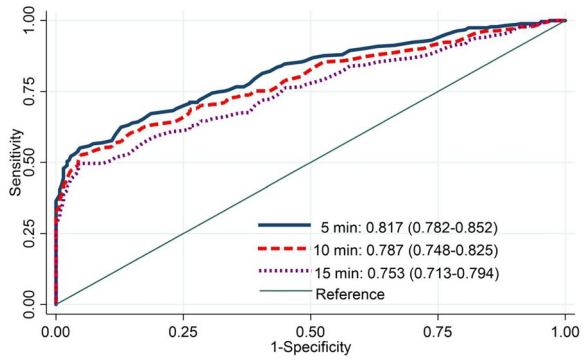


Fig. 2 (abstract 000030) The ROC of HPI for predicting hypotension in secondary outcome

Topic: Cardiovascular issues in ICU

000032

Pro-inflammatory cytokines in response to systemic inflammatory response syndrome post extra-corporeal membrane oxygenator decannulation

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Intensive care Medicine Experimental 2025* 13(1):*000032

Introduction: The use of extracorporeal membrane oxygenation (ECMO) could be associated with systemic inflammatory response syndrome (SIRS) at the time of ECMO initiation or decannulation.(1)
Objectives: There is existing evidence to state that clinical criteria of SIRS accompany decannulation. We aim at finding if the SIRS state in this scenario has a concomitant change in the pro-inflammatory cytokines' levels.
Methods: A prospective observational pre–post study in a single tertiary academic center. Thirty consecutive patients with SIRS after successful decannulation of veno-arterial (VA)-ECMO. Levels of interleukins (ILs), IL-1α, IL-1β, IL-6 and tumor necrosis factor-alpha (TNF-α) were measured at 1 h before and at 1, 12, and 24 h(s) after decannulation
Results: One hundred and ten patients who were on VA-ECMO were screened and of them, a total of 30 (27.3%) patients with post-ECMO-decannulation SIRS were recruited during the study period. The mean age of patients was 48.80 ± 10.91 years. One hour prior to VA-ECMO decannulation, the blood levels of IL-1α, IL-1β, IL-6, and TNF-α were 6.68 ± 10.99 pg/mL, 0.28 ± 0.21 pg/mL, 18.21 ± 55.76 pg/mL, and 5.62 ± 5.89 pg/mL, respectively. There were not statistical differences between the pre-cannulation blood levels of all the cytokines and their respective blood levels at 12 and 24 h post decannulation except for the 24-h post-decannulation level of TNF-α (4.15 ± 4.65 pg/mL) which showed significant reduction compared with the pre-decannulation level ($p = 0.044$).
Conclusions: In patients with SIRS at the time of ECMO decannulation, there were no significant changes in the blood levels of the pro-inflammatory cytokines pre- and post-ECMO decannulation.

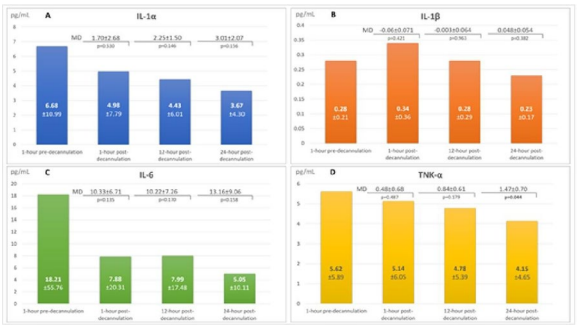


Fig. 1 (abstract 000032) Pro-inflammatory cytokines blood levels. Panel A. interleukin-1α (IL-1α); Panel B. interleukin-1β (IL-1β); Panel C. interleukin (IL-6); Panel D. tumor necrosis factor-alpha (TNF-α)

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2. Thanks to all members of the cardiothoracic surgery team, and Medical Research Center/Hamad Medial Corporation for the unlimited support throughout the work.

Topic: Cardiovascular issues in ICU

000034

Pediatric intensivist coverage and outcomes in critically ill pediatric patients: A

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Intensive care Medicine Experimental 2025* 13(1):*000034

Introduction: The impact of trained intensivist staffing on critically ill pediatric patients requiring intensive care unit (ICU) admission is not clear.
Objectives: This study aimed to examine whether trained intensivist coverage is associated with improved survival outcomes in critically ill pediatric patients.
Methods: Our analysis included all pediatric patients hospitalized in ICUs in South Korea between 2017 and 2021. The intensivist and non-intensivist groups included pediatric ICU patients in hospitals with and without trained intensivists, respectively
Results: This study included 28,047 critically ill pediatric patients. Among them, 9,909 (35.3%) were admitted to ICUs of hospitals where trained intensivists were dedicated to patient management and were subsequently assigned to the intensivist group. After propensity score matching, 16,992 critically ill pediatric patients (8,496 in each group) were included in the final analysis. The all-cause mortality rates for 90 days and one year were 6.7% (566/8,496) and 8.3% (709/8,496) in the intensivist group, and 8.6% (732/8,496) and 9.8% (835/8,496) in the non-intensivist group, respectively. In the Cox regression analysis, the intensivist group showed 24% (hazard ratio [HR]: 0.76, 95% confidence interval [CI]: 0.68–0.85; $P < 0.001$) and 17% (HR: 0.83, 95% CI: 0.75–0.92; $P < 0.001$) lower 90-day and 1-year all-cause mortality rates, respectively, than the non-intensivist group.
Conclusions: The presence of pediatric intensivists in the ICU substantially reduced the mortality of critically ill pediatric patients. Our findings highlight the significant role of pediatric intensivists in reducing long-term mortality among critically ill pediatric patients.

Table 2 (abstract 000034) Survival analyses using multivariable Cox regression

Variable	HR (95% CI)	*P*-value
90-day mortality (model 1)		
Non-intensivist group	1	
Intensivist group	0.85 (0.78, 0.93)	<0.001
90-day mortality (model 2)		
Non-intensivist group	1	
Type I Intensivist group	0.91 (0.82, 0.99)	0.044
Type II Intensivist group	0.74 (0.65, 0.85)	<0.001
1-year all-cause mortality (model 3)		
Non-intensivist group	1	
Intensivist group	0.93 (0.83, 0.98)	0.021
1-year all-cause mortality (model 4)		
Non-intensivist group	1	
Type I Intensivist group	0.92 (0.83, 0.99)	0.046
Type II Intensivist group	0.82 (0.73, 0.91)	<0.001

HR, hazard ratio; CI, confidence interval

Topic: Health Services Research and Outcome

000036

Comparison of motor subtypes of delirium in critically ill patients: a retrospective study

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Intensive care medicine experimental 2025* 13(1):*000036

Introduction: Delirium is a common problem in critically ill patients and it can increase mortality; however, the epidemiology of delirium, especially based on motor subtypes, is not fully understood.
Objectives: The aim of this study was to evaluate demographics, treatments, and outcomes for critically ill patients with an accurate diagnosis of delirium by consultation liaison psychiatry (CLP).
Methods: This single-center, retrospective cohort study was carried out from January 1, 2021, to December 31, 2022. All adult patients who were admitted to the intensive care unit (ICU) or high care unit (HCU) and who had been diagnosed with delirium by CLP were enrolled. The main outcome measure was all-cause in-hospital mortality. The subjects were assigned to either the hyperactive delirium group or the hypoactive/mixed delirium group and backgrounds, treatments, and outcomes were compared between the groups.
Results: Among 1,910 patients admitted to the ICU and HCU during the study period, 82 adult patients were included in this study. Of these, 62.2% had hyperactive delirium and 37.8% had hypoactive or mixed delirium. The diagnosis and vital signs at admission and psychotropic drugs for delirium did not differ between groups. In-hospital mortality was higher in the hypoactive/mixed delirium group than in the hyperactive delirium group (16.1% vs. 2.1%; $p = 0.027$).
Conclusions: Most patient characteristics, diagnoses, severity of vital status, and medications for delirium prescribed by CLP were similar between the two groups. However, in-hospital mortality was higher in the hypoactive/mixed delirium group than in the hyperactive delirium group.

Topic: Sedation, analgesia and delirium

000037

Prognosis prediction for post-cardiac arrest patients using images of waveforms of somatosensory evoked potential manipulated by machine learning: a single-center retrospective cohort study

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Intensive care Medicine Experimental 2025* 13(1):*000037

Introduction: Somatosensory evoked potentials (SSEP) are part of the multimodal approach for neurological prognostication after cardiac arrest (CA). Previously reported that the lack N20 wave strongly suggested poor outcome; however, there was no established evidence about the predictive ability of SSEP for favorable outcome.
Objectives: This study aimed to make several machine learning models to predict neurological outcome after CA using images of SSEP waveforms, and to validate the predictive ability of them.
Methods: This was a single center retrospective cohort study. We analyzed SSEP images which were performed for post-CA patients who admitted to our hospital from 2016 January to 2024 December. The outcome was neurological outcome judged with cerebral performance category (CPC): favorable outcome (CPC1 and 2) or poor outcome (CPC 3, 4,and 5). Firstly, we collected the raw image of SSEP, then adjusted them as the same size and resize them for easy manipulation

by machine learning. Next, we classified the images into favorable or poor group, and assigned them into train, validation and test data. Thirdly, we performed several machine learning methods (K-nearest neighbor algorithm, conventional neural network, feature extraction, principal component analysis, autoencoder, siamese network, prototypical networks and Model-agnostic Meta-learning [MAML]).
Results: We collected 173 images from 89 patients. The accuracy of each models ranges from 0.64 to 0.89. The area under the curve of receiver operating characteristic (roc-auc) of each models ranges from 0.54 to 0.83. Autoencoder (the accuracy 0.71, roc-auc 0.88), and MAML (the accuracy 0.78, roc-auc 0.83) were reliable models.
Conclusions: Using images of waveforms of SSEPs, we could make machine leaning models which showed the accuracy over 0.7 and the roc-auc over 0.8. These methods might help using the small number of images with simple lines in critical care field.

Topic: Information systems and Data Science

000038

Nutrition support and adequacy in stunted critically ill children

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Intensive care Medicine Experimental 2025* 13(1):*000038

Introduction: Nutritional support for children in the pediatric intensive care unit (PICU) is influenced by disease severity, baseline nutritional status, and invasive therapeutic interventions. In the first week of admission, a survival benefit is associated with achieving 60% enteral adequacy for calories and protein. We hypothesize that malnourished children will achieve > 60% calorie and protein adequacy compared to children with a normal nutritional status at baseline during their first week of admission to PICU.
Objectives: To evaluate nutrition support adequacy in malnourished children during their first week of admission to the PICU.
Methods: Retrospective cohort study of children admitted (index) to Texas Children's Hospital PICU between Jan 2016 to Dec 2017. Inclusion criteria included mechanical ventilation (MV) > 48 h., PICU length of stay (LOS) > 7 days, and > 2 yrs. of age. Nutritional status evaluated by CDC growth charts (Height for Age [HFA] z-scores, stunting defined as HFA z-score < -2). Nutrition support included enteral and parenteral nutrition and propofol if on TPN, and adequacy was defined as (intake/prescription × 100). All calculations used dietitians' prescriptions and actual body weight. Optimal adequacy was defined as ≥ 60%. Comparison analysis by Mann–Whitney test.
Results: Of 4199 patient admissions, 164 children (45% female) met inclusion criteria. Anthropometric evaluation on admission was an HFA z-score of -1.15 ± 1.92 [SD], with 75% normal nutritional status and 25% stunted. Patient characteristics are included in Table 1. Malnourished children vs. nourished children on day 7 had a median caloric intake (kcal/kg/day) of 37 (24-52, IQR) vs. 24 (13-40); p = 0.0032 and a protein intake (g/kg/day) of 1.56 (0.99-2.24) vs. 1.21 (0.63-2.10); p = 0.1233. Total calorie adequacy (%) in malnourished vs nourished children for days 1, 3, 5 and 7 were: 0 (0-0) vs. 0 (0-0), p = 0.48; 22 (0-77) vs. 25 (0-69), p = 0.78; 70 (28-129) vs. 76 (26-122), p = 0.99; and 105 (62-132) vs. 85 (45-118), p = 0.0362; respectively. Total protein adequacy (%) in malnourished vs nourished children for days 1, 3, 5 and 7 were: 0 (0-0) vs. 0 (0-0), p = 0.62; 21 (0-82) vs. 15 (0-75), p = 0.59; 76 (40-107) vs. 74 (20-132), p = 0.95; and 104 (66-149) vs. 81 (42-141), p = 0.12; respectively. For both groups, calorie and protein adequacy of ≥ 60% was reached on day 5.

Table 1 (abstract 000038) Patient

Characteristics	All	Nourished at baseline (n = 122)	Malnourished at baseline (n = 42)	P value
Age (years)	11.7 (7.7–15)	11.7 (7.4–15)	12.5 (8–16)	0.3472
Weight (kg)	37 (23–55)	39 (25–62)	30.6 (21–41)*	0.0004
PIM2 ROM (%)	3.7 (2.8–6.3)	3.7 (2.8–6.3)	3.8 (2.8–6.3)	0.8329
PSOFA score day 1	7.5 (5–10)	8 (5–10)	6.5 (4–9)	0.0635
PSOFA score day 3	7 (5–9)	7 (5–10)	6 (5–8)*	0.0126
MV (days)	9.3 (6.5–16)	9.3 (6.5–16)	9.4 (6.5–21)	0.6363
PICU LOS (days)	12 (9–20)	12 (9–18)	12 (10–28)	0.3163
Hospital LOS (days)	30 (19–53)	30 (19–51)	29 (20–58)	0.6283
Chronic condition n (%)	109 (66.4)	70 (64.2)	39 (35.8)**	< 0.0001
Mortality n (%)	20 (12.2)	16 (80)	4 (20)	0.5396

Values are median (IQR 25th–75th). PIM 2 ROM: Pediatric Index of Mortality, Risk of Mortality; PSOFA: Pediatric Sequential Organ Dysfunction; MV: mechanical ventilation; LOS: length of stay. * Comparison analysis by Mann–Whitney and ** Chi-square tests.

Conclusions: In this cohort of critically ill children, 1 out of 4 were stunted, and malnourished children had lower organ dysfunction scores on day 3. Optimal nutrition delivery was reached on day 5, and malnourished children reached higher caloric intake and adequacies than nourished children on day 7. Nutrition support teams should enact prompt nutritional support to stunted critically ill children.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000039

Anterior intercostal vs subxiphoid approach to pericardial effusion in an intensive care unit in a regional hospital

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Intensive care Medicine Experimental 2025* 13(1):*000039

Introduction: The approach to pericardial effusion in Intensive Care Medicine has always been controversial. Traditionally, this procedure has been reserved for other specialties. The often urgent need for pericardial drain placement and the lack of 24-h availability of some specialists (mainly in lower-level hospitals) can pose a problem that cannot always be resolved quickly and effectively. Furthermore, the traditional subxiphoid approach, in our opinion, does not always offer guarantees of success or safety for various reasons: obesity or morphological abnormalities, abdominal pathology (ascites, hepatomegaly), loss or lack of complete vision of the procedure. We propose a different approach, performed by the intensivist (a specialist available 24 h a day) at the bedside, under ultrasound guidance and with direct vision throughout the procedure.
Objectives: To analyze the management, approach and safety of the pericardial drainage technique performed (in cases eligible for drainage) in patients admitted to the ICU of a regional hospital with a diagnosis of pericardial effusion over a period of 6 years. Comparison between the classic subxiphoid approach vs. the anterior ultrasound-guided puncture under direct vision.
Methods: Retrospective, single-center observational study. The data have been obtained from the database of the Intensive Care Medicine service of the Hospital General de Granollers over a period of 6 years (2018-2024). All patients diagnosed with pericardial effusion, drained or not, are included.
Results: Final cohort: 50 patients. Mean age 63 years, 58% men. GMA (adjusted morbidity group) average of 4 (range 0 to 5). Apache average income of 14. The causes of effusion include paraneoplastic (32%), pericarditis (16%), autoimmune pathology (14%), congestive heart failure (CHF) (8%), idiopathic (18%) and others (12%). In terms of severity: 11% non-severe, 14% pre-tamponade (RV collapse, without hypotension), 64% cardiac tamponade. Drainage was indicated in 80% of cases, being successful in 95% of these.
Regarding the approach, it was anterior ultrasound-guided in 62.5% and subxiphoid in 37.5%. Of those performed via anterior ultrasound-guided route, 100% were successful. With the subxiphoid approach, the drain was not correctly placed in 14.3% of cases.
The rate of complications associated with drain placement was 7.5%. A 100% in cases with subxiphoid approach. The observed complications were: right ventricular puncture, wall hematoma and malposition of the drain. None of the cases was death as a consequence of the placement of the drainage.
Conclusions: The ultrasound-guided anterior approach is highly effective and safe. No complications of any kind were observed with the anterior approach during the data collection period. Greater drainage failure and a greater number of complications were observed in cases where a subxiphoid puncture was performed. The ultrasound-guided anterior approach allows drainage in the region with the greatest volume of effusion, under direct vision during all the procedure. It is a technique that requires training, but provides autonomy to the intensive care physician.

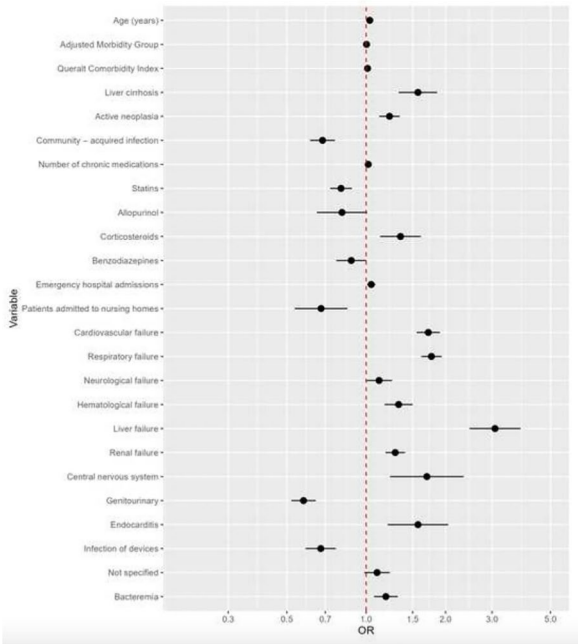
Topic: Cardiovascular issues in ICU

000040

Influence of comorbidities and chronic medications on ICU mortality in sepsis: A population-based cohort study of 12,095 patients

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Introduction: Sepsis patients are becoming progressively older and frailer, and often require chronic medication. Comorbidities and long-term pharmacological treatments may influence survival outcomes in sepsis. This study aimed to assess the impact of baseline health status and chronic medication on sepsis-related mortality.
Objectives: The aim of this to study the relationship between pre-existing comorbidities, chronic medication use, and sepsis-related mortality in critically ill patients.
Methods: Retrospective population-based cohort study of ICU patients diagnosed with sepsis. The influence of baseline health status, measured using the adjusted morbidity group (GMA) score and the Queralt index, along with the effect of chronic pre-admission medication on post-sepsis survival was analysed.
Results: A total of 12,095 ICU-admitted patients with a diagnosis of sepsis were identified in the Catalan population database for 2018-2019. The cohort had a mean age of 68.2 years; high comorbidity burden (Queralt index: 52.9; GMA: 33.2), high dependency on health services; and elevated baseline health expenditures. In 73.5% of cases infection was present at admission. The overall mortality rate was 36.4%. Non-survivors exhibited higher comorbidity levels and greater medication use, particularly of statins, antiplatelet agents, beta-blockers, benzodiazepines, but lower use of corticosteroids, non-steroidal anti-inflammatory drugs and sulphonylureas. In multivariate analysis, prior statin use was the only pharmacological factor associated with reduced mortality (OR 0.803, 0.731, 0.883).
Conclusions: This population-based study highlights the significant role of age, comorbidities, and chronic medication in sepsis survival. Statin use was associated with reduced mortality, whereas corticosteroid use correlated with worse outcomes. The GMA score and Queralt index may enhance predictive models, improving resource allocation and clinical decision-making in hospitals.



Multivariate analysis of patients discharged from hospitals with a diagnosis of sepsis, showing risk factors, origin of infection, comorbidities, chronic medication and organ failure at admission. OR: odds ratio.

Table 1 (abstract 000040) Multivariate analysis of mortality risk factors for patients included in the study

Variable	beta	OR	CI_{95}
Age	0,031	1,032	1,028 - 1,035
Community-acquired infection	-0,381	0,683	0,613 - 0,762
Bacteremia	0,172	1,188	1,070 - 1,318
Morbidity indexes			
Adjusted Morbidity Group	0,003	1,003	1,000 - 1,007
Queralt Comorbidity Index	0,012	1,012	1,011 - 1,014
Morbidity			
Liver cirrhosis	0,452	1,571	1,328 - 1,859
Active neoplasia	0,204	1,226	1,122 - 1,340
Chronic medication	-0,926	0,396	0,368 - 0,426
Number of chronic medications	0,018	1,018	1,010 - 1,026
Statins	-0,219	0,803	0,731 - 0,883
Allopurinol	-0,211	0,810	0,649 - 1,010
Corticosteroids	0,300	1,349	1,130 - 1,611
Benzodiazepines	-0,130	0,878	0,771 - 1,001
Dependence on health services			
Emergency hospital admissions	0,044	1,045	1,008 - 1,084
Patients admitted to nursing homes	-0,394	0,674	0,535 - 0,849
Organ failure during admission			
Cardiovascular failure	0,542	1,720	1,554 - 1,904
Respiratory failure	0,569	1,767	1,617 - 1,931
Neurological failure	0,113	1,119	1,000 - 1,253
Hematological failure	0,283	1,327	1,174 - 1,500
Liver failure	1,124	3,078	2,465 - 3,843
Renal failure	0,254	1,289	1,184 - 1,403
Source of infection			
Central nervous system	0,530	1,699	1,232 - 2,343
Genitourinari	-0,548	0,578	0,520 - 0,644
Endocarditis	0,452	1,572	1,208 - 2,047
Infection of devices	-0,397	0,672	0,589 - 0,768

Topic: Sepsis

000042

Comparing opioid exposure and associated risk factors in adult patients admitted to ICU or HDU following right hemicolectomy

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Introduction: Following right hemicolectomy, patients at University Hospital Southampton (UHS) NHS Foundation Trust are often admitted to the intensive care unit (ICU) or high dependency unit (HDU). This decision is based on patients' underlying co-morbidities and surgical complexity. Pain management here consistently features strong opioids (fentanyl, morphine, oxycodone) and adjuvant agents (paracetamol, regional anaesthesia) [1]. Postoperative opioid exposure and its associated risk factors are important to establish given opioids' safety profile. There is a potential risk of relative overdose in ICU where mechanical ventilation precludes titration to effect, though this has not yet been examined rigorously.
Objectives: To compare patients' opioid consumption within 24 h of admission to an ICU or HDU following right hemicolectomy and identify clinically relevant factors associated with opioid use.
Methods: This retrospective cohort study was registered and approved by the University of Southampton's ethics service (ERGO reference 88350.A1). It included adult patients admitted to the ICU or HDU at UHS (between 2017 and 2024) following right hemicolectomy that received opioids within 24 h of admission. Clinical data were manually extracted from a local clinical information system (MetaVision) and opioid doses were converted into IV morphine milligram equivalents (MMEs) [2]. Multiple linear regression (MLR) analysis was then conducted. The dependent variable was log-transformed opioid consumption in IV MMEs within 24 h of admission and the independent variables were demographic characteristics (gender, age, weight), history of substance dependence (alcohol, smoking, pre-hospital opioids), unit admitted to (ICU or HDU), mechanical ventilation and Sequential Organ Failure Assessment (SOFA) score.
Results: A total of 254 patients were included: 57 were admitted to ICU and 197 to HDU. Median (IQR) opioid consumption in IV MMEs within 24 h of admission was 68 (32-124) in ICU and 39 (20-70) in HDU patients ($p = 0.002$). The MLR model explained 24% of the variance in opioid consumption (adjusted R2 = 0.24) and was statistically significant ($p = < 0.001$). Age (B = 0.97, $p = < 0.001$) and history of alcohol dependence (B = 1.98, $p = 0.038$) were significant predictors of opioid consumption, while pre-hospital opioid exposure (B = 1.50, $p = 0.054$) was marginally significant. In contrast, gender, weight, history of smoking, unit admitted to, mechanical ventilation and SOFA score did not reach statistical significance.
Conclusions: Opioid consumption was significantly greater in patients admitted to ICU compared to HDU following right hemicolectomy. Younger age and history of alcohol dependence (> 14 units per week) both positively predicted opioid consumption. Adequately powered research is needed to confirm these findings and should assess the clinical impact of ICU opioid consumption excess to pain requirements.

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Topic: Sedation, analgesia and delirium

000045

BMSCs-Exos promotes M2 polarization of mouse alveolar macrophages by delivering miR-137-3p

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Introduction: Acute lung injury (ALI) is a common problem in the critically ill population with a high mortality rate, phenotypic transformation of alveolar macrophages (AMs) plays a crucial role in the progression of ALI [1]. AMs account for over 90% and they are the main body of cells involved in the regulation of inflammation and immune imbalance in lung tissue of ALI patients [2]. Research has shown that in the progression of ALI, AMs can be activated into classically activated M1 macrophages and alternative activated M2 macrophages based on different lung microenvironments [3]. The main function of M2-type AMs is to release anti-inflammatory factors and promote the repair of diseased tissues. Up to now, multiple studies have confirmed that the M2 polarization of AMs can improve lung tissue damage and fibrosis progression caused by ALI by effectively inhibiting the pulmonary inflammatory cascade and cytokine storm [4].
Mesenchymal stem cells (MSCs) are a type of adult stem cells derived from bone marrow, with high self-renewal ability and multi-directional differentiation potential [5]. Research has shown that MSCs can colonize the lung tissue of ALI mice to exert immune regulatory effects and improve the survival rate of model mice [6]. Independent studies have also shown that human bone marrow-derived mesenchymal stem cells (BMSCs) have a significant protective effect on lipopolysaccharide (LPS) induced lung tissue damage in ALI mice [7]. Studies have shown that extracellular vesicles derived from MSCs can participate in M1/M2 polarization of macrophages through microRNAs (miRNAs) delivery [8]. This suggests that exosomes derived from BMSCs may participate in the M1/M2 polarization regulation of AMs through miRNAs delivery and thereby improving pulmonary inflammatory injury and delaying fibrosis progression through M2 polarization of AMs.

Objectives: To clarify the role of exosomes derived from bone marrow mesenchymal cells (BMSCs-Exos) in promoting M2 polarization of mouse alveolar macrophages and elucidate the mechanism.
Methods: BMSCs isolated from 8-week-old male mice and were used to prepare BMSCs-Exos. The mouse alveolar epithelial cells (MH-S) were induced with bacterial lipopolysaccharide (LPS) and INF-γ and were then treated with gradient BMSCs-Exos. A co-culture system was established with mouse BMSCs and MH-S cells, after treatment with exosome inhibitor GW4869 and LPS + INF-γ, the relative content of miR-137-3p in MH-S cells was detected by RT-qPCR, the proteins expression of TRIM24 and p-STAT6 in MH-S cells was detected by western blotting, and the intracellular ROS activity in MH-S cells was detected by using fluorescence probe method. The binding sites between miR-137-3p and TRIM24 mRNA 3′-UTR was predicted by using database and confirmed by luciferase assays. Furthermore, Co-IP was used to detect and evaluate the effect of BMSCs-Exos addition on the binding of CREB-binding protein (CBP) and STAT6 proteins in MH-S cells.
Results: Induction of LPS (100 ng/ml) + IFN-γ(20 ng/ml) for 48 h significantly upregulated the contents of inflammatory factors (TNF-α, IL-1β and IL-10) in the supernatants, and significantly upregulated the expression of M1 macrophage marker CD86 in MH-S cells. Treatments of BMSCs-Exos (1-10 mg/ml) could significantly inhibit LPS + IFN-γ induced increase in TNF-α and IL-1β contents and further upregulate the IL-10 level in the supernatants, and inhibited the expression of M1 polarization marker CD68 but upregulate the expression of M2 type marker CD163 in MH-S cells in a gradient dependent manner(Fig. 1). Co-culture of BMSCs upregulated the content of miR-137-3p, inhibited the protein expression of TRIM24, promoted phosphorylated STST6 protein expression and inhibited the enhanced ROS activity in MH-S cells induced by LPS + INF-γ(Fig. 2). Moreover, the aforementioned effects of BMSCs could be blocked by 20 μM exosome inhibitors. MiR-137-3p can bind to the 3′UTR of TRIM24 mRNA and inhibit its protein expression. Treatment of BMSCs-Exos inhibits the binding of CBP and STAT6 proteins in MH-S cells (Fig. 3)
Conclusions: BMSCs-Exos carrying miR-137-3p can promote M2 polarization and inhibit M1 polarization of mouse alveolar macrophages by activating the miR-137-3p/TRIM24/STAT6 axis, suggesting that it has broad application prospects in the biological therapy of acute lung injury patients.

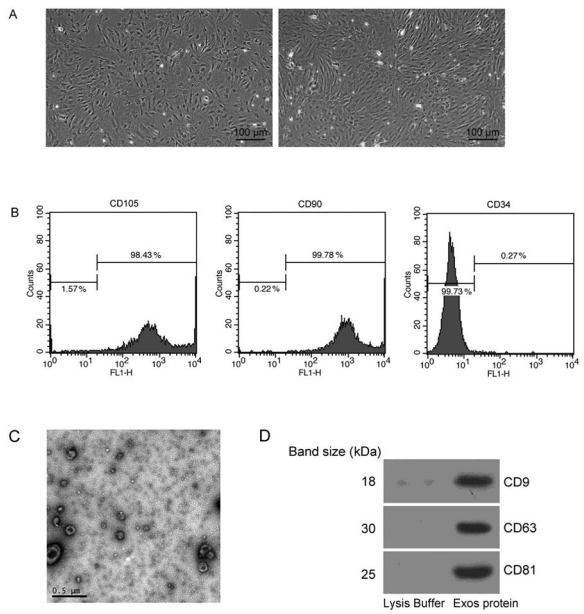


Fig. 1 (abstract 000045) Preparation of mouse BMSCs and their exosomes. A) Morphological observation of mouse BMSCs cells at 2nd and 3rd passages. The magnification factor was 100 × . B) Flow cytometry was used to detect the expression of biomarkers CD105, CD90 and CD34 in 3rd passages of BMSCs. C)SEM characterization of BMSCs-Exos. D) Western blotting was used to detect the expression of CD9, CD63, and CD81 proteins in BMSCs-Exos. Lysis solution was used as control

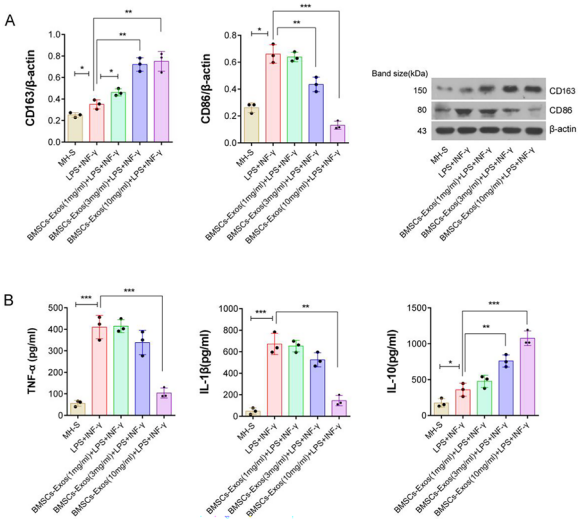


Fig. 2 (abstract 000045) Detection of macrophage polarization marker proteins and supernatants inflammatory factors contents in MH-S cells of different treatment groups. A) Western blotting was used to detect the expression of CD68 and CD206 in MH-S cells of different treatment groups. Left, analysis of inter-group differences in relative optical density of the target proteins; right, protein target bands. B) ELISA of inflammatory factors (TNF-α, IL-1β and IL-10) in the supernatants of MH-S cells of different treatment groups. All experiments were set with 3 biological replicates (n = 3), and the data were represented as mean ± SD. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$, t-test

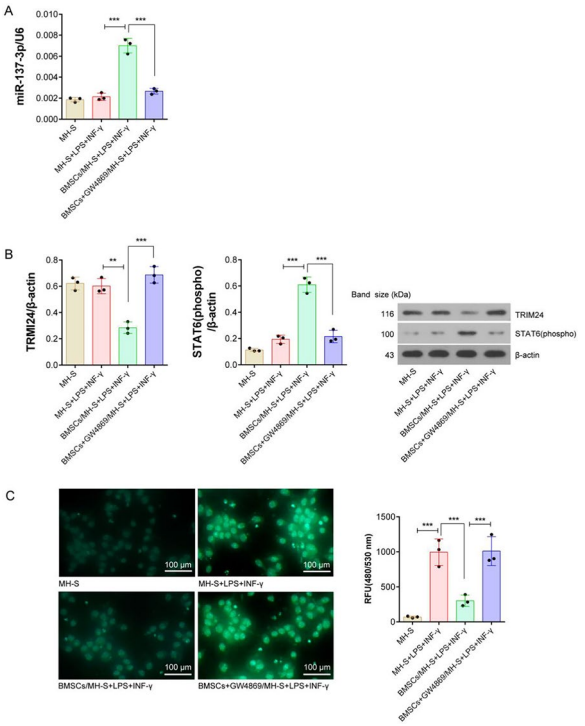


Fig. 3 (abstract 000045) Detection of miR-137-3p, TRIM24, phosphorylated STAT6 expression and ROS activity in MH-S cells in different

treatment groups. A) RT-qPCR was used to detect the relative content of miR-137-3p. U6 was used as a reference gene. B) Western blotting was used to detect the expression of TRIM24 and phosphorylated STAT6 proteins in MH-S cells in different treatment groups. β-actin was used as an internal parameter. Left, analysis of differences in relative optical density of the target protein between groups; right, protein target bands. C) Analysis of ROS activity in MH-S cells in different treatment groups. Left, DCF dye fluorescence was directly observed under a fluorescence inverted microscope; right, the fluorescence intensity of DCF-dye in cell lysates were detected using a UV-fluorescence spectrophotometer, with excitation and emission wavelengths of 480 and 530 nm, respectively. All experiments were set with 3 biological replicates (n = 3), and the data were represented as mean ± variance. **$p < 0.01$ *** $p < 0.001$, t-test

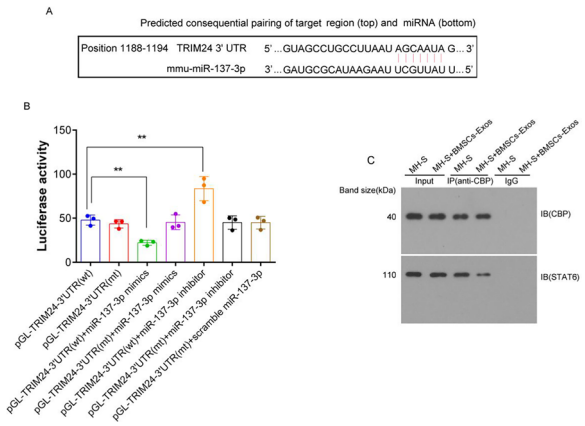


Fig. 4 (abstract 000045) Analysis of luciferase and Co-IP. A) Bioinformatics prediction of the binding site between miR-137-3p and 3′UTR of TRIM24 mRNA. B) Detection of luciferase activity. 293 cells transfected for 48 h were used to detect the luciferase activity, and the relative luciferase activity was expressed as the ratio of firefly luciferase activity to renilla luciferase activity, with renilla luciferase activity as a reference. C) Immunoprecipitation detection for the binding between CBP and STAT6 proteins in MH-S cells under different treatment conditions. All experiments were set with 3 biological replicates (n = 3), and the data were represented as mean ± SD. * $p < 0.05$ ** $p < 0.01$, t-test

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Topic: Acute respiratory failure and mechanical ventilation

000046

Predictive value of IL-10/lymphocytes ratio for prognosis in the elderly with severe infections, a prospective cohort study in China

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Intensive care Medicine Experimental 2025* 13(1)*:000046

Introduction: Aging is posing a threat to the healthcare system globally. One of the biggest challenges the elderly facing is the infection of various sites. The elderly is vulnerable to infections, such as urinary tract, respiratory tract, and gastrointestinal tract[1], as a result of immune system dysfunction and accompanied chronic diseases, such as cardiovascular diseases and diabetes. These comorbidities further weaken the function of the immune system and increase the risk of infection[2]. As the population get older, there is an increasing incidence of elderly patients with sepsis[3, 4]. As a result of their relatively reduced immunity, elderly individuals are inclined to develop a quicker disease progression and higher mortality[5, 6]. Consequently, early identification, clinical intervention, and managing the infection progression are of paramount importance for the prognosis of patients.
Methods: A total of 775 patients were admitted into this study, who were diagnosed as infections and critical state. Firstly, using association rule mining methods, the mortality rates were obtained in the different combinations of abnormal indicators, which were compared with the baseline. Indicator was divided into quartiles and the mortality rate was calculated to figure out the threshold and different critical indicators were combined in different ways to form a specific marker for predicting the prognosis. Moreover, the association between biomarkers and prognosis was analyzed by multivariable Cox proportional hazard models, and the predictive value was determined by a receiver-operating characteristic curve.
Results: Firstly, we identified five indicators, including interleukin-10 (IL-10), activated partial thromboplastin time (APTT) and thrombin time (TT), alanine aminotransferase (AST), and monocyte, resulting in a significant increase of mortality. Further data mining revealed IL-10 alone as a valid predictor (AUC = 0.68, 95%CI 0.64-0.74). More importantly, when the value of IL-10 exceeds 2.73 pg/ml, the mortality risk rises significantly (OR = 2.70, 95%CI 1.80-4.15). The dynamic changes of IL-10 reflected the changes of infections and critical state in the elderly population. Furthermore, IL-10/lymphocytes ratio (ILR) (AUC = 0.70, 95%CI 0.63-0.76) acts as an effective predictor of prognosis in the elderly with infections. Patients with ILR at 0.63 and higher would be at a relatively higher risk of mortality (OR = 2.96, 95%CI 1.96,4.49).

Table 1 (abstract 000046) Mortality rates of six groups of patients for training cohort

		Deaths (mortality rate)	
Group	**Indicator combinations and ranges**	**Derivation cohort**	**Validation cohort**
1	All-cause deaths (All-cause mortality rate)	107(30%)	70 (17%)
2	IL-10 (pg/mL) > 12.9	71 (54%)	33 (31%)
3	IL-10 (pg/mL) > 12.9 & APTT (s) > 43	11 (91%)	12 (55%)
4	IL-10 (pg/mL) > 12.9 & ALT (U/L) > 50	25 (72%)	11 (61%)
5	IL-10 (pg/mL) > 12.9 & PT(s) > 16	20 (70%)	18 (53%)
6	IL-10 (pg/mL) > 12.9 & Monocyte (%) < 3	24 (75%)	17 (42%)

Table 2 (abstract 000046) The optimal cutoff value of IL-10 in all cohorts

Cohort	IL-10	OR	95% CI	p-value
Derivation cohort	IL-10 > 2.73	2.70	[1.80, 4.15]	$p < 0.005$
West China & Huashan	IL-10 > 2.36	2.36	[1.29, 4.30]	$p < 0.05$
Peking Union	IL-10 > 5.0	1.90	[1.25, 2.87]	$p < 0.005$

Table 3 (abstract 000046) The optimal cutoff value of ILR in all cohorts except for Peking Union hospital

Cohort	ILR	OR	95% CI	p-value
Derivation cohort	ILR > 0.63	2.96	[1.96, 4.49]	$p < 0.005$
West China & Huashan	ILR > 0.63	2.40	[1.32, 4.36]	$p < 0.005$

Conclusions: IL-10 alone predicts the prognosis and risk of death in the elderly with infections and critical state, and ILR showed a better performance. Clinicians are supposed to pay more attention to the high IL-10 and especially high ILR in the elderly with infections.

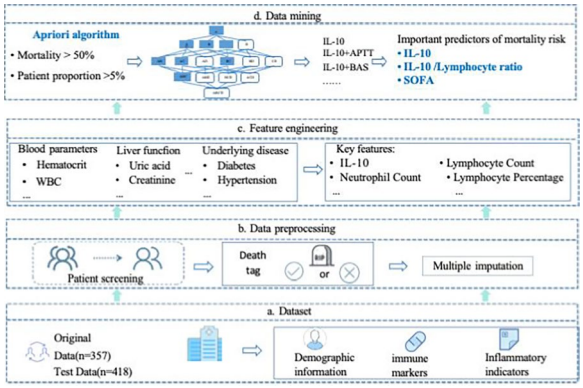


Fig. 1 (abstract 000046) The flowchart of data processing and analyzing

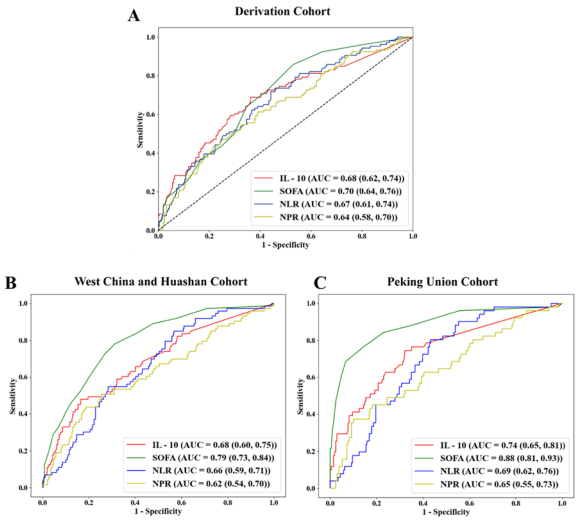


Fig. 2 (abstract 000046) Receiver operating characteristic (ROC) curves of interleukin-10(IL-10), neutrophil lymphocyte ratio (NLR), neutrophil platelet ratio (NPR) and Sequential Organ Failure Assessment (SOFA) for all-cause in-hospital mortality in the derivation cohort and two different validation cohorts

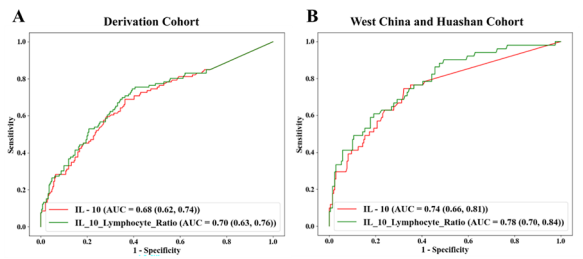


Fig. 3 (abstract 000046) Receiver operating characteristic (ROC) curves of interleukin-10, IL-10/lymphocyte ratio for all-cause in-hospital mortality in the derivation cohort and two different validation cohorts

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Topic: Infections and prevention

000048

Evolution of acute kidney injury definition and inclusion in randomized controlled trials of acute respiratory distress syndrome: a systematic review and mortality trends over time

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Intensive care Medicine Experimental 2025* 13(1)*:000048

Introduction: Acute respiratory distress syndrome (ARDS) is a critical condition with high mortality, frequently complicated by acute kidney injury (AKI). Despite the substantial impact of AKI on ARDS outcomes, its inclusion and definition in randomized controlled trials (RCTs) of ARDS remain inconsistent. This study systematically reviews the definition and inclusion of AKI in ARDS RCTs over time and analyzes trends in mortality among these patients
Methods: A systematic search was conducted in PubMed, Embase, Cochrane Library, and ClinicalTrials.gov from 2000 to 2025, following PRISMA guidelines. We included RCTs assessing interventions in ARDS that reported AKI as an outcome. Data extraction included study year, AKI definition used (RIFLE, AKIN, KDIGO, or study-specific criteria), inclusion criteria, AKI incidence, and mortality rates. Meta-regression was performed to assess trends in mortality over time.
Results: A total of 68 RCTs, involving 24,315 patients with ARDS, were included in the analysis. Among these trials, 47 (69%) reported on AKI as an outcome, with the inclusion of AKI patients increasing significantly over the years. The inclusion rate rose from 36% in trials published between 2000 and 2010 to 89% in studies published between 2011 and 2025. The definition of AKI varied across studies: the KDIGO definition became predominant, used in 58% of studies after 2015, compared to the RIFLE and AKIN definitions, each used in 21% of studies. In 22 studies (32%), patients with severe AKI or those requiring renal replacement therapy (RRT) were excluded, potentially leading to selection bias. The incidence of AKI in ARDS patients varied widely between studies, ranging from 19 to 72%. Higher incidences of AKI were observed in trials focused on lung-protective ventilation strategies (53%) compared to those assessing pharmacological interventions (38%). Regarding mortality, the overall mortality rate for ARDS patients across all studies was 41% (95% CI: 37–45%). Patients with AKI had significantly higher mortality, with a rate of 58%, compared to 33% in those without AKI ($p < 0.001$). Over the years, the mortality rate of ARDS patients with AKI demonstrated a modest decline. In studies conducted between 2000 and 2005, the mortality rate in AKI patients was 63%. This decreased to 53% in trials published between 2011 and 2015 and further to 50% in the most recent studies (2016–2025). However, the mortality gap between AKI and non-AKI patients persisted throughout the years, with AKI remaining a strong predictor of poor outcomes. Meta-regression analysis showed that while the overall mortality rate of ARDS patients decreased over time ($\beta = -0.34$, $p = 0.047$), the mortality in AKI patients did not show a comparable decrease. The persistent higher mortality in AKI patients underscores the ongoing need for better management strategies targeting renal dysfunction in ARDS.
Conclusions: The inclusion of AKI in ARDS RCTs has significantly increased over the past two decades, with a shift towards the use of the KDIGO definition. Despite improvements in ARDS management and a decline in overall mortality, patients with AKI continue to experience substantially higher mortality rates, and this disparity has not decreased significantly over time. Standardized definitions of AKI and its inclusion in RCTs are critical for improving the comparability of study findings and optimizing outcomes for critically ill patients

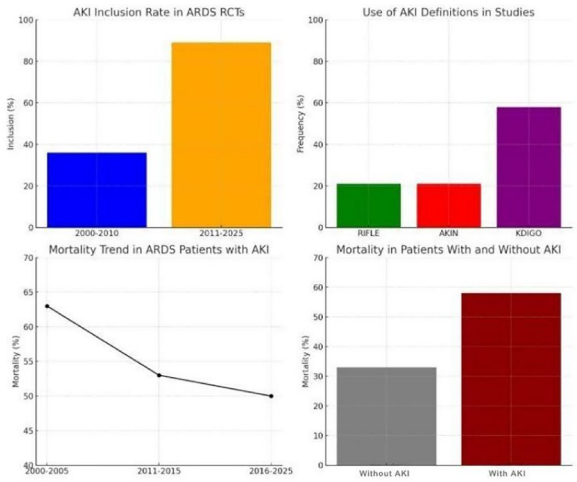


Fig. 1 (abstract 000048) The graphs illustrate: (I) the inclusion rate of patients with AKI in randomized controlled trials on ARDS across the periods 2000–2010 and 2011–2025; (II) the frequency of use of different AKI diagnostic criteria (RIFLE, AKIN, and KDIGO); (III) the temporal trend in mortality among patients with both ARDS and AKI; and (IV) the comparison of mortality between ARDS patients with and without AKI

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Topic: Acute Kidney Injury and haemofiltration

000049

Diagnostic value of endotoxin activity for acute postoperative complications: a study in major abdominal surgery patients

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Intensive care Medicine Experimental 2025* 13(1)*:000049

Introduction: Endotoxin, a component of lipopolysaccharide (LPS) from bacteria, disrupts the immune system, potentially leading to multiorgan failure. Unlike previous studies that used endotoxin activity (EA) levels, this study involved patients with relatively mild clinical conditions after major abdominal surgery and assessed the predictive value of EA levels for postoperative complications. We also evaluated the differential diagnostic value of EA in a subgroup of patients with abnormal liver function during the immediate postoperative period.
Methods: Patients admitted to the surgical ICU of our institution following major abdominal surgery were included in this study. Participants were classified into low and high postoperative EA groups based on EA cutoff values for predicting complications. Additionally, participants were categorized based on liver function assessed at ICU admission using total bilirubin (TB) levels after surgery. Abnormal liver function was defined as a TB level > 1.2 mg/dL.
Results: The study included 86 patients. The EA cutoff for postoperative complications was 0.485, with 49 patients (57%) categorized in the low EA group (EA levels < 0.485) and 37 patients (43%) in the high EA group (EA levels ≥ 0.485). The high EA group experienced statistically worse clinical outcomes, including longer ICU stays and higher mortality rates. Logistic regression analysis confirmed that EA levels and SOFA scores were significant predictors of postoperative complications. For patients with elevated TB, the EA cutoff value for postoperative complications was 0.515, which is higher than those obtained for the total patient cohort.
Conclusions: EA level is a viable surveillance tool for detecting postoperative complications in the acute period among ICU patients undergoing major abdominal surgery, and must be interpreted carefully considering the patient's liver function.

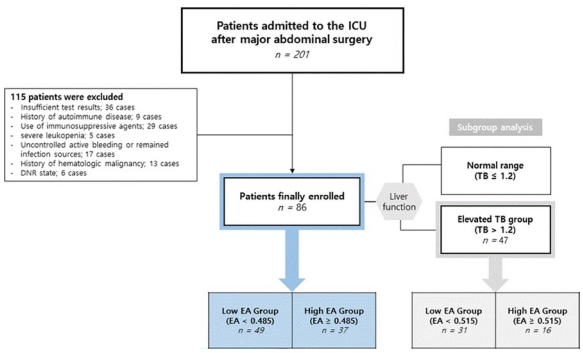


Fig. 1 (abstract 000049) Schematic legend of patient enrollment

Topic: Perioperative care

000051

Placenta accreta spectrum (pas): data review of pas cases successfully managed by a trained multidisciplinary team in our tertiary referral hospital

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Intensive care Medicine Experimental 2025* 13(1):*000051

Introduction: Placenta accreta spectrum (PAS), is frequently associated with severe obstetric haemorrhage, anaesthesia risks and high mortality. We present a data review of PAS cases successfully managed by a trained, comprehensive, multidisciplinary team in an Italian Tertiary referral hospital.

Objectives: To validate the necessity of a trained, comprehensive, multidisciplinary team.
Methods: The analysis includes all PAS cases which have been managed between 2020 and 1st semester of 2024 at Casa Sollievo della Sofferenza (CSS), city of San Giovanni Rotondo, Italy.
Results: During the study period, 19 women underwent caesarean section for PAS-related reasons. More than half women were preterm at time of delivery and almost 100% had almost one previous caesarean section (CS) in their obstetric history. Regarding obstetric management during pregnancy, 66.7% were placenta praevia major cases. MRI was performed in 3 cases. Regarding multidisciplinary management at time of delivery, almost half CS were performed in hybrid operating room; more than half were conducted under regional anaesthesia and for all of them interventional radiologic procedures with preoperative placement of catheters were carried out; iliac arteries occlusion was necessary for half of them. Ureteral stents were placed in 2 cases. Peripartum hysterectomy was performed in 4 cases and one-third of them were admitted to the ICU. More than half newborns were admitted to the NICU. No maternal or neonatal deaths occurred.
Conclusions: CSS has developed an internal protocol for managing PAS cases. We presented our cases successfully managed by a trained, comprehensive, multidisciplinary team, composed of Gynaecologists, Obstetricians, Sonographers, Anaesthesiologists, Urologists and Interventional Radiologists. A careful antepartum diagnosis by ultrasound imaging is critical to get ready for surgery; surgical and anaesthetic skills are significant to reduce risk of injury; interventional radiologic technique is fundamental to minimise high risk of intraoperative haemorrhage. These skilled facilities are fundamental for optimal management of these increasingly frequent cases.

Table 1 (abstract 000051) Maternal features

TOTAL	19 Patients	
AGE	35 ys	
BMI	24,6	
ART	4/19	21.1%
≥ 1 previous CS	6/19	31.6%
PAS known during pregnancy	18/19	94.7%
Previous myomectomy	1/19	5.3%
Gestational age at delivery < 37ws (30ws+4 – 36ws+6)	11/19	57.9%

Table 2 (abstract 000051) Management during pregnancy

PAS known during pregnancy	18/19	94.7%
Placenta praevia major	12/18	66.7%
Placenta praevia minor	6/18	33.3%
Anterior development	9/18	50%
Posterior development	8/18	44.4%
PAS Ultrasound suspicion	3/18	16.7%
MRI during pregnancy	3/18	16.7%

Table 3 (abstract 000051) Multidisciplinary management at delivery

Hybrid Operating Room	8/19	42.1%
Regional Anaesthesia	10/19	52.6%
General Anaesthesia	9/19	47.4%
Interventional Radiologic Procedure (preoperative placement of catheters into iliac pelvic arteries)	8/19	42.1%
Iliac arteries occlusion	4/8 (average 12')	50%
Preoperative cystoscopy and placement of ureteral stents	2/8	25%
Post partum Haemorrhage ≥ 1000mL	6/19	31.6%
Peripartum Hysterectomy	4/19	21.1%
Blood products transfusion	6/19	31.6%
IV iron therapy	8/19	42.1%
ICU	6/19	31.6%
Histological assessment	13/19	68.4%

Table 4 (abstract 000051) Neonatal outcome

BIRTH WEIGHT	2743 gr	
Apgar 5'	8	
Umbilical Artery pH	7.29	
Umbilical Vein pH	7.33	
UTIN	11/19	57.9%

References
1. None
2. None

Topic: Perioperative care

000052

Ventilator high and low alarms that received intervention: an analysis in respiratory care center

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Intensive care Medicine Experimental 2025* 13(1):*000052

Introduction: Ventilator alarms are a critical built-in safety feature designed to detect changes that may require immediate attention to the patient and/or ventilator. Alarms are capable of identifying faulty equipment, leakage, patient disconnection, and alerting a trained clinician when important changes such as compliance or airway resistance occur. Data describing ventilator high and low alarm management in respiratory care center (RCC) are limited. Effective high and low alarm management is an important goal for patient safety and avoid respiratory therapists burnout.
Objectives: This study wanted to evaluate the selection of intervention ventilator high and low alarm settings, determine agreement to current recommendations. This study wanted to evaluate the selection of intervention ventilator high and low alarm settings, determine agreement to current recommendations.
Methods: This was a retrospective review of electronic medical records (EMR) of subjects admitted to the RCC and placed on a mechanical ventilator during the month of Oct. 2024 in Taiwan middle medical center. We retrospectively gathered ventilator alarm and event data without patient identifiers, for ventilator with a Drager Evita 4、Savina300 and PB840. The measured values recorded were peak inspiratory pressure (PIP), respiratory rate (RR), and exhaled minute ventilation (MV). The alarm settings selected for analysis were high peak inspiratory pressure (HI PIP), high respiratory rate (HI RR), and high and low minute volume (HI MV, LOW MV).The data were analyzed for event, priority, date, time, and duration of alarm using Microsoft access and Excel
Results: Data were collected from 242 subjects. The mean recorded measured values were: RR = 15.54 (± 4.63), PIP = 26.70 (± 6.45), MV = 8.18 (± 2.00). Discrepancies between recorded patient parameter and alarm limits ranged ranging from 63 to 94%. The mean percentage change between measured PIP and the high-pressure alarm was 53.52 ± 25.26%; while between measured total respiratory rate and the high-rate alarm was 80.82 ± 23.67%. The difference between mean measured minute ventilation and low minute ventilation alarm was 53.18 ± 6.59% and between measured minute ventilation and high minute ventilation alarm was 93.92 ± 30.56%. The three most common ventilator alarms, comprising more than 70% of all high priority alarms, were compared. Alarm that were not followed by an any intervention than 1 min were reported as average time in second and number of alarm events.
Conclusions: Ventilators alarms are created and set to signify a change in a patient condition that requires the attention of the clinician in our population, high peak inspiratory pressure and high respiratory rate alarms are the largest high priority alarms that received intervention. Alarm limits in the RCC were not selected in accordance with current recommendations and appear to be poorly individualized. Airway pressure high alarms are the shortest alarms with interventions and were common especially in the RCC. Alarms with interventions contribute to alarm fatigue and noise. There is a clear need to review the practice of ventilator alarm selection in the RCC and to evaluate the potential impact of alarm selection on clinical outcomes.

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2. The authors would like to thank all colleagues who contributed to this study.

Topic: Acute respiratory failure and mechanical ventilation

000053

The ARDSnet predicted body weight equation overestimates functional lung sizes of female patients mediating higher risk of mortality at guideline-adherent tidal volumes

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Intensive care Medicine Experimental 2025* 13(1):*000053

Introduction: Current guidelines for mechanical ventilation (MV) recommend targeting tidal volumes (Vt) normalized to predicted body weight (PBW) to prevent ventilator-induced lung injury [1]. The calculation of PBW aims to account for smaller lung sizes of females by applying a correction factor [2]. However in critically ill patients, the functional lung size often deviates from actual lung size, and the validity of the sex-correction factor has not been assessed.
Objectives: To assess whether the PBW equation used since the ARDSnet ARMA trial [2] adequately corrects for differences of female vs. male patients using physiologically derived lung size estimations and lung volumetry from CT scans in critically ill patients undergoing MV.
Methods: Adult patients undergoing controlled MV in an ICU setting were eligible for inclusion. For the primary cohort, routine data from Beth Israel Deaconess Medical Center, Boston, USA, the eICU dataset, and prospectively collected data of the EPvent-2 RCT [3] were harmonized. Within this study population, subcohorts of patients with 1) esophageal manometry (Pes) data and 2) available chest CT scans were derived. Additionally, applicable analyses were repeated in patients with acute respiratory distress syndrome (ARDS) from 9 RCTs.
In the primary analysis, lung sizes of female vs. male patients of the same PBW were compared using the proxies of static respiratory system (Crs) and lung (Clung) compliance, as well as anatomical and aerated lung volumes measured from chest CT scans. Additionally, the risk of receiving high (≥15cmH2O) driving pressures (DP) at similar Vt/kgPBW was compared between males and females, and its potential impact on mortality was assessed using mediation analysis.
All analyses were adjusted for a comprehensive confounder model and/or males and females were matched by PBW or Vt/kgPBW, as applicable.
Results: 26,467 (38.7% female, Fig. 1A) patients were included in the primary cohort. Out of these, 694 patients had available Pes measurements, while 3,410 had available CT scans. The pooled ARDS RCT cohort comprised a total of 5,092 patients.
In the primary cohort, at the same PBW, female patients had a lower Crs (-3.1 ml/cmH2O, 95%CI -3.7 to -2.5, p < 0.001) and a lower Clung (-8.9 ml/cmH2O, 95%CI -15.2 to -2.5, p = 0.007) than male patients. CT-based lung volumetry (Fig. 1) demonstrated a 403.5 ml (95%CI 297.1 to 510.0, p < 0.001) lower anatomical and a 231.9 ml (95%CI 136.5 to 327.2, p < 0.001) lower aerated lung size among females compared to males of the same PBW. At comparable standardized Vt/kgPBW, females were at an absolute 5.1% (95%CI 3.7 to 6.4, p < 0.001) increased risk of high DP (Fig. 2). Mediation analysis revealed that this increased risk of high DP partially explained excess mortality among females (9.7% proportion mediated).
Findings on DP and Crs were confirmed in the ARDS RCT cohort (Fig. 3).
Conclusions: The ARDSnet PBW equation overestimates lung sizes of female compared to male patients, resulting in an excess risk of high driving pressures and increased mortality even at guideline-adherent tidal volumes.

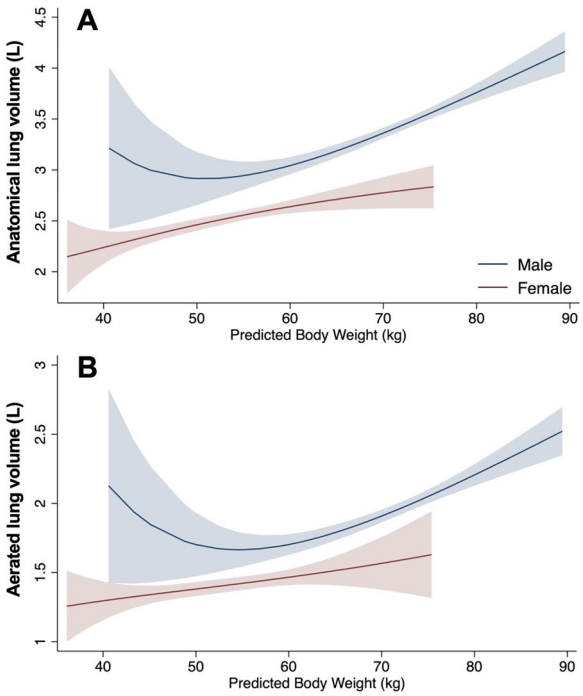


Fig. 1 (abstract 000053) AI-based CT ling volumetry among male and female patients
The PBW overestimated CT-derived anatomical (Panel A) and aerated (Panel B) lung volumes in female compared to male patients. Using the COVID-AI module within 3D slicer, lung volumes were measured for 3,410 patients in the primary cohort with available chest CT scans. On these data, fractional polynomial regression models were fit.

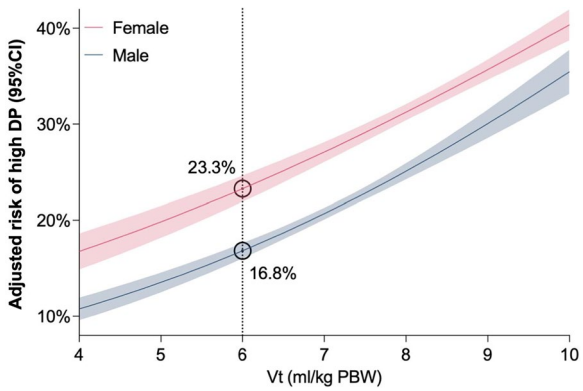


Fig. 2 (abstract 000053) Risk of high driving pressures by standardized tidal volume and sex
The adjusted absolute risk of high driving pressure (≥ 15cmH2O) ventilation was modelled for a clinically meaningful range of tidal volumes among male and female patients of the primary cohort (n = 26,467). Estimates were adjusted for age, body mass index, indicators of disease severity (non-respiratory SOFA score, PF-ratio, paCO2, arterial pH), year, and study center. Abbreviations DP, driving pressure, Vt, tidal volume, PBW, predicted body weight

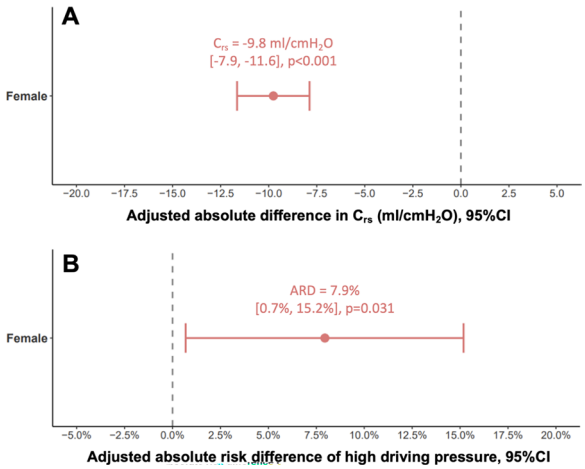


Fig. 3 (abstract 000053) Result from a pooled cohort of 9 ARDS RCTs Panel A shows differences in functional lung sizes (as approximated by Crs) among male and female ARDS patients of the same predicted body weight. Panel B shows the adjusted absolute risk difference for ventilation with driving pressures ≥ 15cmH2O in females compared to males, given the same standardized tidal volume.
The pooled RCT cohort included a total of 5,092 patients with ARDS from the ARMA, ALVEOLI, FACTT, EDEN, SAILS, ROSE, ICAR, EPVent-1, and EPVent-2 trial. The confounder model included age, body mass index, PF-ratio, paCO2, arterial pH, and non-respiratory components of the SOFA score. *Abbreviations: Crs, Respiratory system compliance; ARD, adjusted absolute risk difference.*

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Topic: Acute respiratory failure and mechanical ventilation

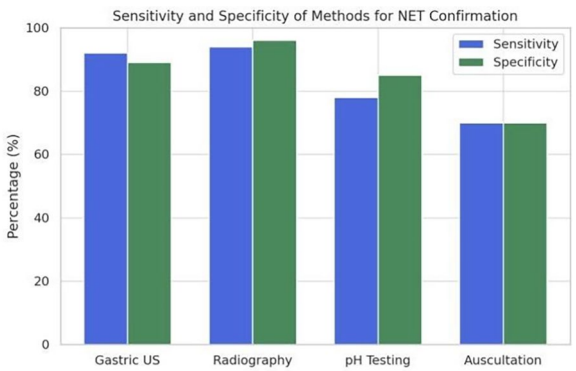
000059

Gastric ultrasound for nasoenteric tube positioning in critically ill patients: a systematic review

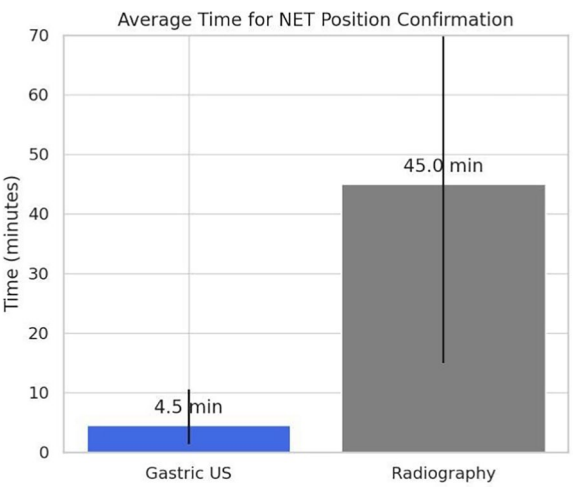
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Intensive care Medicine Experimental 2025* 13(1):*000059

Introduction: Incorrect placement of nasoenteric tubes (NETs) in critically ill patients is associated with complications such as aspiration pneumonia and pneumothorax. Radiographic confirmation remains the gold standard, but is time-consuming and not always readily available. Gastric ultrasound (GUS) has emerged as a potential bedside tool for confirming NET positioning, offering a rapid and non-invasive alternative.

Objectives: To systematically evaluate the accuracy, feasibility, and clinical outcomes of gastric ultrasound for confirming nasoenteric tube position in critically ill patients.
Methods: A systematic search was conducted in PubMed, Embase, Scopus, and Cochrane Library from inception to January 2025. Studies evaluating gastric ultrasound for NET placement confirmation in adult critically ill patients were included. Accuracy metrics (sensitivity, specificity, positive predictive value [PPV], negative predictive value [NPV]), feasibility, and comparison with standard methods (radiography, pH testing, auscultation) were extracted. The QUADAS-2 tool was used for quality assessment.
Results: A total of 14 studies, comprising 1,987 critically ill patients, met the inclusion criteria. The pooled sensitivity of gastric ultrasound for confirming correct NET placement was 92% (95% CI: 88–96%), and specificity was 89% (95% CI: 85–93%). Positive and negative predictive values were 95% and 87%, respectively. GUS showed near-equivalent accuracy to radiography (diagnostic concordance: 94%) and outperformed pH testing (sensitivity: 70–85%) and auscultation (misplacement rate: 30%). The median time for ultrasound confirmation was 4.5 min (IQR: 3.2–6.0), compared to 45 min (IQR: 30–65) for radiographic confirmation. Operator experience influenced accuracy, with a learning curve of 25–30 scans.
Conclusions: Gastric ultrasound is a feasible, rapid, and accurate method for confirming nasoenteric tube positioning in critically ill patients. Its high sensitivity and specificity make it a promising bedside tool, potentially reducing reliance on radiographic confirmation and facilitating earlier enteral nutrition. Standardization of ultrasound protocols and further large-scale studies are needed for widespread implementation.



Sensitivity and specificity of methods for NET confirmation



Average time for NET position confirmation

Reference

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Topic: Imaging in intensive care

000060

Diaphragmatic Dysfunction Assessed by Ultrasound: A Key Predictor of Prolonged Ventilation in Emergency Department

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Intensive care Medicine Experimental 2025* 13(1):*000060

Introduction: Respiratory failure is a common and critical condition in the emergency department (ED), often requiring non-invasive ventilation (NIV) or continuous positive airway pressure (CPAP). In severe cases, invasive mechanical ventilation may be necessary. The diaphragm, responsible for much of the inspiratory volume, plays a critical role in respiratory mechanics, and its dysfunction can impact ventilatory outcomes. Diaphragmatic ultrasound, a non-invasive diagnostic tool that assesses diaphragmatic excursion and thickening, is becoming increasingly important in evaluating critically ill patients. However, its use in the ED is limited due to the fast-paced nature of care. This study aimed to evaluate the feasibility and utility of diaphragmatic ultrasound in guiding management and improving outcomes in ED patients with respiratory failure.
Objectives: The primary objective was to assess the feasibility of performing diaphragmatic ultrasound in ED patients with respiratory failure requiring NIV or CPAP. The secondary objective was to determine if diaphragmatic ultrasound could provide meaningful information to guide clinical decisions and improve patient outcomes, particularly by predicting ventilation time and need for invasive interventions.
Methods: An observational study was conducted in the ED of Santa Maria Delle Grazie hospital in Pozzuoli (NA) from November 2023 to April 2024. Patients with type 1 or type 2 respiratory failure requiring NIV or CPAP were included. Diaphragmatic ultrasound was performed at baseline to measure diaphragmatic excursion and thickening fraction (DTF). The primary outcomes were in-ED and in-hospital ventilation times, and length of stay in the ED. Secondary outcomes included mortality, need for endotracheal intubation (ETI), and need for rescue NIV. Statistical analyses included comparisons of continuous and discrete variables, and regression analysis to assess the relationship between diaphragmatic function and ventilation time.
Results: A total of 44 patients were included in the study. The average age was 74 years, with respiratory failure caused by acute heart failure, pneumonia, chronic obstructive pulmonary disease (COPD), and acute respiratory distress syndrome (ARDS). Patients with diaphragmatic dysfunction (defined as excursion < 10 mm and/or DTF < 30%) required significantly longer ventilation times both in the ED and during hospitalization. Regression analysis revealed a significant correlation between diaphragmatic excursion and both in-ED ($p = 0.011$) and in-hospital ventilation times ($p = 0.004$). Diaphragmatic dysfunction was associated with prolonged ventilation, though no significant differences were observed in mortality or need for intubation between the groups.
Conclusions: Diaphragmatic ultrasound is a feasible tool for assessing diaphragmatic function in ED patients with respiratory failure. The presence of diaphragmatic dysfunction, as indicated by reduced diaphragmatic excursion and DTF, is associated with prolonged ventilation times, both in the ED and during hospitalization. Early identification of diaphragmatic dysfunction may help clinicians better predict ventilation needs and optimize management strategies, potentially improving patient outcomes by reducing the risk of complications associated with prolonged ventilation.

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Topic: Acute respiratory failure and mechanical ventilation

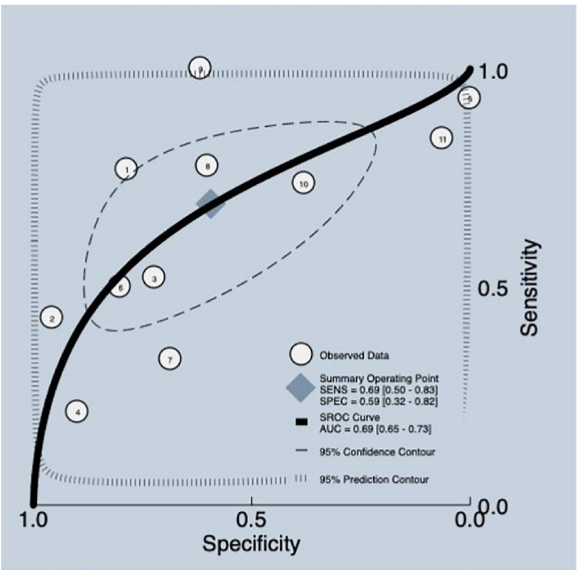
000062

End-expiratory diaphragm thickness (EeDT) for assessing readiness for mechanical ventilation withdrawal in adults: a systematic review and meta-analysis

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Intensive care Medicine Experimental 2025* 13(1):*000062

Introduction: Weaning from mechanical ventilation is one of the most challenging aspects of managing critically ill patients and involve a gradual and complex process that begins as soon as the decision to initiate mechanical support is made. Both premature and delayed weaning can significantly impact patient outcomes, increasing morbidity and mortality, as well as the overall cost of medical care. Therefore, it is crucial for the practitioner to be well-informed about of all available diagnostic tests with the aim of identifying the opportune moment for the discontinuation of this support.
Objectives: To assess the diagnostic test accuracy of end-expiratory diaphragm thickness (EeDT) for assessing readiness for mechanical ventilation withdrawal in adult population.
Methods: Searches were conducted in MEDLINE, Embase, CENTRAL, and CINAHL, with additional publications identified through conference proceedings and contact with experts. Diagnostic test accuracy studies were independently assessed for inclusion, data extraction, and risk of bias (QUADAS-2), without language or date restrictions. Included studies focused on adults diagnosed with ventilatory failure requiring invasive support for more than 24 h.
Results: Eleven studies with 617 participants were included. The median prevalence of weaning failure was 34% (range 9% to 73%), and the included studies reported postoperative cardiovascular (9-30%), COPD (7-70%), brain trauma/stroke (4-25%), ARDS (0-6%), trauma (11-15%), and sepsis (3-18%) as the most prevalent indications for mechanical ventilation. The reported cut-off for EeDT 1.7 a

15.5 mm, being performed during, or after a spontaneous breathing test with pressure support (< 10 cmH2O), or T-piece.
The pooled sensitivity and specificity for retrieved studies were 0.69 (95% CI 0.50 to 0.83) and 0.59 (95% CI 0.32 to 0.82), for a mean LR + 1.7 (95% CI 1.00 to 2.90), LR- 0.53 (95% CI 0.34 to 0.81), DOR 3.0 (95% CI 1.0 to 7.0), and AUC of 0.69 (95% CI 0.65 to 0.73). The ROC plot indicated a high degree of heterogeneity between studies for estimates of sensitivity and specificity.
Conclusions: End-expiratory diaphragm thickness for assessing readiness for mechanical ventilation withdrawal in adult population demonstrate weak diagnostic accuracy. On average, this test yield a 31% chance of incorrectly indicating successful weaning, and a 41% chance of mistakenly suggesting failure. Given the potential negative consequences of improper ventilator withdrawal, physicians should integrate the results of physiological, ultrasound, and paraclinical measures to minimize uncertainty in deciding which patients should progress toward ventilator withdrawal.



End-expiratory diaphragm thickness (EeDT) SROC curve

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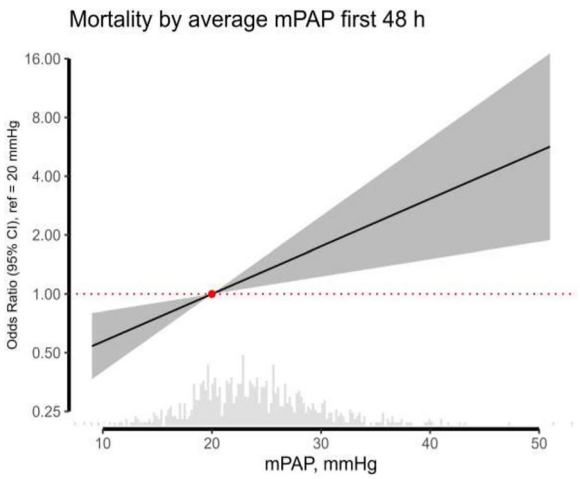
Topic: Acute respiratory failure and mechanical ventilation

000064

Effect of oxygen targets on pulmonary hemodynamics after out-of-hospital cardiac arrest—a sub-study of the box cardiac arrest trial

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Intensive care Medicine Experimental 2025* 13(1):*000064

Introduction: Hypoxia may induce harmful effects in critically ill patients, potentially resulting in pulmonary vasoconstriction. We aimed to assess the impact of two different oxygen targets on pulmonary hemodynamics in comatose patients resuscitated from out-of-hospital cardiac arrest (OHCA). Furthermore, we assessed the prevalence of pulmonary hypertension in patients with OHCA and its association with outcome.
Methods: Predefined, two-centre, prospective, double-blinded sub-study of the "Blood pressure and oxygenations targets after out-of-hospital cardiac arrest (BOX)"-trial. Patients were randomized to a restrictive oxygen target of a partial pressure of arterial oxygen (PaO2) of 9 to 10 kPa or a liberal oxygen target of a PaO2 of 13 to 14 kPa. Invasive hemodynamic assessment was recorded from pulmonary artery catheterization and serial blood-gas analyses for an initial 48 h. The primary endpoint was the difference in pulmonary vascular resistance (PVR) within 48 h between oxygen groups from a repeated measurements-mixed model.
Results: Among 789 randomized patients, 730 (93%), who all had right heart catheterization, were included in this sub-study. At admission, the median PVR, mean pulmonary artery pressure (mPAP), and pulmonary artery pulsatility index (PAPi) were 2.4 wood unit (WU) (95% CI, 1.7-3.4), 25 mmHg (95% CI, 21-30) and 1.3 (95% CI, 0.8-1.8), respectively. The average PVR in the liberal oxygen group was comparable to that of the restrictive group (mean difference 0.05 WU, 95% confidence interval (CI) -0.09 to 0.18 WU, p = 0.48). mPAP, PAPi, and right atrial pressure did not differ between groups (p > 0.05). The adjusted odds ratio for one-year mortality increased progressively and linearly over a wide mPAP range. Compared with mPAP < 20 mmHg, pulmonary hypertension (mPAP > 30 mmHg) was associated with an increased risk of mortality (OR = 4.2; 95% CI, 2.0–9.2, p < 0.001).
Conclusions: Pulmonary hypertension is an independent risk factor for mortality in comatose resuscitated patients after OHCA. However, a restrictive oxygen strategy aiming at a PaO2 of 9 to 10 kPa during post-resuscitation critical care did not result in a higher PVR or deterioration of right ventricular function compared to a liberal oxygen strategy.



The adjusted odds ratio (95% confidence interval) for 1-year all-cause mortality is plotted for mean pulmonary artery pressure relative to a reference value of 20 mmHg. The adjusted odds for one-year mortality increases progressively and linearly over a wide mPAP range, beginning at 10 mmHg and extending through values > 30 mmHg. The histogram represents the density of patients across mPAP values.

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Topic: Cardiac arrest

000065

African mortality predictor score (AMPS): a pilot study to explore a novel mortality predictor score

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Intensive care Medicine Experimental 2025* 13(1):*000065

Introduction: Critical care service delivery in low- to middle-income countries (LMICs) is a huge challenge. The significant scarcity of resources coupled with high critical care service demand mandates efficiency. There are no validated prognostic scores to assist prioritization in these settings. The purpose of this study is to design a *simple, practical and context-appropriate* prognostic score for predicting ICU mortality in low middle income countries.
Objectives: The aim of this study is to develop a novel prognostic score and investigate its precision, discrimination, and calibration properties in predicting ICU mortality in LMICs.
Methods Model development: A comprehensive review of all the relevant published studies from LMICs was conducted. The most highly cited factors associated with mortality were identified to formulate a ***novel*** context appropriate prognostic score.
Model performance and comparison: This was assessed on a data collected from Medical surgical ICU of Black lion Hospital from Sept 2019 to 2020. Predicted mortality and actual mortality were determined and compared. The score was assessed for its accuracy, discrimination, and calibration using Brier's score, the area under the receiver operating characteristic curve (AUROC), and a reliability diagram for predicting ICU mortality. It was also compared with existing mortality predictor scores i.e., mortality prediction model II (MPM II) and ICU priority level. P value less than or equal to 0.05 was considered statistically significant.
Results Score development: Altered Mental status, **M**echanical ventilation, **M**ore than two organ systems involvement, **P**ressure(systolic) less than 90, **P**otentially irreversible disease condition (ICU admission priority 3/4), **S**uspected infection and **S**evere hypoalbuminemia (serum albumin $\leq$ 2 g/dl)) were the most frequently cited predictors of mortality in low middle income countries. A prognostic tool, (A(MPS)2), was created using these variables. Each of the variables were scored out of one and the maximum possible score was 7.
Score test: The score evaluated on 265 patients admitted to the medical surgical unit of Black Lion hospital. All the selected predictor variables for the model (**A**(**MPS**)2: **A**ltered Mental status, **M**echanical ventilation, **M**ore than two organ systems involved, **P**ressure (systolic) less than 90, **P**otentially irreversible disease condition, **S**uspected infection and **S**evere hypoalbuminemia (serum albumin $\leq$ 2 g/dl)) demonstrated to have a statistically significant difference between survivors and non-survivors.
Score performance and comparison: A (MPS) two was able to correctly predict mortality in 86.4% of the cases with a sensitivity of 87.6% and specificity of 84.6%. The area under the operator curve for AMPS and other commonly used scores were AMPS (Area 0. 92; CI 0.88-0.93), MPM II score (Area 0.86; CI 0.82-0.91) and ICU priority level (Area 0.76; CI 0.68-0.83).
Conclusions: The African Mortality Predictor Score (A(MPS)2) is a promising prognostic score with a great ability to predict ICU mortality in low resource settings. A larger, multicenter study is recommended to further evaluate and validate the findings.

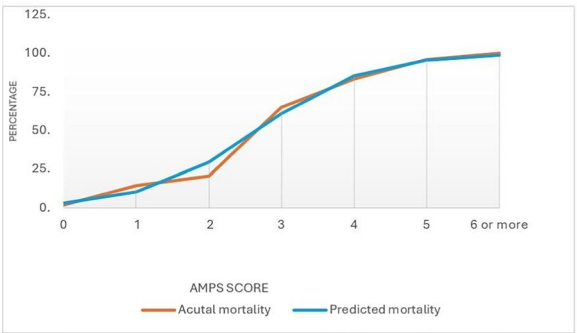


Fig. 1 (abstract 000065) Line graphs of predicted mortality versus actual observed mortality displayed in accordance with AMPS scores among patients admitted to the intensive care unit of Black Lion hospital from Sep 2019—2020, Addis Ababa, Ethiopia

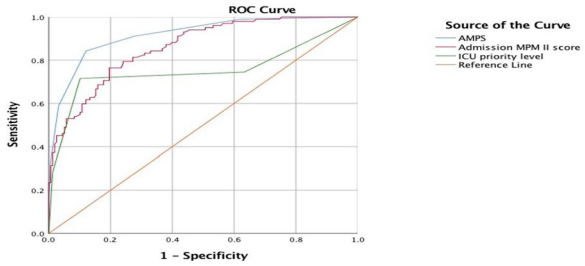


Fig. 2 (abstract 000065) Graph showing the area under the operating curve using AMPS, Admission MPM II score and ICU priority level of participants admitted to the adult intensive care unit of Black Lion hospital, Addis Ababa, Ethiopia, from Sep 2019- 2020

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35. Addis Ababa University

Topic: Health Services Research and Outcome

000067

Indirect calorimetry versus urea: creatinine ratio to evaluate catabolism in critically ill patients

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Intensive care Medicine Experimental 2025* 13(1):*000067

Introduction: The ESPEN guideline on nutritional support in critically ill patients identifies three phases in the evolution of critical illness: the early acute phase, the late period of the acute phase, and the rehabilitation phase. Despite this division into phases, there is no clear evidence of metabolic behavior, especially in the transition from the second to the third phase, when the catabolic state gives way to anabolism.
Although indirect calorimetry can be a reliable measure for determining the beginning of the anabolic phase, it is not widely available in ICUs, unlike urea and creatinine measurements, which are part of routine daily exams in ICUs. Urea:creatine has been demonstrated to be a reliable marker of catabolism.
Objectives: To correlate the behavior of the urea:creatinine ratio with energy expenditure determined by indirect calorimetry in patients with severe COVID-19 to identify the onset of the anabolic phase translated by a reduction in the urea:creatinine ratio and increased energy expenditure in indirect calorimetry.
Methods: This retrospective cohort included 20 patients with severe COVID-19 confirmed by RT-PCR admitted to an ICU for patients with COVID-19 from June 2021 to February 2022 and who underwent invasive mechanical ventilation for at least 3 days and underwent determination of energy expenditure by indirect calorimetry on the 1st, 4th, 7th, 9th, 11th, 14th, 17th and 20th day of hospitalization. The calorimetric results were correlated with the urea:creatinine ratio. Data were obtained from the hospital's electronic medical record. All collected values were categorized into three time periods based on the days after the start of mechanical ventilation: MV days 1 to 4, MV days 7 to 11, and MV days 14 to 20.
Results: Twenty patients were analyzed. The median age was 49 years, the duration of mechanical ventilation was 14 days, ICU stay was 20.5 days, and hospital mortality was 25%. Indirect calorimetry values remained high in the 3 periods (32.5, 31.8, and 29.9 kcal/kg/day, $p = 0.94$), as well as the urea:creatinine ratio (82.7, 91.7, and 85.9, $p = 0.92$). There was no statistically significant differences between the three periods. Hemoglobin and CRP values also did not show a statistically significant difference.
Conclusions: In this study, we observed that energy expenditure measured by indirect calorimetry and the urea:creatinine ratio maintained high values over the 20 days of evolution of patients with COVID-19. The prolonged hypermetabolism observed in this (as in other studies) did not allow us to identify the beginning of the anabolic phase, which would allow us to recommend the urea:creatinine ratio instead of calorimetry to identify the beginning of the anabolic phase.
This study undoubtedly encourages the implementation of this protocol model in other nosologies. Septic patients may constitute a good analysis model.

Topic: Metabolism, endocrinology, liver failure and nutrition

000068

A pilot study comparing automated ultrasound measurement of cardiac diastolic function versus manual measurement in the intensive care unit

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Intensive care Medicine Experimental 2025 **13(1):*000068***

Introduction: Recent advancements in ultrasound technology have demonstrated significant potential in enabling clinicians to obtain critical measurements more efficiently, particularly in time-sensitive situations. While much attention has been directed towards the assessment of systolic dysfunction, diastolic dysfunction remains challenging to evaluate and is often overlooked in acute clinical scenarios. Its clinical significance, however, cannot be understated. Diastolic dysfunction is frequently implicated in acute heart failure, and is observed in up to 76% of patients with septic shock (1, 2). Additionally, inappropriate or rapid fluid administration can exacerbate diastolic dysfunction by elevating ventricular filling pressures (3). Impaired ventricular relaxation reduces filling time, stroke volume, and coronary perfusion, underscoring its importance. This study aimed to evaluate whether automated ultrasound measurements of key diastolic parameters (E velocity, E/A ratio, septal e', lateral e', and E/e') are comparable to manual measurements performed by trained clinicians.
Methods: This single-centre, cross-sectional observational pilot study compared automated and manual ultrasound measurements of diastolic parameters in a tertiary intensive care unit. Fourteen patients were included, with repeat measurements performed by trained clinicians when significant hemodynamic changes occurred, yielding a total of 21 datasets. Manual measurements of E velocity, E/A ratio, septal e', lateral e' and E/e' were obtained followed by automated measurements. Correlation and agreement were assessed using appropriate statistical methods, including Spearman's or Pearson's correlation for linear relationships and Bland–Altman analysis for agreement evaluation.
Results:

Table 1 (abstract 000068) Automated versus manual measurement of diastology parameters

Parameter	Correlation	Mean bias	Standard deviation	95% limits of agreement
E velocity	$r = 0.867$	-2.744	8.937	(-20.261, 14.773)
E/A	$\rho = 0.916$	0.022	0.118	(-0.209, 0.253)
Septal e'	$\rho = 0.753$	0.263	0.760	(-1.227, 1.753)
Lateral e'	$r = 0.934$	-0.184	0.823	(-1.797, 1.429)
E/e'	$r = 0.931$	-0.364	0.997	(-2.318, 1.59)

All parameters (Table 1) demonstrated strong correlation with manual measurements ($r > 0.75$, $P < 0.001$). The automated measurement of E velocity exhibited a higher mean bias (8.937) and broader limits of agreement (-20.261, 14.773) compared to other parameters. In contrast, E/A ratio exhibited the best agreement, with minimal mean bias and narrow limits of agreement. These findings suggest robust concordance between automated and manual measurements, particularly for certain diastolic parameters.

Conclusions: This pilot study indicates that automated ultrasound measurement of diastolic function parameters can achieve good agreement with manual measurements when performed by trained clinicians. Further research is required to validate the precision and reliability of this automated approach across varying degrees of diastolic dysfunction severity.

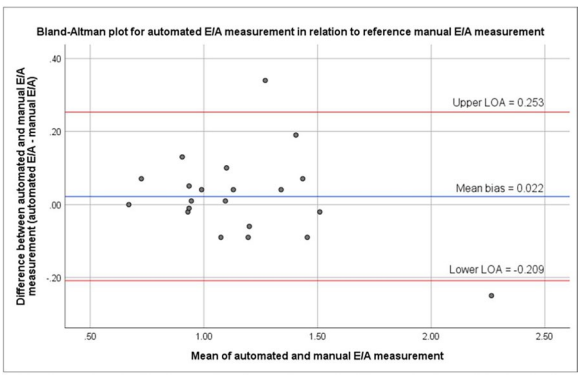


Fig. 1 (abstract 000068) Bland–Altman plot for automated E/A measurement in relation to manual E/A measurement

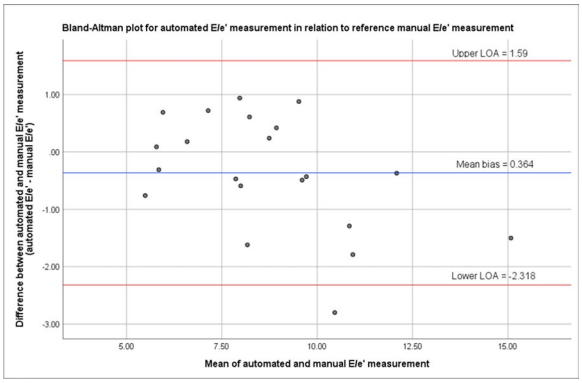


Fig. 2 (abstract 000068) Bland–Altman plot for automated E/e' measurement in relation to manual E/e' measurement

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Topic: Imaging in intensive care

000069

Fluid responsiveness tests applicability in a tertiary intensive care unit: a cross-sectional observational study

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Intensive care Medicine Experimental 2025 13(1):000069

Introduction: A myriad of different fluid responsiveness tests (FRTs) exists in the armamentarium of fluid management, the applicability of which depends mainly on the mode of ventilation, cardiac rhythm, and the availability of continuous cardiac monitoring devices (1-3). Both under-resuscitation and overzealous fluid administration leads to organ dysfunction(4), the former from inadequate organ perfusion and the latter from fluid accumulation syndrome. Higher cumulative fluid balance has been associated with increased hazard of death(5), longer intensive care unit (ICU) stays and more days on ventilator(6). Fluid stewardship, therefore, is highly dependent on FRTs that guide the clinician on when to or not to administer fluid. This study aims to evaluate real-world applicability of FRTs in a tertiary ICU setting.
Methods: This cross-sectional observational study was conducted in a tertiary intensive care unit, including neurosurgical and trauma patients in its case mix. All the patients across the unit over 2 days were included, and the appropriate FRTs were determined for each patient based on their individual disease profile, ventilation parameters, cardiac rhythm, and presence of invasive hemodynamic monitoring devices. Descriptive statistics were used for data analysis.
Results:

Table 1 (abstract 000069) Patient characteristics

Characteristics	n (%)	Characteristics	n (%)
Sepsis	32 (43.8)	Mandatory ventilation	4 (5.5)
Trauma	13 (17.8)	Assisted ventilation	34 (46.6)
Myocardial infarction	4 (5.5)	Spontaneous breathing	35 (47.9)
Post cardiac arrest	6 (8.2)	Right heart dysfunction	6 (8.2)
Neurosurgical cases	30 (41.1)	Intraabdominal hypertension	5 (6.9)
Spine injury	8 (11)	Arterial line	48 (66)
Post surgery	23 (31.5)	PiCCO monitoring	4 (5.5)
Arrhythmia	2 (2.7)	Central venous catheter	37 (50.7)

PiCCO Pulse index continuous cardiac output

73 patients were included for analysis (Table 1). Mini fluid challenge (MFC) was the most widely applicable in our unit due to its minimal prerequisites (Fig. 1). The high number of neurosurgical and trauma cases in our unit precludes the use of positional changes required for passive leg raising. FRTs that utilises the ventilator can be applied in just about half of our patients, which is a reflection of the proportion of ventilated patient in the unit at the time. The low number of patients on continuous cardiac output monitoring necessitates the use of echocardiography, pulse pressure variation, pulse pressure, perfusion index, and end tidal carbon dioxide as a means of monitoring response to FRT.
Conclusions: The applicability of FRTs is highly dependent on ICU casemix. This study provides critical insights into FRT selection, resource allocation, and training needs. MFC was the most versatile FRT, highlighting its utility in diverse ICU populations.

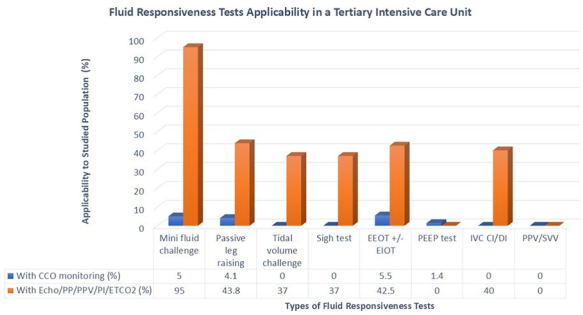


Fig. 1 (abstract 000069) Fluid responsiveness tests applicability in a tertiary intensive care unit
CCO continuous cardiac output, *Echo* echocardiography, *PPV* pulse pressure variation, *PP* pulse pressure, *PI* perfusion index, *ETCO2* end tidal carbon dioxide, *MFC* mini fluid challenge, *PLR* passive leg raising, *TVC* tidal volume challenge, *EEOT* ± *EIOT* end-expiratory occlusion test ± end-inspiratory occlusion test, *PEEP* positive end expiratory positive pressure, *IVC CI/DI* inferior vena cava collapsibility index / distensibility index, *PPV/SVV* pulse pressure variation/stroke volume variation

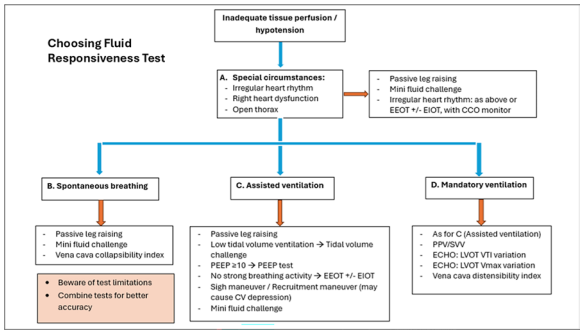


Fig. 2 (abstract 000069) Choosing fluid responsiveness tests
CCO continuous cardiac output, *CV* cardiovascular, *ECHO* echocardiography, *EEOT* end-expiratory occlusion test, *EIOT* end-inspiratory occlusion test, *LVOT* left ventricular outflow tract, *PEEP* positive end expiratory pressure, *PPV* pulse pressure variation, *SVV* stroke volume variation, *Vmax* maximal velocity, *VTI* velocity time integral

	Criteria	CCO monitoring available	Ultrasound available	Arterial line available	Otherwise
Mandatory Ventilation	No IAH / mobility restriction	PLR: ↑CI ≥10%	PLR: ↑VTI≥10%	PLR: ↓PPV ≥ 2%	PLR: ↑ PI ≥ 9% ↑ $EtCO_2$ ≥ 2mmHg
		EEOT: ↑CI ≥5%	EEOT+EIOT: ΔVTI ≥13%		EEOT: ↑PI ≥3%
	LTVV			TVC: ↑ PPV ≥3.5%	TVC: ↑ PI ≥ 12%
	PEEP ≥10	PEEP: ↑CI≥9%		PEEP: ↓PPV ≥2% ↑ PP ≥ 4 mmHg	
	No LIMITS			↓PPV ≤2% PPV/SVV ≥12% EEOT: ↓PPV ≥2%	
	Otherwise	Mini-FC: ↑CI≥5%	Mini-FC: ↑VTI≥5%		
		SVV ≥12%	LVOT Vmax variability >12%		
			IVC distensibility index: ≥18%		
Assisted Ventilation	No IAH / mobility restriction	PLR: ↑CI ≥10%	PLR: ↑VTI≥10%		
	No strong breathing activity	EEOT: ↑CI ≥5%	EEOT+EIOT: ↑VTI ≥13%		
	LTVV			TVC: ↑ PPV 2%	
	PEEP ≥10	PEEP: ↑CI≥9%		PEEP: ↓PPV ≥2%	
	Otherwise	Mini-FC: ↑CI≥5%	Mini-FC: ↑VTI ≥5%	Sigh: ↓PP ≥35%	
Spontaneous breathing	No IAH / mobility restriction	PLR: ↑CI ≥10%	PLR: ↑VTI ≥10%		
	Otherwise	Mini-FC: ↑CI≥5%	Mini-FC: ↑VTI ≥10%		
			IVC collapsibility: ≥50%		

- Beware of test limitations
- Combine tests for better accuracy

Fig. 3 (abstract 000069) Fluid responsiveness test, methods of monitoring response, and best cut-offs
CCO continuous cardiac output; CI cardiac index; CO cardiac output; EEOT end expiratory occlusion test; EIOT End inspiratory occlusion test; EtCO2 End tidal carbon dioxide; IAH Intraabdominal hypertension; IVC inferior vena cava; LIMITS Low HR/RR ratio, Irregular heart beats, Mechanical ventilation with low tidal volumes, increased abdominal pressure, thorax open, spontaneous breathing; LTVV low tidal volume ventilation; Mini-FC mini fluid challenge; PI perfusion index; PLR passive leg raising; PP pulse pressure; PPV pulse pressure variation; SV stroke volume; SVV stroke volume variation; VTI velocity time integral

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Topic: Cardiovascular issues in ICU

000070

A pilot study comparing systemic vascular resistance derived via ultrasound versus transpulmonary thermodilution

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Intensive care Medicine Experimental 2025* 13(1):*000070

Introduction: Advanced hemodynamic monitoring plays a vital role in the management of critically ill patients in shock by providing essential insights into cardiac output (CO) and its determinants: preload, contractility, and afterload (1). These parameters allow for targeted fluid resuscitation and titration of vasoactive medications, which are crucial for optimizing patient outcomes. However, traditional hemodynamic monitoring methods, such as transpulmonary thermodilution (TPTD), while accurate, are invasive, and time-consuming to set up(2). Additionally, these devices may not be readily available during the early stages of shock or in low-resource environments. Recent advances in ultrasound technology has made it possible to automatically derive systemic vascular resistance (SVR) from automated measurement of stroke volume and heart rate, with manual input of mean arterial pressure (MAP) and central venous pressure (CVP). The objective of this pilot study is to compare the accuracy of ultrasound-derived SVR when operated by trained clinicians to TPTD.
Methods: This is a single-center, cross-sectional observational pilot study conducted in a tertiary intensive care unit. 21 measurements were performed in 14 adult patients with varying types and degrees of shock who were already on pulse indicator continuous cardiac output (PiCCO) monitoring. SVR measurements were obtained directly from TPTD. As for ultrasound-derived SVR, left ventricular outflow tract (LVOT) diameter and automated LVOT velocity time integral (LVOT VTI) were measured by trained clinician, while CVP and MAP from invasive arterial blood pressure monitoring were manually inputted the system to generate the SVR. The resulting data were analysed using appropriate descriptive statistics, Pearson's correlation coefficient to assess the strength of the relationship, and Bland–Altman analysis to evaluate the level of agreement between ultrasound-derived and TPTD SVR readings.
Results: A strong positive correlation was observed between ultrasound-derived and TPTD SVR readings ($r = 0.778$, $P = 0.000$). The mean difference was 70.8 dyn·sec·cm^{-5}, with 95% limits of agreement (LOA) ranging from -481.42 to 623.0 dyn·sec·cm^{-5} (Fig. 1). This strong correlation indicates that ultrasound can be a reliable alternative to TPTD, with an acceptable range of variation for clinical use. Furthermore, when classifying patients into low, normal or high systemic vascular resistance index (SVRI) categories, ultrasound accurately predicted the SVRI category in 81% of cases (17 out of 21). Discrepancies between the two methods were observed in four cases: two patients with normal SVRI according to TPTD were classified as having low SVRI by ultrasound, one patient with low SVRI according to TPTD was categorized as normal, and one patient with low SVRI was classified as high by ultrasound.
Conclusions: This pilot study demonstrates a strong correlation between ultrasound-derived and TPTD SVR readings with

acceptable limits of agreement. In resource-limited settings when advanced hemodynamic monitoring equipment is not available, ultrasound-based SVR measurement by trained clinicians can provide invaluable guidance on clinical management. However, further research is necessary to validate the reliability of this method across different clinical scenarios and to investigate factors that may impact its accuracy.

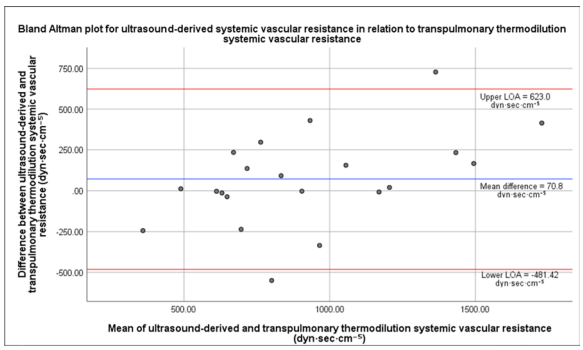


Fig. 1 (abstract 000070) Bland Altman plot for ultrasound-derived systemic vascular resistance in relation to transpulmonary thermodilution systemic vascular resistance. LOA = 95% limits of agreement

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Topic: Cardiovascular issues in ICU

000073

Impact of fluid creep on volume and chloride load in critically ill adults: a prospective study on its prognostic significance and association with MAKE30

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Intensive care Medicine Experimental 2025* 13(1):*000073

Introduction: This prospective ICU study (n = 1633) reveals fluid creep as the primary fluid source (48.4%), linking high doses (> 802 ml/d) to increased major adverse kidney events (MAKE30), emphasizing cautious fluid management in critical care.
Objectives: Quantify the fluids used for different purposes in the intensive care unit (ICU). To explore sources of fluids besides resuscitation fluids that have a significant impact on the volume and chloride load of critically ill adult patients, and analyze its impact on prognosis.
Methods: We performed a prospective observational study in a 52-bed tertiary academic ICU. Precisely recorded information on the volume intake and output in the first 5 days of ICU stay and the purpose of each fluid prescription, for all patients admitted to the ICU from May to December 2022. All fluids were divided according to the purpose of use into five major categories: resuscitation fluids, fluid creep, maintenance/replacement fluids, nutrition fluids, and blood products. Quantify the trend of the amount of each fluid used in adult critically ill patients and its effect on volume load. Patients were divided into the high fluid creep group (> 802 ml/d) and the low fluid creep group (≤ 802 ml/d) according to the median fluid creep dosage. Logistic regression was used to analyse the correlation between this and the incidence of MAKE30.
Results: A total of 1633 adult critically ill patients were included, with a median age of 67 (55, 76) years, and a median APACHE II score of 22 (16, 29). Fluid creep accounted for 48.4% of the total daily fluid, with a median of 802 (450, 1238) mL, far exceeding resuscitation fluid (8.6%) or maintenance/replacement fluids (6.7%), and was the largest daily fluid use in adult critically ill patients. After adjustment for all confounders, high fluid creep was associated with an increased incidence of MAKE30 (OR = 1.35, 95% CI 1.02—1.79, p = 0.038) and each of its components: in-hospital mortality (OR = 1.49, 95% CI 1.03–2.16), the rate of new renal replacement therapy (RRT) (OR = 1.83, 95% CI 1.27–2.64), and the incidence rate of persistent renal damage (PRD) (OR = 1.75, 95% CI 1.06–2.89).
Conclusions: Fluid creep is the major source of volume and chlorine loading in critically ill adult patients, and high doses are associated with an increased incidence of MAKE30. Special care should be taken when prescribing intravenous fluid therapy.

Fluid types		volume		Chloride
	%	Mean daily fluid volume in mL ± SD	Median daily fluid volume in mL (IQR)	Mean daily amount in mmol ± SD
Fluid creep	48.4%	868±618	802 (450, 1238)	134±95
Intravenous solvents	41.5%	756±578	701 (350, 1113)	116±89
Keep line open	4.2%	62±108	0 (0, 100)	10±17
Oral medicine	2.7%	50±98	0 (0, 80)	8±15
Resuscitation fluids	8.6%	153±511	0 (0, 0)	24±79
crystalloid	7.9%	141±487	0 (0, 0)	22±75
20% Human albumin	0.7%	12±52	0 (0, 0)	2±8
Maintenance/replacement	6.7%	125±418	0 (0, 0)	19±64
Maintenance fluids	4.6%	46±186	0 (0, 0)	7±29
Replacement fluids	2.1%	78±384	0 (0, 0)	12±59
Nutrition Fluids	28.9%	517±537	500 (0, 1000)	80±83
Enteral nutrition	19.0%	352±463	50 (0, 540)	54±71
Parenteral Nutrition	9.9%	166±410	0 (0, 0)	26±63
Blood products	7.4%	128±372	0 (0, 0)	20±57
Total amount	100%	1787±1097	1702 (1070, 2414)	275±169

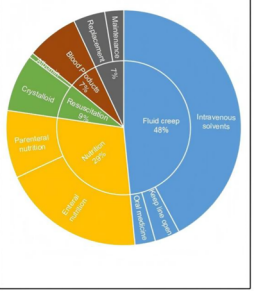


Fig. 1 (abstract 000073) Proportions, means, and medians of average daily different fluid types for the first 5 days of ICU admission

A total of 1633 patients had a cumulative ICU stay of 5305 days. The pie chart represents the overall proportion of different kinds of liquid. Data were skewed and most data had medians of 0. To better represent trends in the set, mean standard deviations were presented. SD standard deviation; M median; IQR interquartile range.

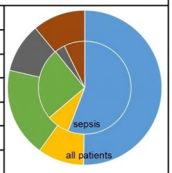
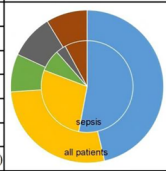
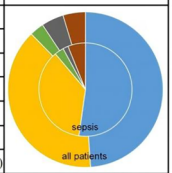
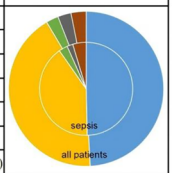
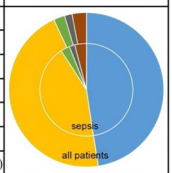
	Sepsis	Whole cohort	
First day of admission	n=487	n=1633	
Fluid creep	56%	50%	
Resuscitation fluids	25%	19%	
Maintenance/replacement fluids	4%	10%	
Nutrient Solutions	8%	10%	
Blood products	7%	11%	
Total mean daily fluid volume	1442 (860, 2253)	1201 (751, 2013)	
Mean cumulative fluid balance	403 (-365, 1395)	99 (-633, 874)	
Second day of admission	n=433	n=1364	
Fluid creep	53%	46%	
Resuscitation fluids	8%	8%	
Maintenance/replacement fluids	4%	9%	
Nutrient Solutions	28%	28%	
Blood products	8%	9%	
Total mean daily fluid volume	1976 (1285, 2523)	1770 (1204, 2438)	
Mean cumulative fluid balance	0 (-878, 725)	-100 (-1050, 637)	
Third day of admission	n=365	n=1025	
Fluid creep	52%	48%	
Resuscitation fluids	3%	3%	
Maintenance/replacement fluids	2%	5%	
Nutrient Solutions	37%	39%	
Blood products	6%	5%	
Total mean daily fluid volume	1892 (1410, 2454)	1734 (1152, 2327)	
Mean cumulative fluid balance	0 (-542, 430)	-42 (-754, 601)	
Fourth day of admission	n=278	n=724	
Fluid creep	50%	49%	
Resuscitation fluids	3%	3%	
Maintenance/replacement fluids	2%	3%	
Nutrient Solutions	41%	42%	
Blood products	5%	3%	
Total mean daily fluid volume	1914 (1310, 2593)	1794 (1243, 2431)	
Mean cumulative fluid balance	0 (-157, 0)	-79 (-825, 540)	
Fifth day of admission	n=219	n=560	
Fluid creep	48%	48%	
Resuscitation fluids	3%	2%	
Maintenance/replacement fluids	2%	2%	
Nutrient Solutions	43%	46%	
Blood products	4%	2%	
Total mean daily fluid volume	2083 (1487, 2713)	1891 (1253, 2452)	
Mean cumulative fluid balance	0 (0, 0)	-38 (-847, 517)	

Fig. 2 (abstract 000073) Variation in the proportion of different fluid sources per day during the first 5 days of ICU admission

The first day of ICU admission from admission to the ICU until 8:00 a.m.; the last day of ICU stay from 8:00 a.m. that day until departure from the ICU.

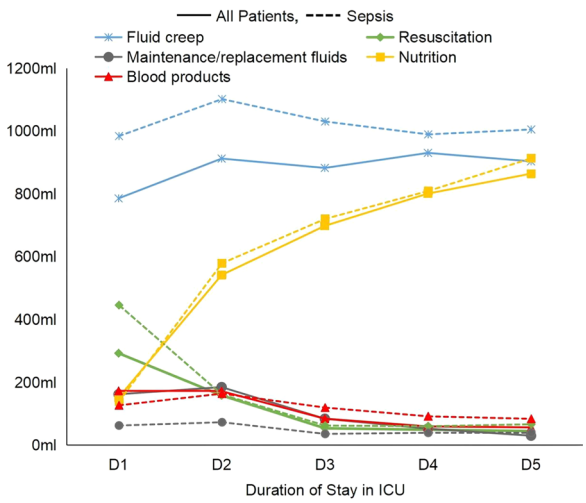


Fig. 3 (abstract 000073) Trends in the average daily dosage of different types of fluids during the first 5 days of ICU stay

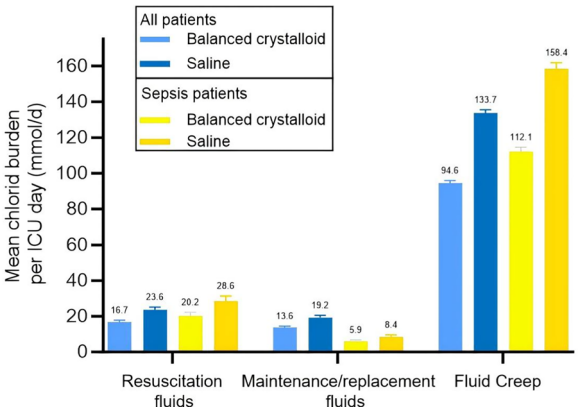


Fig. 4 (abstract 000073) Effect of different fluid types on chloride load in critically ill patients. Assume the difference in chloride load caused by using lactated Ringer's solution or saline as the resuscitation fluids, maintenance/replacement fluids and fluid creep, respectively. The bar is the standard error bar

Table 1 (abstract 000073) Demographic and clinical data of the study population. Data are expressed as median (interquartile spacing) or numbers (percentages)

Baseline Characteristics	n=1633
Male	1014 (62.1%)
Age, years	67 (55, 76)
BMI, kg/m^2	22.0 (19.6, 24.9)
APACHE II	22 (16, 29)
Total days of hospitalization	9 (4, 16)
Length of ICU stay	3 (1, 7)
Death in hospital	191 (11.7%)
Sepsis/septic shock	487 (29.8%)
COPD	144 (8.8%)
Hypertension	562 (34.4%)
Diabetes	296 (18.1%)
TBI	84 (5.1%)
CKD	183 (11.2%)
Mechanical Ventilation	857 (52.5%)

Demographic and clinical data of the study population. Data are expressed as median (interquartile spacing) or numbers (percentages). BMI Body Mass Index, APACHE II Acute Physiology and Chronic Health Evaluation, COPD Chronic Obstructive Pulmonary Disease, TBI Traumatic Brain Injury, CKD Chronic Kidney Disease.

Table 2 (abstract 000073) Comparison of baseline data after grouping patients based on the average daily dosage of fluid creep

variable	Overal n=1633	low fluid creep group n=819	high fluid creep group n=814	*P*
Characteristics，M (IQR)				
Male，n (%)	1014 (62.1%)	500 (61.1%)	514 (63.1%)	0.383
Age，(year)	67 (55, 76)	68 (54, 76)	67 (55, 75)	0.305
BMI, kg/m^2	22.0 (19.6, 24.9)	21.5 (19.5, 24.2)	22.2 (19.5, 25.2)	0.215
APACHE II	22 (16, 29)	19 (13, 25)	25 (19, 33)	<0.001
Mechanical ventilation	857 (52.5%)	271 (33.1%)	586 (72.0%)	<0.001
Fluid creep, ml/d	802 (450, 1238)	452 (252, 620)	1240 (1000, 1615)	<0.001
Underlying diseases，n (%)				
COPD	144 (8.8%)	69 (8.4%)	75 (9.2%)	0.574
hypertension	562 (34.4%)	312 (38.1%)	250 (30.7%)	0.002
diabetes	296 (18.1%)	163 (19.9%)	133 (16.3%)	0.062
Chronic liver disease	169 (10.3%)	89 (10.9%)	80 (9.8%)	0.491
Cardiovascular disease	324 (19.8%)	184 (22.5%)	140 (17.2%)	0.008
Cerebrovascular disease	149 (9.1%)	82 (10.0%)	67 (8.2%)	0.211
Tumour	179 (11.0%)	86 (10.5%)	93 (11.4%)	0.55
CKD	183 (11.2%)	110 (13.4%)	73 (9.0%)	0.004
Diagnosis at ICU admission，n (%)				
TBI	84 (5.1%)	33 (4.0%)	51 (6.3%)	0.041
Poisoning	116 (7.1%)	69 (8.4%)	47 (5.8%)	0.037
Severe pneumonia	286 (17.5%)	102 (12.5%)	184 (22.6%)	<0.001
Gastrointestinal perforation	41 (2.5%)	18 (2.2%)	23 (2.8%)	0.42
Gastrointestinal bleeding	332 (20.3%)	177 (21.6%)	155 (19.0%)	0.197
Acute myocardial infarction	142 (8.7%)	71 (8.7%)	71 (8.7%)	0.976
Severe acute pancreatitis	45 (2.8%)	23 (2.8%)	22 (2.7%)	0.893
Sepsis/septic shock	487 (29.8%)	152 (18.6%)	335 (41.2%)	<0.001
Outcome				
Newly initiated RRT, n(%)	247 (15.1%)	77 (9.4%)	170 (20.9%)	<0.001
Death in hospital，n(%)	191 (11.7%)	54 (6.6%)	137 (16.8%)	<0.001
PRD[a], n(%)	103 (6.3%)	26 (3.2%)	77 (9.5%)	<0.001
MAKE30[b], n(%)	421 (25.8%)	139 (17.0%)	282 (34.6%)	<0.001
Length of ICU stay	3 (1, 7)	2 (1, 4)	4 (2, 9)	<0.001
Total days of hospitalization	9 (4, 16)	10 (5, 16)	9 (3, 15)	0.004
Total hospital costs, in yuan	33020 (18925, 65052)	26550 (15647, 50032)	43856 (23566, 76133)	<0.001

M (IQR) Median and interquartile range，BMI Body mass index，APACHE II Acute Physiology and Chronic Health Evaluation II score，TBI Traumatic brain injury，RRT Renal replacement therapy，PRD Persistent renal dysfunction，MAKE30 Major adverse kidney events within 30 days.

[a] Last serum creatinine at discharge greater than or equal to 2 times the basal serum creatinine

[b] Includes death in hospital, new RRTs, and PRDs, with data collected up to the time of discharge or 30 days after inclusion, whichever occurs first

Table 3 (abstract 000073) The adjusted logistic regression model, correlation analysis between the dosage of fluid creep and the incidence of MAKE30

	Fluid creep as Binary Variable		Fluid creep as Continuous Variable	
	OR (95% CI)	*P*	OR (95% CI)	*P*
High fluid creep group	1.35 (1.02, 1.79)	0.038	——	——
Fluid creep	——	——	1.001 (1.00, 1.001)	<0.001
APACHE II	1.05 (1.04, 1.07)	<0.001	1.05 (1.03, 1.06)	<0.001
Mechanical Ventilation	2.97 (2.15, 4.11)	<0.001	2.69 (1.94, 3.72)	<0.001
Hypertention	0.90 (0.68, 1.198)	0.473	0.95 (0.72, 1.27)	0.75
Diabetes	0.81 (0.57, 1.15)	0.236	0.79 (0.55, 1.13)	0.201
Cardiovsacular disease	1.39 (1.00, 1.92)	0.049	1.43 (1.03, 1.987)	0.033
CKD	0.32 (0.19, 0.52)	<0.001	0.34 (0.21, 0.56)	<0.001
TBI	0.61 (0.33, 1.14)	0.119	0.55 (0.29, 1.23)	0.063
Poisoning	10.67 (6.61, 17.23)	<0.001	10.57 (6.53, 17.11)	<0.001
Severe pneumonia	0.84 (0.59, 1.20)	0.348	0.85 (0.59, 1.22)	0.38
Sepsis/Septic Shock	1.62 (1.19, 2.20)	0.002	1.53 (1.12, 2.09)	0.007

Table 4 (abstract 000073) The adjusted logistic regression model, correlation analysis between the dosage of fluid creep and various outcomes of MAKE30

	Death in hospital		new RRTs		PRDs	
	OR (95% CI)	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*
High fluid creep group	1.49 (1.03, 2.16)	0.036	1.83 (1.27, 2.64)	0.001	1.75 (1.06, 2.89)	0.029

The confounding factors adjusted in the three multivariate regression models were as follows APACHE II score, mechanical ventilation, hypertension, diabetes, underlying cardiovascular disease, CKD, TBI, poisoning, severe pneumonia and sepsis/septic shock.

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Topic: Acute Kidney Injury and haemofiltration

000074

The impact and relationship of diastolic shock index and various hemodynamic variables on mortality in patients with cardiogenic shock

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Intensive care Medicine Experimental 2025* 13(1):*000074

Introduction: Persistent tissue hypoxia from cardiogenic shock (CS) leads to vasoplegia owing to endothelial dysfunction. A low diastolic arterial pressure (DAP) in the first 24 h of admission was independently and significantly associated with mortality in patients with CS. Diastolic shock index (DSI) is a non-invasive hemodynamic parameter which is the ratio of heart rate to DAP, first utilized to evaluate vascular tone in patients with septic shock. There have been no studies utilizing DSI in assessing severity of circulatory dysfunction and classifying patients with CS in order to detect who are more likely to benefit from an early vasopressor treatment and possible escalation of therapy.
Objectives: The primary objective of this study is to determine whether a significant DSI values during the first six hours of assessment is associated with mortality in CS.
Methods: We conducted a single-center retrospective observational study in a tertiary hospital. Adult patients diagnosed to have CS by SCAI classification who have hemodynamic instability not receiving any vasoactive and/or mechanical circulatory therapy on assessment. Patients with moderate to severe aortic regurgitation, atrial fibrillation, hyperthyroidism, on pacemaker, SA and AV node dysfunction, severe anemia and liver cirrhosis were excluded. 266 patients were reviewed but only 54 patients were eligible. DSI was calculated on baseline, 2nd, 4th and 6th hour of initial resuscitation.
Results: Average SAPS score was higher in patients with elevated DSI ($\geq$ 2.2). In-hospital mortality rate remains to be elevated by more than half (52%) similar to the study of Rigamonti et al. and was high (16.7%) in patients with elevated DSI **(Table 1)**. Non-survivors were noted to have higher DSI value as compared to the survivors during the first six hours (**Fig. 3**). For every unit increase in DSI on baseline, odds of mortality increases by less than a half (39%). However, the subsequent increases in DSI from 2nd, 4th, and 6th hour of resuscitation did not show any significant pattern and had no statistically significant relationship with mortality **(Fig. 2)**.
Conclusions: Similar to septic shock, an elevated baseline DSI seems to correlate with inpatient mortality in patients with CS. We failed to demonstrate that changes in DSI during the first six hours of resuscitation impact mortality and therefore we do not recommend DSI as a target for resuscitation in Cardiogenic shock. A larger prospective study is suggested to identify a specific DSI cut-off and evaluate its prognostic value in cardiogenic shock.

Table 1 (abstract 000074) shows the demographic and clinical profile of patients with cardiogenic shock

	DSI < 2.2 (n=43)	DSI ≥ 2.2 (n=11)
Age, years	61.0	58.0
Male sex, n (%)	25 (46.3)	8(14.8)
Female sex, n (%)	18 (33.3)	3(5.6)
SAPS III*		
Average	68.8	83.5
Median	69.5	82.0
Septic shock, n (%)		
- No septic shock	29 (53.7)	6(11.1)
- With concurrent septic shock	14 (25.9)	5(9.3)
Coagulopathy, n (%)		
- No coagulopathy	37 (68.5)	8(14.8)
- With concurrent coagulopathy	6 (11.1)	3(5.6)
Hypertension, n (%)		
- Non-hypertensive	12 (22)	4 (7.4)
- With hypertension	31(57.4)	7 (13.0)
Type 2 DM, n (%)		
- Non-Diabetic	18 (33.3)	7 (13.0)
- Diabetic	25 (46.3)	4 (7.4)
Acute Coronary Syndrome, n (%)		
- Non-ischemic heart disease	11 (20.4)	2(3.7)
- STEMI**	22 (40.7)	5(9.3)
- NSTEMI***	10 (18.5)	4(7.4)
Revascularization, n (%)		
- Optimal medical therapy	23 (42.6)	6(11.1)
- Underwent revascularization	20(37.0)	5(9.3)
Left ventricular ejection fraction (%),		
average	36.5	34.9
median	35.5	40.4
Valvular heart Disease, n (%)		
- No valvular heart disease	19 (35.2)	9(16.7)
- With Valvular heart disease	23 (42.6)	2(3.7)
- No echocardiogram	1 (1.9)	0.0
Volume of initial fluid resuscitation (first 6 hrs), mL	475.0	613.6
Cumulative fluid balance at 24 hrs, mL	1243.8	461.8
Dobutamine, mcg/kg/min		
Average	4.36	2.50
Median	3.00	2.50
Norepinephrine dose, mcg/kg/min		
Average	0.46	0.48
Median	0.20	0.40
Vasopressin dose, units/min		
Average	0.04	-
Median	0.05	
Lactate, mmol/L		
Average	5.6	6.9
Median	4.0	6.1
Acute kidney injury, n (%)		
No acute kidney injury	8 (14.8)	0.0
Non-dialysis requiring	22 (40.7)	6(11.1)
Dialysis requiring	3 (24.1)	5(9.3)
ICU length of stay, days	6.5	2.9
Hospital length of stay, days	14.1	4.5
30-day mortality, n (%)		
- Survivors	24 (44.4)	2(3.7)
- Non-survivors	19 (35.2)	9(16.7)

**Simplified Acute Physiology Score 3*
***ST-elevation Myocardial infarction*
**** Non-ST-Elevation Myocardial infarction*

	Regression coefficient	Std. Error	t-value	p-value
(Intercept)	-3.4531	1.5339	-2.2510	0.0244
Baseline DSI	0.3288	0.5043	0.6520	0.5144
DSI at 2nd hour	-0.3303	0.7533	-0.4380	0.6611
DSI at 4th hour	2.9482	1.6127	1.8280	0.0675
DSI at 6th hour	-0.5909	1.2327	0.4790	0.6317

Logistic regression model on mortality using DSI at baseline, 2nd hour, 4th hour and 6th hour

Fig. 2 (abstract 000074) Logistic regression analysis
The logistic regression model on mortality using DSI during the first six hours of resuscitation

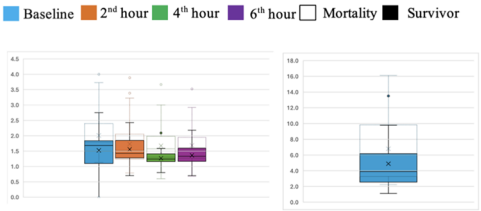


Fig. 3A **Fig 3B.**
Box and whisker plots for DSI at baseline, 2nd hour, 4th hour and 6th hour of resuscitation (Fig 3A) with mortality. Baseline DSI and mortality are shown in Fig 3B. DSI values were partitioned to 4 quantiles (Baseline to 6th hour). The median is shown as the X in the middle of the boxes and tails represent the 95% range.

Fig. 3 (abstract 000074) Comparable box plot legend
Box and whisker plots for DSI during the first six hours of resuscitation. Color filled portion of the box represents the survivors. DSI values were partitioned to 4 quantiles (baseline to sixth hour). The median is shown as the X in the middle of the boxes and tails represent the 95% range.

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Topic: Cardiovascular issues in ICU

000077

Lactylation of S100A9 protein: a new insight into sepsis-associated lung injury

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Intensive care Medicine Experimental* 2025 13(1):*000077

Introduction: Sepsis is a life-threatening systemic inflammatory condition often complicated by acute lung injury (ALI), with limited therapeutic options. The pathophysiology of sepsis-induced organ dysfunction remains poorly understood, highlighting the need for novel insights into disease mechanisms.
Objectives: This study investigates the role of (S100A9 in sepsis-associated ALI, focusing on its post-translational modifications and their implications in inflammation and tissue damage.
Methods: Through lactylation proteomics and immunoprecipitation, we identified that S100A9 undergoes lactylation at K4 and K94. Using BMDM cells and confocal microscopy, we demonstrated S100A9 nuclear translocation and its regulation by lactylation. Subsequent mass spectrometry, CUT&Tag, and RNA sequencing revealed that S100A9 interacts with CEBPB to regulate IL-1β transcriptional activation.
Results: We identified that S100A9 undergoes lactylation at lysine residues K4 and K94. LPS stimulation enhances S100A9's colocalization with the nucleus and its presence in nuclear fractions. Furthermore, lactylation of S100A9 enhances its nuclear translocation, and through interaction with Cebpb, it regulates the transcriptional activation of IL-1β, thereby mediating inflammatory responses that contribute to sepsis-induced lung injury.
Conclusions: In this study, we revealed the specific mechanism of sepsis-induced lung injury through S100A9 lactylation modification

and its interaction with transcription factor Cebpb to regulate pro-inflammatory IL-1β gene transcription. Further research is needed to validate these findings and explore their therapeutic implications, particularly in the context of clinical nutrition and metabolic interventions to improve patient outcomes in sepsis-associated ALI.

Topic: Sepsis

000079

Early mobilization of critically ill patients: a systematic review of perceived barriers

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Introduction: Early mobilization of critically ill patients is a feasible and safe intervention that prevents ICU-acquired weakness and other complications 1. However, its limited implementation suggests a gap between the research evidence and clinical practice 2. It is widely accepted that early mobilization faces a variety of barriers 3. Over the last 15 years, significant efforts have been made internationally to identify and manage these barriers 4, 5.
Objectives: The objective of this systematic review is to identify the questionnaires used for recognizing barriers, as well as to study these barriers faced by physiotherapists at an international level.
Methods: The research was conducted in the following databases: PubMed, Science Direct, Scopus and Cochrane. The keywords which used during the search were: "early mobilization", "early mobility", "early rehabilitation", "intensive unit care patients", "critically ill patients", and "barriers". We included studies from January 2013 to September 2023 and excluded those that were not published in English. The inclusion criteria were as follows: a) qualitative studies in which the questionnaire or interview was used to collect data, b) studies where early mobilization was carried out in the ICU, c) early mobilization was applied to adult patients and d) the participants of the studies included at least the physiotherapy profession.
Results: We included 19 studies and analyzed their data based on the literature search. The participants were doctors, nurses, physical therapists, and respiratory therapists who work in the ICU and are involved in the process of early mobilization. Of the 19 studies, only 3 included exclusively physical therapists. Additionally, 10 studies reported that the sample had an average of more than 5 years of experience in the ICU. In 9 studies, the barriers were categorized into: patients, health care providers, equipment and institutional-related barriers. The most common perceived patient barriers were sedation and medical instability. The most frequently perceived provider barriers were limited staffing and education. Also, insufficient equipment had been reported as a barrier by 16 studies. The most important institutional-related barrier was the lack of communication during early mobilization.
Conclusions: These barriers varied across ICUs and within providers, depending on the ICU patient population, setting, attitude, and ICU culture. Systematic efforts to change ICU culture to prioritize early mobilization using an interprofessional approach and strategies are important steps for successfully implementing early mobility in clinical practice.

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Topic: Nursing care and physiotherapy

000080

Psychometric properties of functional measures in survivors of critical illness: a systematic review

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Introduction: Advances in medical technology have led to an increase of the number of patients who survive critical illness. However, a large percentage of them experience reduced functionality and inability to return to activities of daily living. The international community uses a variety of tools to measure the functional ability of critically ill patients to identify deficits and to design an appropriate rehabilitation program.
Objectives: This systematic review aimed to identify the tools measuring functional ability of surviving critically ill patients and to document the studies testing their reliability and validity.
Methods: The following databases were searched; Scopus and PubMed systematically, by two independent researchers for studies on psychometric evaluation of functional measurement tools implemented post-ICU discharge published in English. Search strategy included keywords like: psychometric properties, validity, reliability, functional, outcome, ability, ICU, survivors critical illness. The assessment of the methodological quality of the studies was performed using the "COSMIN Risk of Bias checklist for Systematic reviews of Patient—Reported Outcome Measures".
Results: 257 studies were identified, of which only 20 were included in the systematic review. The methodological quality of these was low. Barthel Index, Functional Independence Measure (FIM), Chelsea Critical Care Physical Assessment Tool (CPAx), Functional Status Score for the ICU (FSS-ICU), Physical Function in ICU Test (PFIT), ICU Mobility Score (IMS), De Morton Mobility Index (DEMMI), 6 Minute Walk Test (MWT), 2MWT, 30MWT and 5 Sit To Stand have been used after discharge from the ICU to assess functional ability. Yet from these only 9 have been examined for their psychometric properties. FSS-ICU, CPAx and PFIT have the most thorough and extended psychometric evaluation. All had presented moderate to high validity and reliability. Yet, taking into consideration the COSMIN tool there are a lot of domains that have been examined.
Conclusions: Functional assessment tools for survivors of critical illness can provide valid and reliable measures. However, there is a need to test the remaining tools. The need to adopt a tool that assesses all the deficits that this group of patients may present, regardless of their diagnostic category and severity, is highlighted.

Topic: Nursing care and physiotherapy

000081

Burnout syndrome among intensivists and anesthesiologists in four emirates health services hospitals: a cross-sectional study

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Introduction: Burnout syndrome is a multidimensional mental illness that develops due to sustained exposure to professional stressors without a chance for recovery. Anesthesiologists and intensivists are highly vulnerable to suffer from such disorder due to continuous exposure to high level of stress.
Objectives: *The aim of this study* was to identify the prevalence of burnout syndrome among intensivists and anesthesiologists and to the associated risk factors in four Emirates Health Services (EHS) hospitals: Al Qassimi Hospital (AQH) and Sharjah Kuwait hospital (SKH), Ibrahim Bin Hamad Obeiedullah hospital (IBHOH) and Alkuwait hospital Dubai (MBH)
Methods: This cross-sectional study was conducted on all physicians (111 physicians) (consultants, specialists, general practitioners, and residents) from anesthesia and critical care departments from the four hospitals in (EHS) included in the study. A questionnaire including 54 questions covering the demographic, occupational, social data and Maslach Burnout Inventory Human Services Survey (MBI-HSS) for physicians which included 22 items: emotional exhaustion (nine items [score from 0–54]), depersonalization (five items [score from 0–30]) and feeling of personal accomplishment (eight items [score from 0–48]) was used. Each item in (MBI-HSS) was scored using a 7-level scale ranging from 0 to 6 (0 = never, 1 = a few times a year, 2 = once a month or less, 3 = a few times a month, 4 = once a week, 5 = a few times a week, 6 = every day), allowing for subscale assessment in all three dimensions. The physician was diagnosed to be burnt-out if he achieved total scores of Emotional exhaustion (EE) > 27 and either Depersonalization (DE) > 10 or personal accomplishment (PA) < 40. The questionnaire responses were electronically collected for statistical analysis through the EHS research hub. The physician was diagnosed to be burnt-out if he achieved total scores of EE > 27 and either DE > 10 or PA < 40. The questionnaire responses were electronically collected for statistical analysis through the EHS research hub. An approval from Ministry of Health and Prevention Research Ethical Committee was obtained before starting the research. The questionnaire was sent to all concerned physicians included in the study by email. The consent form was attached to the survey and electronic consent approval was obtained through the survey from all participants. *Exclusion criteria: any* physicians who refused to participate, had any history of psychiatric illness or recruited within 6 months prior to survey
Results: The responders were 96 out of 111. They were classified, based on working department and their position. Out of the 96 participants, 42.7% had been diagnosed with burnout. However, most of the participants, 68.8%, exhibited a high grade of the isolated dimension. In relation to burnout diagnosis and Department, participants working in Anesthesia department exhibited the highest rate of burnout (52.1%), compared to those working in ICU department (33.3%). However, the results were not statistically significant. In terms of burnout diagnosis and position, consultants had the highest rate of burnout at 55.6%, followed by residents by 50%. Conversely, General Practitioners had the highest rate of negative diagnoses at 92.3%. With a p-value of 0.041, based on burnout diagnosis across hospitals, participants from AQH had the highest rate of burnout (58.3%), followed by SKH (47.8%). Conversely, HBH had the highest rate of negative diagnosis (91.7%). With a p-value of 0.001, we may conclude that there is a statistically significant association between burnout diagnosis and hospital affiliation. All other factors like work load, job satisfaction, working hours, age, social status, financial satisfaction did not showed significant correlation with burnout.
Conclusions: Based on this study, anaesthesiologists are more vulnerable to burnout compared to intensivists, the work place affiliation is a significant factor as well as the position as consultants are more vulnerable than other positions, followed by residents and the least were general practitioners and physicians working in Alqassimi hospital developed more burnout.

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Topic: Health Services Research and Outcome

000083

The dose–response relationship between transfusion and the incidence of infection in critically ill patients: a systematic review and dose–response meta-analysis

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Introduction: Red blood cell (RBC) transfusion is the most frequently administered therapy in intensive care units (ICU). Red blood cell transfusion carries inherent risks including hospital-acquired infections (HAIs). Identification of modifiable risk factors is essential for optimizing patient outcomes.
Objectives: To estimate the association between red blood cell transfusion volume and HAIs in critically ill patients.
Methods: MEDLINE, CENTRAL, Embase, and Transfusion Evidence Library were searched for studies published from database inception until November 2024. Citation searches and reference checks of relevant guidelines were combined. Studies to evaluate the transfusion and anemia pharmacotherapy for critically ill patients were included. The interested outcome was the incidence of HAIs. We conducted a dose–response meta-analysis (DRMA) using a one-stage random-effects model.
Results: We identified 39,453 records from database searches. After combining results from citation searches and reference checks of guidelines, 45 studies were eligible. For DRMA, we eliminated 14 studies without results and 15 studies with critical risk of bias. We included 9,452 patients from 16 studies. Our DRMA showed a U-shaped risk curve, with odds ratios for HAIs decreasing and reaching a trough at three units of RBC transfusion. Three units of RBC transfusion may not increase the risk of HAIs in critically ill patients. The clinical implications of higher RBC transfusion volumes remain uncertain.

Conclusions: Healthcare professionals can adopt a restrictive RBC transfusion strategy in critically ill patients with minimal concern for increasing HAIs.

Topic: Transfusion and haemostasis disorders

000087

Early lactate clearance and outcome in severe sepsis: relationship with $ScvO_2$ and implications for resuscitation

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Introduction: Early lactate clearance may be an important indicator of improved survival among patients with severe sepsis. However, the degree to which achieving central venous oxygen saturation ($ScvO_2$) ≥ 70% aligns with lactate clearance during early resuscitation remains unclear.
Objectives: We sought to determine (1) whether early lactate clearance is associated with improved in-hospital survival in emergency department patients with severe sepsis, and (2) the concordance between $ScvO_2$ optimization and lactate clearance during initial sepsis management.
Methods: Within a multicenter shock research network implementing quantitative resuscitation for severe sepsis, we analyzed prospectively collected data from three urban hospitals. Inclusion criteria were:

- Age > 17 years.
- ≥ 2 systemic inflammatory response syndrome criteria.
- Systolic blood pressure ≤ 90 mmHg after fluid challenge **or** initial lactate ≥ 4.0 mmol/L.
- Initial and repeat lactate measurements obtained within 6 h of resuscitation initiation.

Patients were categorized a priori based on previously reported thresholds:

- **Lactate clearance group**: repeat lactate decreased by ≥ 10% from the initial level **or** both initial and repeat lactate ≤ 2.0 mmol/L.
- **Lactate non-clearance group**: repeat lactate decreased by < 10%.

The primary outcome was in-hospital mortality. Multivariate analysis was conducted to assess independent predictors of death.
Results: A total of 166 patients met the inclusion criteria, of whom 15 (9%) showed lactate non-clearance. Overall in-hospital mortality was 19% in the lactate clearance group and 60% in the non-clearance group (P < .001). On multivariate analysis, lactate non-clearance emerged as an independent predictor of mortality (odds ratio, 4.9; 95% CI, 1.5–15.9). Moreover, discordance was observed between lactate clearance and $ScvO_2$ optimization: 79% of those without lactate clearance simultaneously had an $ScvO_2$ ≥ 70%.
Conclusions: In this multicenter cohort of severely septic patients, a failure to clear lactate early in resuscitation was associated with a markedly higher risk of death. Furthermore, achieving $ScvO_2$ ≥ 70% did not reliably ensure lactate clearance. These results support the need for a clinical trial evaluating lactate clearance as a distinct end point in early sepsis resuscitation.

o1-pro

Topic: Sepsis

000090

The impact of normothermic machine perfusion (NMP) support on hemodynamic stability during reperfusion and early recovery outcomes for liver transplant recipients from donation after cardiac death (DCD) donors

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Introduction: Liver transplantation is the only current effective treatment option for patients with end-stage liver disease. Donation after cardiac death (DCD) provides additional potential liver grafts for the growing number of patients on the liver transplant waiting list. However, DCD livers are more prone to the negative effects from an often-prolonged ischemia time compared to traditional donation after brain death (DBD) donors. Recently, the use of ex situ normothermic machine perfusion (NMP) has shown early promising results for increasing acceptable grafts for transplantation and decreasing the incidence of early graft dysfunction.
Objectives: Our study aimed to identify if the use of NMP impacts stability at reperfusion and early clinical outcomes for liver transplant recipients who receive a liver from a DCD donor.
Methods: We performed a retrospective cohort study comparing adult liver transplant recipients who received DCD liver transplants with and without the use of NMP support after harvest and prior to transplant at Mayo Clinic in Rochester, MN from June 2018 through February 2025. Our institution transitioned to use of NMP in November 2023 and 35 patients ultimately received DCD liver grafts with the use of NMP. We then took a random historical sample of 35 different patients prior to November 2023 for our comparison group. We also collected patient age and sex at the time of transplant. Outcomes of interest included total epinephrine and vasopressin dose during the reperfusion phase (1 min prior through 4 min after), incidence of cardiac arrest at reperfusion, development of post-reperfusion syndrome, and 30-day mortality.
Results: The mean age of patients was 55.4 years and 34.3% were female in the non-NMP DCD liver transplant group compared to 54.3 years and 42.9% who were female in the NMP group. During reperfusion, median epinephrine dose was not significantly different between each group (non-NMP: 20 mcg (IQR 30 mcg); NMP: 20 mcg (IQR 10 mcg) p: 0.55) and median vasopressin dosing was also similar (both non-NMP and NMP: 0.0 units (IQR: 0.5 units) p: 0.85). However, there was a significantly higher incidence of post-reperfusion syndrome in the non-NMP group (51.4%) compared to the NMP group (11.4%) (p: 0.0008). One patient developed cardiac arrest during reperfusion in the non-NMP group compared to no patients in the NMP group and all patients in both groups survived for at least 30 days in our study (Table 1).
Conclusions: In conclusion, our single-center retrospective cohort study showed that while epinephrine and vasopressin use were similar between the non-NMP DCD liver transplant recipients compared to NMP-supported DCD grafts at the time of reperfusion, the incidence of post-reperfusion syndrome was significantly lower in patients who received NMP-supported DCD liver transplants. All patients survived for at least 30 days in our study. Future research should be performed to continue to assess the impact of NMP support for DCD liver transplants on relevant clinical outcomes in this patient population.

Table (abstract 000090) Incidence of post-reperfusion syndrome, cardiac arrest during reperfusion, and 30-day mortality for non-NMP DCD liver transplant patients compared to those who received a graft with the use of NMP support in DCD donors

	Development of Post-Reperfusion Syndrome	Cardiac Arrest During Reperfusion	30-day Mortality
Non-NMP DCD liver transplant patients	51.4%	2.9%	0%
NMP-supported DCD liver transplant patients	11.4%	0%	0%

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Topic: Brain death, organ donation and transplantation

000091

Delta-hemoglobin (ΔHb) and delta-mixed venous oxygen saturation (ΔSVO2) before and after spontaneous breathing trials (SBT) as predictors for mechanical ventilation weaning and extubation

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Introduction: The discontinuation of mechanical ventilation is a critical phase in intensive care, requiring adequate tissue oxygenation for successful weaning and extubation. Previous studies have linked parameters like venous oxygen saturation (VO_2)and hemoglobin (Hb) to weaning outcomes. This study aimed to assess whether changes in mixed venous oxygen saturation (ΔSVO_2) and hemoglobin (ΔHb) during a spontaneous breathing trial (SBT) can predict successful weaning and extubation.
Methods: A prospective cohort study was conducted at a tertiary cardiac center involving mechanically ventilated adult patients with pulmonary artery catheters deemed ready for weaning. Arterial and venous blood gases and complete blood counts were collected before and after the SBT. Patients were categorized based on SBT success or failure, and clinical outcomes—including ICU and hospital days, post-extubation airway support, and mortality—were recorded.
Results: Of the 85 enrolled patients, 73% successfully completed the SBT. Age and sex distributions were similar across groups. The failure group had longer ICU and hospital stays and more likely required non-invasive ventilation. Notably, pre-SBT SVO_2 was significantly lower in the failure group (68.56 ± 9.77) than in the success group (73.11 ± 8.12, p = 0.033), though post-SBT values and ΔSVO_2 were not significantly different. Overall, SVO_2 dropped significantly after SBT (p = 0.030).
ΔHb showed poor predictive value: AUROC 0.4719(95% CI: 0.3395–0.6044), Sn 61.29%,Sp 34.78%, LR + 0.9892, LR − 1.0202. Similarly, ΔSVO_2 had an AUROC of 0.4860(95% CI: 0.3398–0.6320), Sn 64.52%, Sp 34.78%, LR + 0.9892, LR − 1.020. These results suggest limited predictive utility for both markers. This may reflect the patient population—predominantly post-cardiac surgery cases with minimal expected weaning difficulty—and the institutional approach of performing SBTs only in hemodynamically optimized patients, limiting physiologic variability.
Subgroup analysis revealed that post-SBT lactate levels were significantly higher in the failure group (2.7[1.7–7.9],p = 0.002), with a significant increase from baseline (p = 0.018). In contrast, lactate decreased significantly in the success group (p < 0.001), supporting its potential as a predictive marker. Additionally, the pre-SBT CO_2 gap was higher in the failure group (6.5[4.8–8.1]) versus the success group (5.5[3.9–6.9],p = 0.024), with ΔCO_2 gap yielding an AUROC of 0.6052,suggesting modest predictive value.
Conclusions: We observed that neither ΔHb nor ΔSVO_2 proved reliable for predicting weaning success. The limited utility of these markers may reflect the specific characteristics of the studied population with low weaning complexity. Findings from existing literature may be more relevant to patients with anticipated weaning challenges. Alternative predictors like lactate and CO_2 gap, pose greater promise as potential tools for guiding weaning and extubation decisions.

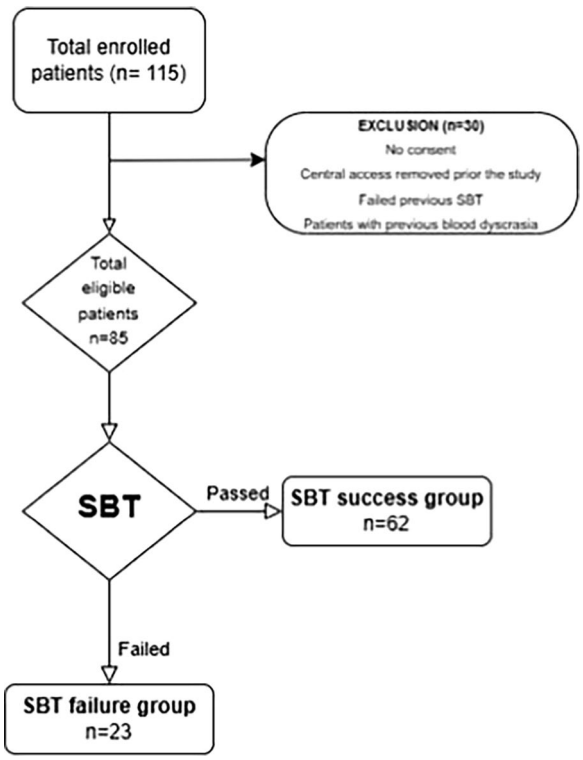


Fig. 1 (abstract 000091) Flow diagram for the recruitment of patients

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Topic: Acute respiratory failure and mechanical ventilation

000092

The application of artificial intelligence technology for assessment of study of the new nurses critical care skill

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Introduction: CPR is an essential competency for training emergency and critical care nurses. Artificial intelligence (AI) technology is emerging as a vital tool.
Objectives: This study employed a mixed-methods approach—integrating quantitative assessments and qualitative interviews—to evaluate the effectiveness of AI-driven CPR study evaluations for newly trained nurses. The findings aim to provide empirical support for optimizing competency-based training systems, particularly for nurses managing critically ill patients in high-stakes clinical environments
Methods Material and method: The study adopted a mixed-methods design, comprising two components:

1. **Quantitative study**: 190 new nurses from Ruijin Hospital, affiliated with Shanghai Jiao Tong University School of Medicine, were randomly assigned to an experimental group (AI-based assessment) and a control group (manual assessment). Operational performance, mastery of theoretical knowledge, and satisfaction levels were compared between the two groups.
2. **Qualitative Study**: Focus group interviews were conducted with 95 participants in the experimental group to explore their experiences and perceived needs regarding AI-driven assessments.
3. All participants underwent standardized training covering CPR techniques (compression depth, frequency, and ventilation ratio) and AED operation protocols. The experimental group utilized an AI assessment system, which automatically scored performance via video capture, posture analysis, and deep learning algorithms.

Results:

1. Operational performance comparison The experimental group's AI-assessed scores (n = 91) averaged 82.35 ± 9.05, significantly lower than the manual scores (90.09 ± 6.85; $P < 0.05$). In contrast, the control group's manual scores (n = 95) averaged 88.08 ± 6.38, showing no significant difference compared to the experimental group's manual scores ($P > 0.05$). These results indicate that AI scoring demonstrated stricter criteria, particularly in technical metrics such as compression depth and interruption duration, whereas manual evaluations prioritized overall procedural fluency.
2. Satisfaction and theoretical knowledge

- Theoretical knowledge: both groups exhibited comparable scores (experimental group: 6.07 ± 0.73 vs. control group: 6.01 ± 0.73; $P > 0.05$). Satisfaction: the manual group reported higher satisfaction (4.73 ± 0.50 vs. 4.21 ± 0.70 in the experimental group; $P < 0.05$). Participants highlighted that AI assessments lacked interpersonal interaction, and technical issues (e.g., system latency) exacerbated anxiety during evaluations.

1. Qualitative insights analysis of interview data identified four key themes:

- Mixed perceptions: participants acknowledged AI's objective feedback, but noted that the silent testing environment heightened nervousness.
- Human–machine interaction dynamics: while the AI interface was user-friendly, real-time performance data were absent. Conversely, traditional assessments risked examiner-induced operational distractions.
- Technical limitations: four participants experienced exam suspensions due to system failures, with some questioning AI's scoring fairness.

Conclusions: AI scoring with human oversight could balance technical precision with holistic evaluation, enhancing both assessment efficiency and standardization.

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Topic: Nursing care and physiotherapy

000094

Assessment of mechanical power normalisation and mechanical power ratio as predictors of ICU mortality: a retrospective cohort study

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Intensive care Medicine Experimental 2025* 13(1)*:000094

Introduction: The optimal mechanical ventilation strategy to minimise ventilator-induced lung injury (VILI) remains uncertain [1]. Mechanical power (MP), the energy applied to the respiratory system per unit time, has emerged as a potential unifying VILI determinant [2]. However, the question of whether and how MP should be normalised to individual patients' characteristics remains unresolved. MP normalisations for predicted body weight [3], compliance [4], and lung gas volumes measured by CT scan [5] have been studied although results have been inconsistent. MP ratio, the ratio of MP to an ideal value of MP based on individual patient characteristics, has shown promise in animal models [6] and small human acute respiratory distress syndrome cohorts [7].
Objectives: In this study, we aimed to assess the impact of normalising mechanical power to a range of physiologically relevant variables on mortality.
Methods: In this retrospective observational study, we analysed granular electronic healthcare record data from mechanically ventilated adults in a single centre over a seven-year period. Primary exposures were MP and five normalisations: for dead space (for corrected minute ventilation, ventilatory ratio, end-tidal to arterial CO2 ratio); lung size (compliance) and for idealised MP (MP ratio). We used logistic regression to assess their association with ICU mortality and calculated the area under the receiver operating characteristic curve (AUROC) to compare their predictive performance. Additionally, we evaluated the linearity or presence of a threshold for the relationships between MP and MP ratio and mortality.
Results: A total of 3,578 patients were included in the analysis. The discrimination of MP normalised to compliance (AUROC 0.71 (0.69-0.73), p = 0.007 for DeLong's test) and MP ratio (AUROC 0.71 (95% CI 0.68–0.73), p = 0.0007 for DeLong's test) were statistically better than of standard MP (AUROC 0.69 (95% CI 0.66–0.71) for predicting ICU mortality. Other mechanical power variants did not show statistically significantly different predictive power for ICU mortality compared to conventional mechanical power. The relationships between MP and MP ratio showed a significant but small departure from linearity (see Fig. 1).
Conclusions: Mechanical power normalised to compliance and to idealised mechanical power (MP ratio) had significantly greater predictive power than mechanical power per se on ICU mortality, although the absolute difference was modest.

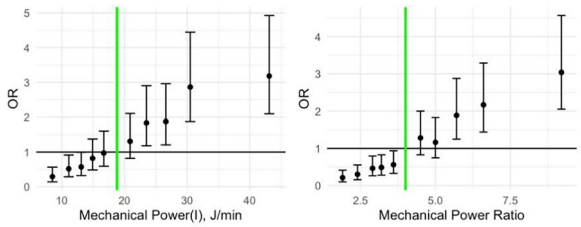


Fig. 1 (abstract 000094) Odds ratios for ICU mortality for 11 quantiles of mechanical power and mechanical power ratio referenced to the median quantile (green line)

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Topic: Acute respiratory failure and mechanical ventilation

000095

Hypotensive exposure duration index: a novel tool for quantifying blood pressure burden and predicting mortality in critically ill patients

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Intensive care Medicine Experimental 2025* 13(1)*:000095

Introduction: Blood pressure management is crucial in critical care, but the relationship between blood pressure exposure patterns and outcomes remains incompletely understood. Current assessment methods often fail to capture the combined impact of both magnitude and duration of blood pressure deviations. This study aimed to develop and validate a novel index that quantifies the cumulative burden of blood pressure exposure by analyzing high-resolution blood pressure measurements in critically ill patients.
Methods: In this retrospective study using the Salzburg Intensive Care Database (SICdb), 15,530 ICU admissions with minute-by-minute continuous invasive arterial pressure monitoring were analyzed. We developed the hypotensive exposure duration index (HEDI) based on high-resolution blood pressure data, examining relationships between various blood pressure thresholds (50-120 mmHg) and exposure durations (5 min to 6 h). The association between HEDI and 28-day mortality was evaluated using Cox regression and Kaplan–Meier analysis. Additionally, we employed nine different machine learning algorithms to assess HEDI's predictive value for 28-day mortality, with the dataset randomly split into training (70%) and testing (30%) sets. Subgroup analyses were conducted for patients with sepsis and those who underwent cardiac surgery.
Results: The developed HEDI values were significantly higher in non-survivors compared to survivors (0.27 versus -0.14, p < 0.001). Our high-resolution analysis revealed that mortality risk increased non-linearly with both the intensity and duration of blood pressure deviations. After adjusting for confounders including Simplified Acute Physiology Score III, peak lactate, age, and comorbidities, HEDI independently predicted 28-day mortality (adjusted hazard ratio 1.352, 95% CI 1.297-1.410; p < 0.001). Kaplan–Meier analysis demonstrated significant differences in 28-day survival between HEDI tertile groups (log-rank test: p < 0.001), with patients in the highest HEDI tertile showing significantly lower survival probability. The machine learning model demonstrated excellent discrimination with an area under the curve of 0.908 (95% CI, 0.889-0.927) and a remarkable specificity of 99.8%. Feature importance analysis identified HEDI as one of the most crucial clinical predictors (importance score = 0.09), ranking fourth among all features examined. Similar patterns were observed in both sepsis and cardiac surgery subgroups, though cardiac surgery patients exhibited a notably steeper risk gradient.
Conclusions: The high-resolution analysis of blood pressure exposure patterns provides new insights into the relationship between hypotension and mortality in critical illness. The HEDI effectively quantifies the cumulative burden of hypotensive episodes, capturing both the intensity and duration of exposures and demonstrating a strong independent association with mortality across diverse ICU populations.

This comprehensive assessment of hypotensive burden shows promise as a tool for early risk stratification in critically ill patients, though prospective validation studies are needed to confirm its clinical utility in guiding therapeutic interventions.

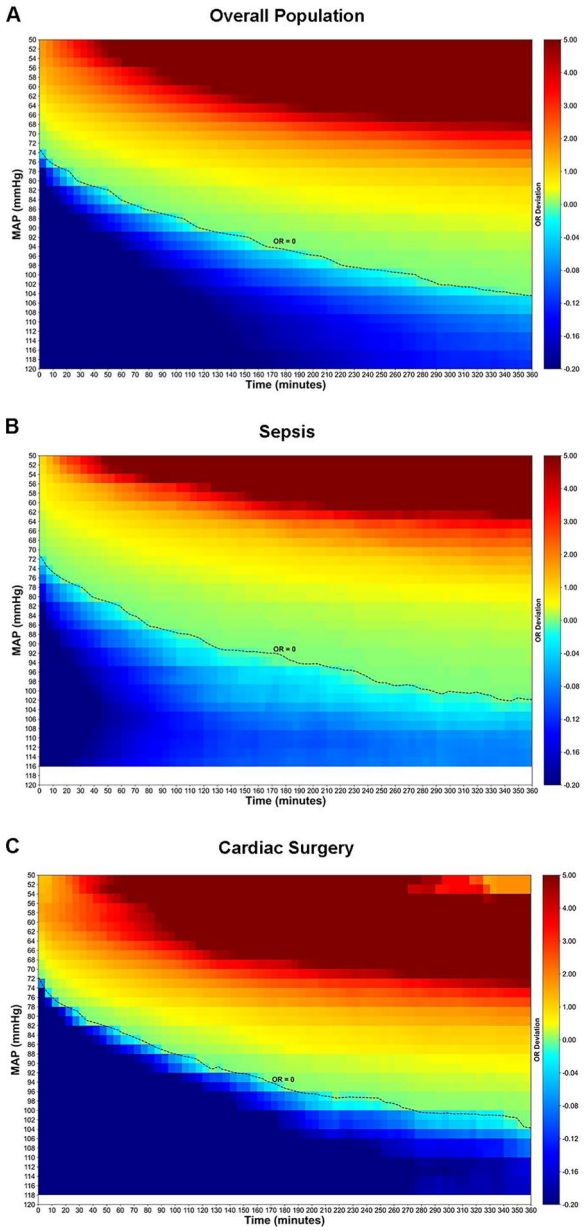


Fig. 1 (abstract 000095) Blood pressure exposure patterns and associated mortality risk across different ICU populations

Heat maps illustrating the relationship between mean arterial pressure (MAP) thresholds (50-120 mmHg, y-axis) and cumulative exposure durations (0-360 min, x-axis) for (A) overall ICU population, (B) sepsis patients, and (C) cardiac surgery patients. The color scale represents odds ratio (OR) deviation from neutral effect (OR = 1), with red indicating increased 28-day mortality risk (positive OR deviation) and blue indicating decreased risk (negative OR deviation). The black dashed line (OR = 0) demarcates the boundary between risk (above) and benefit (below) zones.

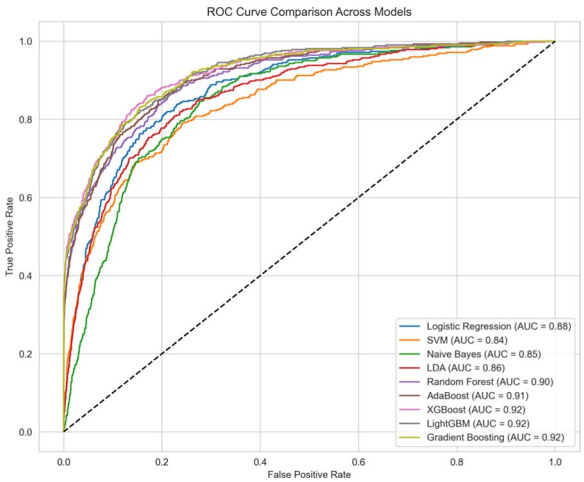


Fig. 2 (abstract 000095) Receiver operating characteristic (ROC) curves for different machine learning models in predicting 28-day mortality

ROC curves comparing nine machine learning models for predicting 28-day mortality in ICU patients. Ensemble methods demonstrated superior performance, with XGBoost, LightGBM, and Gradient Boosting achieving the highest discrimination (all AUC = 0.92), followed by AdaBoost (AUC = 0.91) and Random Forest (AUC = 0.90). Traditional statistical and machine learning approaches showed moderate performance: logistic regression (AUC = 0.88), linear discriminant analysis (AUC = 0.86), naive Bayes (AUC = 0.85), and support vector machine (AUC = 0.84). The dashed diagonal line represents random classification (AUC = 0.5).

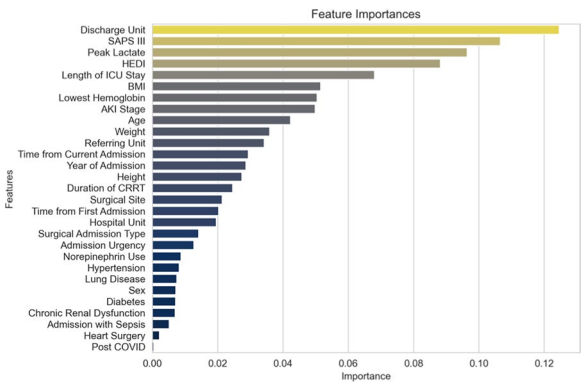


Fig. 3 (abstract 000095) Relative importance of clinical features in mortality prediction

Feature importance analysis identified HEDI as one of the most crucial clinical predictors (importance score = 0.085), ranking fourth among all features. Other significant predictors included discharge unit (0.125), SAPS III score (0.110), and peak lactate levels (0.095), while demographic and comorbidity factors demonstrated relatively lower importance. These findings highlight HEDI's substantial predictive value and potential utility in clinical decision-making.

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Topic: Information systems and Data Science

000098

Role of VExUS score in predicting risk of acute kidney injury in critically ill non-cardiac patients: a prospective observational study

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Intensive care Medicine Experimental 2025* 13(1)*:000098

Introduction: Although there are numerous signs of venous congestion, each one has its drawbacks. This prompted the creation of the venous Doppler-based VExUS grading system. Previous studies have shown a role for VExUS in predicting AKI, but these patients had recently had heart surgery. Our study's primary goal was to investigate the possibility that serial VExUS scoring could accurately predict AKI in ICU patients without cardiopathy. One of the secondary goals was to determine if there were any relationships between VExUS and fluid balance, 30-day mortality, PaO2/FiO2 ratio, duration of mechanical ventilation, length of ICU stay, and Glasgow Outcome Score.
Objectives: To assess the association between serial VExUS score and occurrence of acute kidney injury [defined using acute kidney injury network (AKIN) criteria] in critically ill non-cardiac patients.
Methods: It was a single-centre observational study done in Main ICU (mostly medical) of PGIMER, Chandigarh. Utilising clinical history, physical examination, lab parameters and transthoracic echocardiography to examine visual ejection fraction, cardiac sickness was ruled out. 30 patients made up the final sample size that could be evaluated, which included all patients with an IVC of 2 cm or greater and a normal VEF. Serial VExUS scoring was done on admission and subsequently for next 6 days or until they developed AKI (whichever was earlier).
Results: 1) Of the 30 participants in the study, 22 (73.3%) had an AKI diagnosis. 2) On days 2, 3, and 5, patients in the AKI group showed a higher mean VExUS score than those in the non-AKI group, which was significant. 3) Logistic regression was unable to forecast the development of AKI. 4) On day 2, the VExUS score threshold was greater than 1, with a sensitivity and specificity of 86.4% and 100%, respectively, and an AUC of 0.932. Similar conclusions were found at day 3, where the AUC was 0.846 and the sensitivity and specificity were 69.2% and 100%, respectively. 5) When a patient's VExUS score increased from the mean score on day 2 to + 1 unit, their risk of developing AKI increased by 4.735 times. 6) On day 3, there was a significantly positive link between VExUS and fluid balance as opposed to a marginally favourable correlation on day 2. 7) On day two, VExUS demonstrated a slight negative correlation with the length of mechanical breathing and the ICU stay. 8) However, multivariate analysis revealed no link between any of the previously mentioned factors and the VExUS score at day two. 9) The VExUS score and 30-day mortality had no correlation.
Conclusions: In critically unwell non-cardiac patients, the VExUS score cannot predict the onset of AKI. Higher daily fluid balance may have a low to moderate correlation with VExUS score. Poorer Glasgow outcome scores, longer durations of mechanical breathing, longer stays in the intensive care unit, and higher 30-day mortality do not result from higher scores.

Topic: Acute Kidney Injury and haemofiltration

000099

Efficacy and safety of a repositioning schedule intervention on the incidence of pressure injury in the intensive care unit

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Introduction: The incidence of pressure injuries in the ICU ranges from 10 to 26% (1). These injuries are associated with increased morbidity and mortality (2). Many measures are used to prevent pressure injuries, among which repositioning is recommended. Guidelines recommend adapting the frequency of repositioning based on the patient's clinical condition (3).
However, available data do not establish the optimal repositioning frequency. Moreover, a Spanish study reported that repositioning was associated with increased adverse events (clinical instability or unplanned device removal). In 2018, we conducted a pilot study (4) whose results highlighted the feasibility and applicability of an individualized repositioning schedule to prevent pressure injuries. To further explore this approach, we conducted a multicenter study.
Objectives: The aim was to evaluate the efficacy of a schedule in which repositioning frequency was adapted daily according to the patient's pressure injury risk (Braden score) and clinical condition (Table 1), compared with usual care. Efficacy was assessed by the rate of pressure injuries. Secondary objectives included the evaluation of safety and overall cost.

Table 1 (abstract 000099) Repositioning schedule

Braden score (points)	6 to 8	9 to 13	14 to 17	18 to 23
Frequency of skin moisturizing and repositioning	Every 2 h	Every 4 h	Every 6 h without repositioning	Every 12 h without repositioning

Methods: Sixteen French ICUs participated in this study. All patients without pressure injuries, hospitalized in the ICU for less than 72 h, and mechanically ventilated for less than 48 h were consecutively included. This study was a randomized controlled cluster trial with two parallel groups: an intervention group (repositioning schedule individualized according to the patients' risk of pressure injury, assessed by the Braden score) and a control group (usual care). Patients were followed until ICU discharge or death, within a 28-day limit. ICU and hospital length of stay were recorded from each hospital's medical information systems program. This study was approved by the ethics committee and the protocol was registered on ClinicalTrials.gov NCT04550182.
Results: From April 2021 to June 2024, 1232 participants were included, 436 in the intervention group and 796 in the control group. Currently, the database is locked and analyses are about to begin. Results will include the rate of pressure injuries, the rate of adverse events related to the procedure, the time spent treating pressure injuries, nurses' clinical barriers to patient repositioning, risk factors for pressure injuries and the overall cost of the procedure.
Conclusions: The results of this study are expected to provide additional insights into pressure injury prevention in the ICU, clarifying the practice of patient repositioning in terms of frequency, efficacy, safety,

clinical barriers, and cost-effectiveness. In addition, barriers to repositioning in the ICU will be described, considering patients' characteristics, invasive therapies, and workload associated with pressure injuries care.

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Topic: Nursing care and physiotherapy

000102

Analysis of the main adverse events (AE) in a third-level multipurpose ICU prior to the implementation of UNE 179003 standard

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Introduction: Systematic and structured methods must be used to ensure that healthcare risks are effectively managed. Spanish standard UNE 179003:2013 provides healthcare organizations with a framework and a systematic protocol for managing patient safety from a clinical and organizational perspective.
Objectives: Retrospectively analyze, over the last 6 months, the main adverse events reported in the ICU of HCUV in order to identify risk factors for the creation of plan risk management prior to the implementation of the UNE 179003 risk management standard.
Methods: Retrospective analysis and classification of the main adverse events reported in the multipurpose ICU of HCUV, which unit is certified by the ISO 9001 standard and currently working to be accredited by the UNE 179003 risk management standard.
Results: From June to November 2023, the main adverse events reported in the ICU were collected and analyzed: 24 adverse events and one sentinel event that was analyzed through RCA reported to the center's management. Of the 24 adverse events reported in the last 6 months, 70.66% were related to accidental device removal: nasogastric tube (SNG): 8.3% loss of central lines: 16.66% self-extubations: 29.16% chest tube: 12.5% intracranial pressure drainage: 4.16%. The other 29.08% were related to medication errors: 4.16% non-administration of chemotherapy 8.3% dosing error (related to verbal orders) 8.3%. Failure to suspend enteral nutrition for invasive procedures (tracheostomies, colonoscopies, etc.) 4.16% non-administration of prescribed treatment in acute heart failure 4.16% maintaining closed PIC drainage with increased pressure. We also studied the shift, experience, and occupancy of the unit at the time of the adverse event: 20.83% of AEs occur in the morning shift, 41.66% of AEs occur in the afternoon shift 37.5% of AEs occur in the night shift. In 75% of cases, unit occupancy exceeds 80%, and in the remaining 25%, although it is close. Personnel experience: 70.83% occur with new staff and 29.17% with experienced staff.
Conclusions: We must improve the safety culture to report any AE and improve and increase patient safety.
• Intensive care services are critical areas where most AEs occur and, as studies show, mostly related to medication, as in our unit.
• AEs increase with maximum occupancy and inexperienced staff.
• These notifications have allowed us to identify the main risks of the unit, detecting areas for improvement, and develop contingency plans, barrier measures… to prevent them from happening again.

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2. No

Topic: Health Services Research and Outcome

000103

Therapeutic impact of performing transesophageal echocardiography in critically ill patients: prospective study

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Introduction: Echocardiography has become a fundamental tool in the evaluation and management of critically ill patients. Its use, both as a diagnostic tool and for hemodynamic monitoring, has increased significantly in the last 10 years (1).
However, critically ill patients often present characteristics that limit the obtaining of quality images with transthoracic echocardiography (TTE) and this is where transesophageal echocardiography (TEE) plays a very important role. The conditions in which TEE is superior to TTE are well known, such as: a) hemodynamically unstable patients with suboptimal images in TTE; b) hemodynamically unstable patients on mechanical ventilation; c) postoperative or polytraumatized patients; d) suspected aortic dissection or aortic trauma; e) suspected endocarditis; f) assessment of mechanical prostheses, and e) assessment of embolic source. TEE has other advantages such as its ease of use at the patient's bedside and its low rate of complications (2.6%) (2), as well as representing a safe procedure when performed by intensive care physicians (3).
Although multiple studies have been carried out that demonstrate a diagnostic impact of the use of TEE in critical patients, located between 43-99% (4,5) and therapeutic between 10 and 78% (6,7), the latter resulting in changes in medical treatment and/or surgical interventions in patients, very few of these studies are prospective in design (8,9,10).
The objective of this study is to corroborate and revalidate the effect on therapy of the use of TEE in critical patients through a prospective study carried out in a multipurpose adult ICU in a third level hospital.
Objectives: To evaluate the therapeutic impact of performing transesophageal echocardiography (TEE) in critically ill patients.
Methods: Twenty critically ill patients who underwent TEE were prospectively recruited. The following data were recorded: the indication for TEE, the main findings, the therapeutic impact after the procedure, the latter defined as changes in the patient's acute management that occurred as a result of the procedure, and whether or not there were complications related to the technique. The primary objective was to determine the therapeutic impact after the TEE.
Results: 20 TEE studies were performed. The most frequent indications were to rule out infective endocarditis (35%), followed by poor transthoracic window and hemodynamic assessment (30%), and thirdly to rule out intracavitary thrombi (20%) (Table 1).
Performing TEE had a therapeutic impact in 80% of patients, with the most frequent therapeutic effect being that of shortening the duration

of antibiotic treatment by ruling out endocarditis (25%), followed by adjustment of fluids and inotropes (20%) and electrical cardioversion (15%) (Table 2).
No complications were recorded.
Conclusions: TEE has a high therapeutic impact on critically ill patients and represents a safe procedure when performed by intensive care physicians.

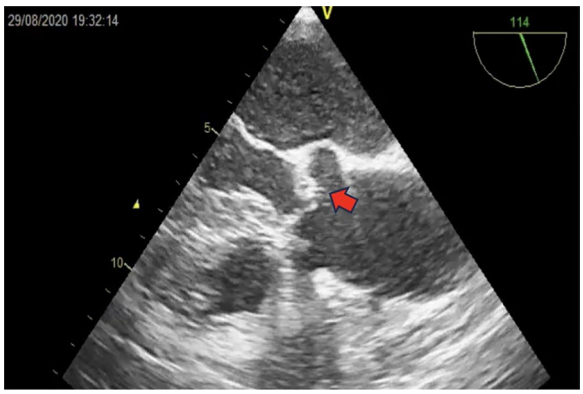


Image 1 (abstract 000103) TEE mid-esophageal plane of the aortic root at 114º. Thickening of the non-coronary leaflet (arrow) suggestive of aortic endocarditis in a patient with pneumonia and meningitis due to *Streptococcus pneumoniae*, a condition compatible with Austrian syndrome

Table 1 (abstract 000103) Indication for TEE

INDICATION FOR TEE	n	%
Rule out infective endocarditis	7	35,0
Poor transthoracic window and hemodynamic assessment	6	30,0
Rule out intracavitary thrombus	4	20,0
Rule out valvular disease	1	5,0
Prosthetic valve assessment	1	5,0
Postoperative follow-up for cardiac surgery and VA ECMO	1	5,0
Total	20	100,0

Table 2 (abstract 000103) Type of therapeutic impact

TYPE OF THERAPEUTIC IMPACT	n	%
Shortening the duration or changing antibiotic treatment	5	25,0
Modification of fluid therapy and/or inotropic agents	4	20,0
None	4	20,0
Electrical cardioversion and reduction of anticoagulation time	3	15,0
Adjustments and decisions related to VA ECMO therapy	2	10,0
Initiation of anticoagulation	1	5,0
Choice of surgical technique	1	5,0
Total	20	100,0

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Topic: Imaging in intensive care

000105

Effects of implementing a National Early Warning Score-based management protocol for suspected sepsis in adult patients in general wards

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Intensive care Medicine Experimental 2025* 13(1)*:000105

Introduction: Sepsis is a life-threatening condition resulting from a dysregulated host response to infection, leading to severe organ dysfunction and complications. Early implementation of the sepsis bundle has been significantly associated with improved survival rates. The Surviving Sepsis Campaign (SSC) Guidelines recommend that the sepsis bundle be completed within 1 h of detecting sepsis. To enhance compliance with sepsis bundles, Sepsis Performance Improvement Programs have been developed and implemented worldwide. In patients with hospital-onset sepsis, the mortality rate is notably high; however, clinical awareness remains low, and data on compliance with sepsis care bundles are limited. Therefore, systematic interventions are needed to enhance the recognition of hospital-onset sepsis and to improve compliance with the 1-h sepsis bundle.
Objectives: The objective of this study is to evaluate compliance with the 1-h sepsis bundle before and after the implementation of a National Early Warning Score (NEWS)-based management protocol for suspected sepsis in adult patients in general wards.

Methods: In July 2022, our institution developed and implemented a sepsis protocol based on the NEWS within the electronic medical record (EMR) system for adult patients in general wards. The protocol is designed to trigger an automated alert in the system when a patient's NEWS first reaches 7 or higher during hospitalization, allowing nurses to recognize the potential for sepsis and report it to the attending physician. If an infection is suspected, the protocol proceeds with the physician prescribing the individual components of the 1-h sepsis bundle. This is a retrospective observational study designed to compare the outcomes before and after the implementation of a NEWS-based management protocol for suspected sepsis. The pre-intervention period was defined as January to June 2022, and the post-intervention period as January to June 2023, excluding the protocol implementation and awareness period, as the sepsis protocol was introduced in July 2022. To ensure comparability between the pre- and post-intervention groups, data were extracted for patients who had a blood culture order placed within 24 h before or 1 h after the time point at which the first NEWS of 7 or higher was recorded during hospitalization. All data were retrospectively collected based on electronic medical records, and the study was conducted after receiving approval from the Institutional Review Board (IRB).
Results: A total of 197 patients were included in the pre-intervention group and 200 in the post-intervention group. The median age was 68 years (interquartile range [IQR] 60–75), and 270 patients (68%) were male. Solid tumors were the most prevalent comorbidity, present in 212 patients (53.4%). The baseline Sequential Organ Failure Assessment (SOFA) score was 2 (IQR 0–3), and the SOFA score at the time of protocol activation was 6 (IQR 4–8). Among the patients, 87 (21.9%) had septic shock. In terms of infection sources, intra-abdominal infections were the most common, accounting for 206 cases (51.9%). There were no significant differences in general or clinical characteristics between the pre- and post-intervention groups. Following the implementation of the sepsis protocol, compliance with the 1-h sepsis bundle significantly increased (20.8% in the pre-intervention group vs. 47.0% in the post-intervention group, $p < 0.001$). Although the 28-day mortality rate decreased after protocol implementation (22.8% vs. 16.5%), the difference was not significant ($p = 0.112$). A total of 91 patients (22.9%) were admitted to the intensive care unit, and 306 patients (77.1%) were discharged alive.
Conclusions: Following the implementation of a NEWS-based management protocol for suspected sepsis in adult patients in general wards, compliance with the 1-h sepsis bundle significantly increased. Although the 28-day mortality rate decreased after protocol implementation, the difference was not significant, highlighting the need for future studies with an extended follow-up period

Table 1 (abstract 000105) Comparison of the rates compliance with 1-h bundle by National Early Warning Score (NEWS)-based management protocol for suspected sepsis in adult patients in the general ward

(N=397)

	Pre intervention	Post intervention	χ^2	*p*
Lactic acid measurement	73 (37.1%)	119 (59.5%)	20.019	<.001
Obtaining blood culture	186 (94.4%)	186 (93.0%)	0.337	.561
Antibiotics administration	154 (78.2%)	169 (84.5%)	2.620	.106
Use of bolus fluid	165 (83.8%)	174 (87.0%)	0.837	.360
Not indicated	116 (58.9%)	115 (57.5%)		
Indicated*	49 (24.9%)	59 (29.5%)		
Use of vasopressor	186 (95.4%)	191 (95.5%)	0.001	.974
Not indicated	159 (80.7%)	158 (79.0%)		
Indicated†	29 (14.7%)	33 (16.5%)		
1 hour bundle compliance	41 (20.8%)	94 (47.0%)	30.328	<.001
Total	**197 (100.0%)**	**200 (100.0%)**		

*lactic acid ≥ 4mmol/L or mBP ≤ 65mmHg, †required to maintain mBP ≥ 65mmHg

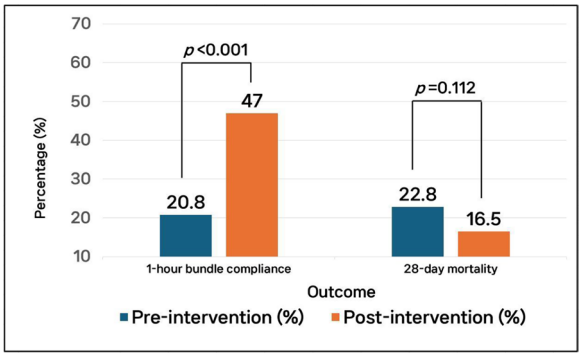


Fig. 1 (abstract 000105) Comparison of sepsis 1 h bundle compliance and 28-day mortality before and after intervention

Table 2 (abstract 000105) Comparison of clinical outcomes by National Early Warning Score (NEWS)-based management protocol for suspected sepsis in adult patients in the general ward

(N=397)

Variable	Total	Pre intervention (n=197)	Post intervention (n=200)	χ^2	*p*
	n (%)				
28-day mortality	78 (19.6)	45 (22.8)	33 (16.5)	2.529	.112
ICU admission	91 (22.9)	45 (22.8)	46 (23.0)	0.001	.970
Survival discharge	306 (77.1)	148 (75.1)	158 (79.0)	0.843	.359

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Topic: Sepsis

000107

Comparing the efficacy of ceftazidime avibactam plus aztreonam therapy versus meropenem polymyxin combination therapy for Gram-negative sepsis caused by metallo beta lactamase producers in intensive care unit: a randomised control trial

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Intensive care Medicine Experimental 2025* 13(1):*000107

Introduction: Gram-negative sepsis caused by metallo-beta-lactamase (MBL)-producing organisms is a serious global health concern and optimal treatment remains uncertain. This study compares the effectiveness of meropenem–polymyxin combination therapy with ceftazidime–avibactam plus aztreonam therapy in treating MBL sepsis in an intensive care unit and the use of biomarkers such as procalcitonin, pro-adrenomedullin, neutrophil-to-lymphocyte ratio, lactate, and C-reactive protein for prognostication.

Methods: The study was conducted at the AICU of AIIMS Jodhpur to evaluate the treatment outcomes in patients with Gram-negative sepsis caused by metallo-beta-lactamase (MBL) producers. It was a prospective, open-label, randomized comparative trial lasting 12 months. Patients over 18 years old with culture-proven MBL Gram-negative sepsis were enrolled after obtaining informed consent. A total of 128 patients with Gram-negative sepsis caused by MBL-producing bacteria were screened for eligibility. Among them 48 patients were excluded and 80 patients were recruited for the study. They were randomized into two groups: Group A received ceftazidime–avibactam plus aztreonam, while Group B received meropenem polymyxin combination therapy. Prognostic biomarkers, including proadrenomedullin (ProADM), procalcitonin (PCT) and C-reactive protein (CRP) were evaluated. The clinical data, such as demographics, comorbidities, and sepsis severity scores (SOFA, APACHE II) were collected. Primary outcomes included cure rates based on negative cultures and patient survival. The secondary outcomes included, 28-day all-cause mortality and the incidence of organ failure in terms of acute kidney injury were noted.

Results: The statistical evaluation showed both the groups were comparable in terms of age, SOFA scoring and the APACHE II score at the time of enrolment ($p > 0.05$). The treatment of sepsis caused by MBL producing Gram negative organisms with ceftazidime–avibactam plus aztreonam (Group A) was more effective than meropenem–polymyxin (Group B), with a higher cure rate (73.81% vs. 47.37%) and lower 28-day mortality (11 out of 42 patients as compared to 17 out of 38 in Meropenem Polymyxin group, Fig. 1). The incidence of AKI was also less in the ceftazidime avibactam group. While biomarkers such as ProADM, PCT and CRP showed no statistical difference between the treatment groups, they were significantly ($p < 0.05$) higher among non-survivors as compared to survivors, highlighting the prognostic value of these biomarkers (Table 1, Fig. 2). ProADM demonstrated strong predictive power for patient outcomes (specificity 100%, Figs. 3 and 4). The diagnostic performance analysis revealed that ProADM had the highest AUC (1) in both the groups.

Conclusions: The study found that ceftazidime–avibactam plus aztreonam was more effective than meropenem–polymyxin for treating MBL-producing Gram-negative sepsis. Additionally, ProADM demonstrated strong prognostic value in terms of mortality, though further large-scale trials are required to establish the new cutoff values of ProADM specific to the Indian population.

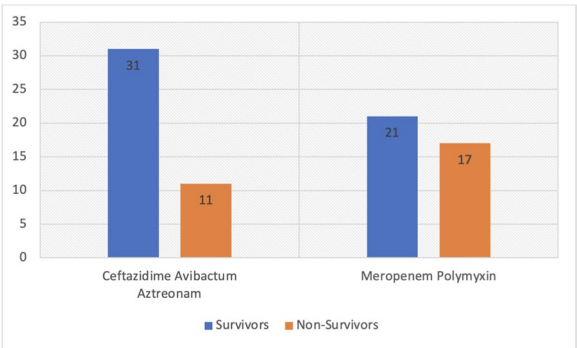


Fig. 1 (Abstract 000107) Bar chart showing increased cure rates and survival in Ceftazidime Avibactam group as compared to Meropenem Polymyxin group

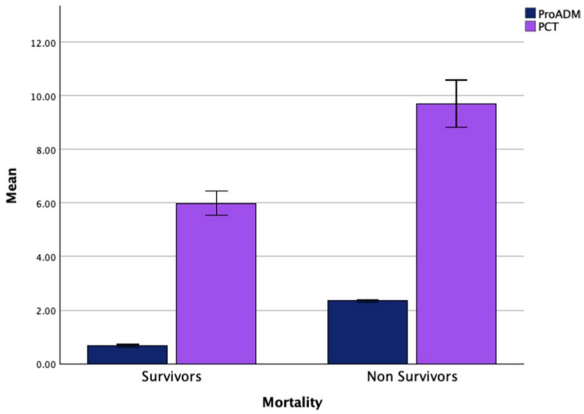


Fig. 2 (Abstract 000107) The bar chart showing higher levels of ProADM and PCT in non-survivors as compared to survivors

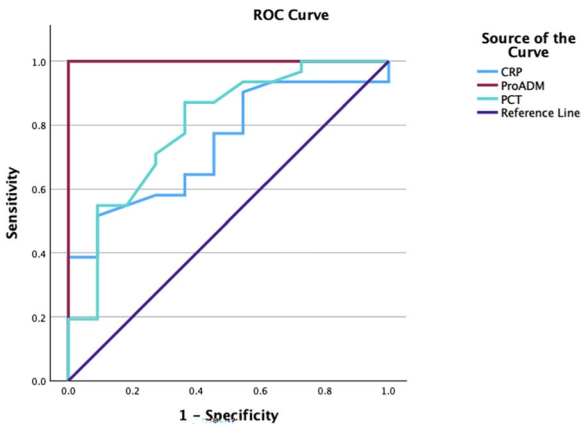


Fig. 3 (Abstract 000107) ROC curve for Ceftazidime Avibactam group. The AUC for ProADM is 1 in both the groups. Thus, it is a better predictor of mortality in terms of sensitivity and specificity as compared to PCT and CRP

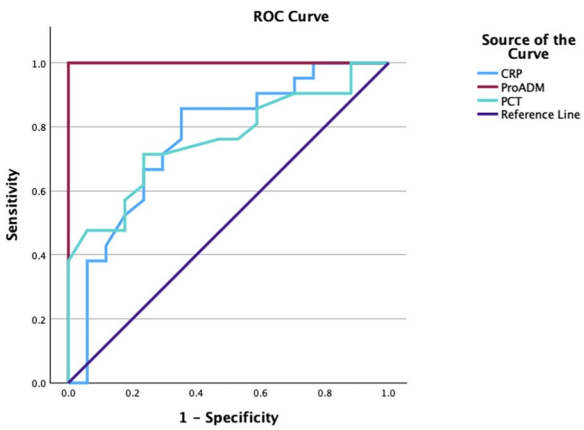


Fig. 4 (Abstract 000107) ROC curve for Meropenem Polymyxin group. The AUC for ProADM is 1 in both the groups. Thus, it is a better predictor of mortality in terms of sensitivity and specificity as compared to PCT and CRP

Table 1 (Abstract 000107) The mean value of ProADM in nMol/L and the mean value of PCT in ng/ml and CRP values in mg/L. The mean values of all the biomarkers were higher among non-survivors as compared to survivors (p < 0.05)

Group		Mortality	N	Mean	Std. Deviation	Std. Error Mean	One Sided p
Ceftazidime Avibactum Aztreonam	ProADM	Survivors	31	0.6545	0.38690	0.06949	<.001
		Non-Survivors	11	2.3564	0.19836	0.05981	<.001
	PCT	Survivors	31	5.5968	1.85894	0.33388	<.001
		Non-Survivors	11	8.8336	3.57931	1.07920	.007
	CRP	Survivors	31	131.5968	44.73038	8.03381	.020
		Non-Survivors	11	163.4455	36.65982	11.05335	.015
Meropenem Polymyxin	ProADM	Survivors	21	0.6933	0.38371	0.08373	<.001
		Non-Survivors	17	2.3424	0.24545	0.05953	<.001
	PCT	Survivors	21	6.5795	4.63824	1.01215	.014
		Non-Survivors	17	10.2741	5.24361	1.27176	.015
	CRP	Survivors	21	133.7857	46.30404	10.10437	.004
		Non-Survivors	17	177.7059	49.94968	12.11458	.004

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Topic: Infections and prevention

000108

A novel approach to assessing auditory alerts: using the free-response method for objective evaluation of alerts in dual-task conditions with implications for clinical environments

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Intensive care Medicine Experimental 2025* 13(1):*000108

Introduction: In high-consequence environments, e.g., medical and military environments, detection and identification of auditory alerts is critical. Conventional alerts are often difficult to detect and identify in noisy conditions, where individuals must process auditory information while multitasking. Previously, we reported using alert pairs, one having consonant harmony ("friendly"), the other dissonant harmony ("enemy"). Those alerts yielded robust detection and discrimination despite occupying a common spectral locus, suggesting advantages over simpler alerts in intuitiveness and resistance to masking.

Objectives: This study aimed to assess the detectability and discriminability of novel auditory alert pairs in single- and dual-task conditions.

Methods: Subjects (n = 20) performed auditory detection/discrimination in isolation or with a simultaneous visual working memory task (N-back task). The N-back task was also run in isolation. Alerts were embedded in continuous broadband "military truck noise" (70 dB SPL in the absence of alerts). Taking careful account of the spectral profile of the masker, both alerts occupied a narrow region around 500-Hz. Trials were blocked by signal-to-noise ratio (SNR) and the presence or absence of the N-back task with values of SNR visited via descending and ascending series. Stimuli were presented via headphones.

A free-response vigilance paradigm was employed. The underlying temporal "trials" were unknown to participants. This afforded measures of "hit" and "false-alarm rates" and the computation of bias-free sensitivity (d'). This is in contrast to the biased measures of percent correct typically employed.

Results: As expected, d' increased with SNR. Near-equal detectability between the alerts was achieved. N-back performance decreased that task was performed concurrently with the auditory task. In contrast, there was essentially no effect on performance in the auditory task when it was coupled with the N-back task. Computation of ß, indicated that, overall, subjects adopted conservative response criteria. Thus, when performance was expressed as p(c), the values obtained were less than the maximum (p(c)max) achievable for the relevant value of d'. This underscores the necessity of evaluating performance using objective metrics based on signal detection theory (SDT).

Conclusions: The results represent "proof of concept" for our approach to evaluating detection and discrimination of auditory alerts within a vigilance paradigm. The findings reveal advantages of a SDT-based free-response paradigm over traditional Methods: In addition, they highlight the potential advantages of alerts tailored to the spectral profile of the acoustic environment. This directly impacts professionals in high-consequence settings, such as clinicians, who rely on auditory information when visual attention is occupied with patient care.

Reference

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Topic: Health Services Research and Outcome

000109

Quantifying the impact: each additional 100 ml to daily fluid balance increases acute kidney injury risk in critically ill patients

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Intensive care Medicine Experimental 2025* 13(1):*000109

Introduction: Acute kidney injury (AKI) significantly impacts outcomes in critically ill patients. Fluid management plays a crucial role in both prevention and management of AKI, yet optimal strategies remain controversial.

Objectives: To evaluate the relationship between fluid balance and AKI occurrence in critically ill patients and identify predictors of AKI development.

Methods: In this observational study (July–November 2024), we collected data from ICU patients regarding demographics, case type, APACHE score, AKI occurrence, renal replacement therapy (RRT) requirements, septic shock and mortality. Daily fluid balance was calculated as the net difference between inputs and outputs, standardized as mL/day by dividing by ICU length of stay. Statistical analysis included Mann–Whitney U test, Kruskal–Wallis test, Spearman correlation, and binary logistic regression for AKI predictors.
Results: We included 191 patients. Demographic and clinical characteristics are presented in Table 1 and Table 2. There were 59(30.9%) elective surgical cases and 55(28.8%) emergency surgical cases. Standardized daily fluid balance showed positive correlation with age ($r = 0.21$, $p = 0.004$) and APACHE score ($r = 0.33$, $p < 0.0001$). Emergency surgical cases received more fluids than medical or elective surgical cases ($p = 0.003$). Results are shown in Table 3. Logistic regression identified three predictors of AKI: each one-point increase in APACHE score increased AKI odds by 15.7% ($p < 0.001$); patients without septic shock have 90.4% lower odds of developing AKI ($p < 0.001$); and each 100 mL/day increase in standardized daily fluid balance raised AKI odds by 5.1% ($p = 0.004$).

Table 1 Descriptives characteristics of continuous variables

	Median	IQR [Q1-Q3]	N
ICU days	3	[1–9]	191
Age (years)	64	[53–78]	191
APACHE score	14	[9–22]	191
Total fluid administered (ml)	200	[-1400—2250]	191
Fluids per day (ml/day)	150	[-300—866.67]	191

Table 2 Categorical variables: patient demographics and clinical outcomes

	n	%		n	%	N
Female	86	45%	Male	105	55%	191
AKI	52	27.20%	No AKI	139	72.80%	191
RRT needed	22	42.30%	No RRT needed	30	57.70%	52
Septic shock	67	35.10%	Without septic shock	124	64.90%	191
Alive	124	64.90%	Dead in ICU	67	35.10%	191

Table 3 Differences in standardized daily fluid balance (ml/day)

	Median	IQR	n	Median	IQR	n
Sex	Female			Male		
p = 0.03	237.5	[-181—950]	86	12.5	[-422—700]	105
Septic shock	No			Yes		
p = 0.07	150	[-400—676]	124	237.5	[-139—1062]	67
AKI	No			Yes		
p < 0.0001	-30	[-422—500]	139	673	[-64—1657]	52
RRT	No			Yes		
p < 0.0001	125	[-229—923]	30	1194	[605–4350]	22
Death	No			Yes		
p < 0.0001	-50	[-481—500]	124	580	[12–1194]	67

Conclusions: This study demonstrates that fluid balance is significantly associated with AKI risk in critically ill patients, independent of illness severity and septic shock status. Each additional 100 mL of daily fluid increases AKI risk by 5.1%, emphasizing that "every mL counts" in the fluid management of critically ill patients.

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Topic: Acute Kidney Injury and haemofiltration

000111

Comparison of efficacy of intravenous anaesthesia with propofol and lignocaine versus inhalational anaesthesia on VEGF, cytotoxic (CD8 +) and helper (CD4 +) T cell levels in ovarian cancer surgery: an open-label randomised controlled trial

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Intensive care Medicine Experimental 2025* 13(1):*000111

Introduction: The surgical stress causes various degrees of immunosuppression and inflammation in the perioperative period, increasing the chances of tumour recurrences and metastasis. Angiogenesis and perioperative inflammation also drive tumour initiation, growth, progression, and metastasis.
Hypothesis: Perioperative Intravenous anaesthesia with combination of lignocaine infusion and propofol (TIVA), will cause less immunosuppression and angiogenesis when compared with inhalational agents in post-operative period in ovarian cancer patients.
Objectives: This study aims to assess the impact of different modes of anaesthesia on perioperative immunosuppression and angiogenesis in patients undergoing ovarian cancer surgery. Due to scarcity of evidence concerning these perioperative phenomena and anesthesia modes, this study was planned. Primary outcome was to compare difference in change of post-operative and preoperative VEGF and T cells (Day 2 -preoperative) in both the groups. Secondary outcomes was to compare changes in level of T cells activity (T helper cell CD4 + and cytotoxic T cells CD 8 +) and VEGF in both groups at Day 2. Glasgow prognostic index (GPI) and systemic immune inflammation index (SII), duration of hospital stay and day of return to intended oncological therapy (RIOT) in both the groups were also compared.
Methods: The study was conducted after approval from ethics committee (AIIMS/IEC/2023/5876) and registration at clinical trial registry-India (CTRI/2024/03/063519) between March 2024 and December 2024. Total 38 patients of American Society of Anaesthesiologists (ASA) physical status grade I to III, aged 25 to 65 years, with ovarian cancer, randomized into two groups. Preoperative biomarkers VEGF, CD4 + and CD8 + cell count were recorded. Patients in group A received TIVA with propofol infusion (Bi spectral index value 40-60) and lignocaine infusion (1.5 mg/kg bolus followed by 2 mg/kg/h infusion), and group B received inhalational agents (minimum alveolar concentration of 1.0) for maintenance. Rest all anaesthesia technique was similar as per the standard protocol. Biomarkers were again recorded on postoperative day 2. SII, GPI, day of discharge and day of RIOT were also noted. Quantitative variables are presented as median (IQR) or mean (SD). Chi-square test was applied for qualitative data. Unpaired Student's t test was applied for comparing quantitative data. The results were significant if P value was < 0.05.

Results: CD4 + (0.335 ± 0.128 vs 0.493 ± 0.451), CD8 + (1161.84 ± 2218.63vs 933.104 ± 1635.320) and VEGF (40.61 ± 62.48 vs 63.88 ± 117.50) were comparable on post-operative day 2 in TIVA and inhalational agents group. Day of discharge in TIVA group was 5 (2) and 5 (2) in inhalational agents group. TIVA group had similar RIOT, 24 (12) days in comparison to 27(11) in inhalational agents group. GPI and SII were also comparable.
Conclusions: The study shows that TIVA and inhalational agents produce similar effects on perioperative immune markers (VEGF, CD4, CD8) in ovarian cancer patients. No significant difference was observed in systemic inflammation, day of discharge or RIOT.
Relevance to patient care: This study suggests that anaesthetic technique does not influence immunosuppression or angiogenesis. Anaesthesia technique can be chosen based on patient profile, comorbidities, and surgical requirements, as both groups demonstrated a comparable profile

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Topic: Perioperative care

000112

The role of magnesium replacement in critically ill patients undergoing continuous renal replacement therapy (CRRT) with Regional citrate anticoagulation (RCA)

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Intensive care Medicine Experimental 2025* 13(1)*:000112

Introduction: Regional citrate anticoagulation (RCA) in continuous renal replacement therapy (CRRT) works through the chelation of calcium, a critical element in thrombin generation, thereby effectively preventing clot formation within the CRRT circuit. However, the citrate complex does not selectively target calcium, and can also chelate other divalent cations, including magnesium. Current CRRT fluids and standard electrolyte replacement protocols following RCA typically focus on calcium, neglecting the potential for significant magnesium loss. This has the potential for profound hypomagnesemia and associated adverse events in critically ill patients, leading to higher morbidity and mortality.
Objectives: The aim of our study was to appraise clinical practice in routine electrolyte replacement after continuous renal replacement therapy with regional citrate anticoagulation to help prevent adverse effects in already high risk patients. The primary objective of our study was to study the frequency, magnitude and adverse effects of hypomagnesemia in patients undergoing continuous renal replacement therapy with regional citrate anticoagulation, and the degree and extent of magnesium replacement. The secondary objectives were to ascertain the correlation of the reduction in magnesium to various parameters pertaining to the patient as well as continuous renal replacement therapy dosing.
Methods: This was a retrospective analysis of adult patients undergoing continuous renal replacement with regional citrate anticoagulation in the Critical Care Department at a District General Hospital from July to December 2023, with the following exclusions—patients on heparin/prostacyclin and patients without a pre and post filter magnesium levels.
Data collected included demographic profile, such as age, sex, comorbid medical conditions such as chronic cardiovascular and chronic kidney disease. The dose and duration of renal replacement therapy was also noted. Magnesium levels were recorded twice—prefilter (before initiation of renal replacement therapy) and post filter (termination of renal replacement therapy or at 72 h of filtration). Normal magnesium levels was defined as a value of 0.8–1.0 mmol/L; and patients were classified as having hypomagnesemia if the serum magnesium was less than 0.8 mmol/ L. The frequency and quantity of magnesium replaced in mmol was collected for the duration of the continuous renal replacement therapy.
Results: Data from 50 patients were analysed which demonstrated a significant drop in the post-filter magnesium levels. The mean pre-filter magnesium level was 1.12 (SD ± 0.26) and post-filter magnesium levels was 0.86 (SD ± 0.19). There was hence a mean reduction of 0.26 mmol which corresponded to a drop of 22% on the percentage scale. This was statistically significant with a P-value of < 0.001 demonstrating significant hypomagnesemia in patients who undergo continuous renal replacement therapy with regional citrate anticoagulation.
The average magnesium replacement was 44 mmol (52 ± 31). Adverse events such as arrhythmia was noted in 12 patients (24%) of patients. There was no statistical correlation with the reduction in magnesium to age, sex, pre-existing kidney disease, continuous renal replacement therapy dose or duration.
Conclusions: In conclusion, hypomagnesemia has a significant correlation with the use of continuous renal replacement therapy with regional citrate anticoagulation. This can predispose to the development of arrhythmias in critically ill patients, and hence judicious magnesium monitoring and replacement must be undertaken in such patients.
Further studies with larger sample size could be undertaken to look for correlation between hypomagnesemia at different effluent doses and duration of continuous renal replacement therapy. Future studies could also focus on measuring the magnesium levels in the effluent.

Table 2 (abstract 000112) Pre- and post-filter magnesium

Reduction scale	Pre Filter Mg Mean ± SD	Postfilter Mg Mean ± SD	Reduction Mean (95% CI)	P-value
Original scale	1.12 ± 0.26	0.86 ± 0.19	0.26 (0.20, 0.32)	<0.001
Percentage scale	-	-	22 (17, 26)	<0.001

Pre- and post-filter magnesium

Table 4 (abstract 000112) Subgroup analysis for correlation of hypomagnesemia with various factor

Variable	Category	% Reduction Mean ± SD	P-value
Age	< 50	12 ± 19	0.11
	50 – 59	21 ± 16	
	60 – 69	28 ± 14	
	70+	19 ± 12	
Sex	Female	21 ± 17	0.94
	Male	22 ± 15	
Chronic cardiovascular disease	No	27 ± 16	0.02
	Yes	16 ± 13	
Kidney disease	No	22 ± 15	0.99
	Yes	22 ± 16	
CRRT duration	12 / 24 hours	17 ± 15	0.27
	48 hours	19 ± 14	
	72 hours	25 ± 16	
CRRT dose	24 ml/kg/hr	20 ± 16	0.41
	36 / 44 / 60 ml/kg/hr	23 ± 15	
Diarrhoea/High output stoma	No	20 ± 15	0.12
	Yes	29 ± 15	

Subgroup analysis

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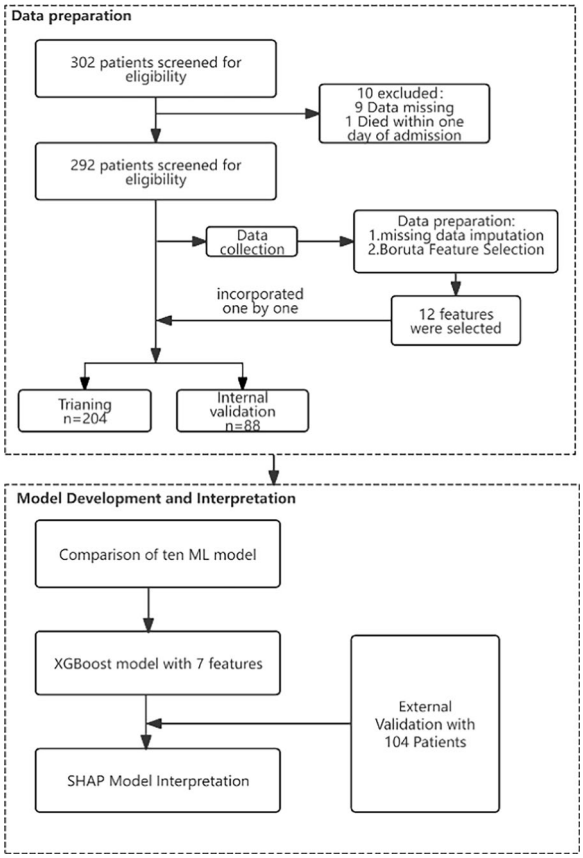
Topic: Acute Kidney Injury and haemofiltration

000114

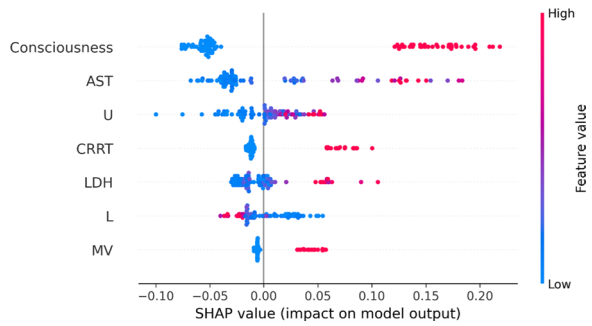
A multicenter study on developing a prognostic model for severe fever with thrombocytopenia syndrome using machine learning

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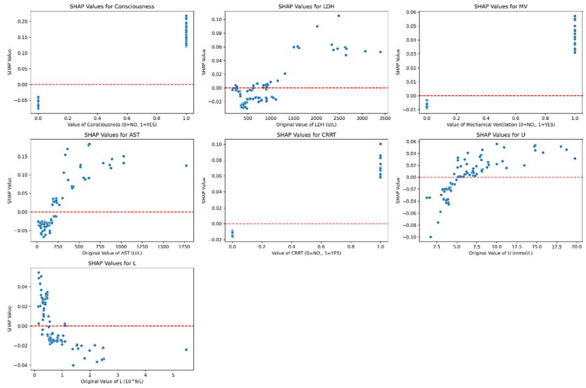
Introduction: Severe fever with thrombocytopenia syndrome (SFTS) is a disease caused by infection with the severe fever with thrombocytopenia syndrome virus (SFTSV), a novel Bunyavirus. Accurate prognostic assessment is crucial for developing individualized prevention and treatment strategies. However, machine learning prognostic models for SFTS are rare and need further improvement and clinical validation.
Objectives: This study aims to develop and validate an interpretable prognostic model based on machine learning (ML) methods to enhance the understanding of SFTS progression.
Methods: This multicenter retrospective study analyzed patient data from two provinces in China. The derivation cohort included 292 patients treated at The Second Hospital of Nanjing from January 2022 to December 2023, with a 7:3 split for model training and internal validation. The external validation cohort consisted of 104 patients from The First Affiliated Hospital of Wannan Medical College during the same period. 24 commonly available clinical features were selected, and the Boruta algorithm identified 12 candidate predictors, ranked by Z-scores, which were progressively incorporated into 10 machine learning models to develop prognostic models. Model performance was assessed using the area under the receiver-operating-characteristic curve (AUC), accuracy, recall, and F1 score. The clinical utility of the best-performing model was evaluated through decision curve analysis (DCA) based on net benefit. Robustness was tested with tenfold cross-validation, and feature importance was explained using SHapley Additive exPlanation (SHAP) both globally and locally.
Results: Among the 10 machine learning models, the XGBoost model demonstrated the best overall discriminatory ability. Considering both AUC index and feature simplicity, a final interpretable XGBoost model with 7 key features was constructed. The model showed high predictive accuracy for patient outcomes in both internal (AUC = 0.911, 95% CI: 0.842-0.967) and external validations (AUC = 0.891, 95% CI: 0.786-0.977). A clinical tool based on this model has been developed and implemented using the Streamlit framework.
Conclusions: The interpretable XGBoost-based prognostic model for SFTS shows high predictive accuracy and has been translated into a clinical tool. The model's 7 key features serve as valuable indicators for early prognosis of SFTS, warranting close attention from healthcare professionals in clinical practice.



Flowchart of the study design.



SHAP analysis showing the impact of each feature on model output



SHAP dependency plots for the seven selected features, illustrating the relationship between feature values and their impact on model output

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11. We appreciated the contributions of all participants in this study and all study staff

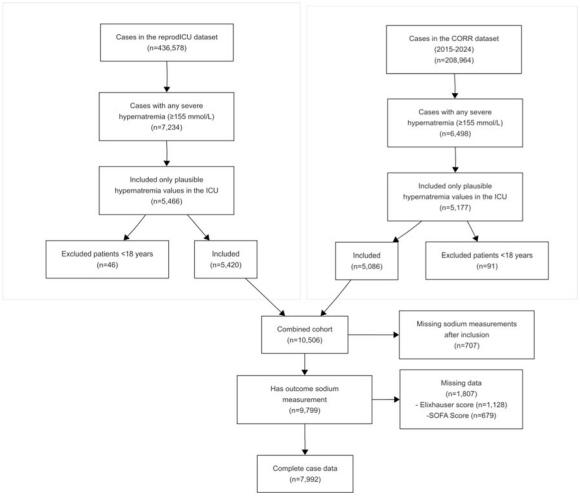
Topic: Infections and prevention

000116

Rapid correction of severe hypernatremia is not associated with increased mortality

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Intensive care Medicine Experimental 2025* 13(1):*000116

Introduction: Hypernatremia (blood sodium concentration > 145 mmol/L) is a frequent complication in adult ICU patients, associated with increased mortality (1). Most authors recommend limiting the rate of hypernatremia correction to 10-12 mmol/L/day to avoid neurological complications (2). Correction rates > 12 mmol/L/day have been linked to cerebral edema and seizures (3,4). Recently, retrospective studies have challenged this paradigm in adult patients. Feigin et al., in a predominantly non-ICU cohort, found that faster correction was associated with lower all-cause mortality (5). In contrast, Olsen et al., focusing on ICU patients with hospital-acquired hypernatremia, reported higher maximum correction rates correlated with increased mortality (6). Methodical differences between these studies, in addition to residual confounding, may explain discrepancies, warranting further exploration.
Objectives: To investigate the association between hypernatremia correction rate and in-hospital mortality in a large, international dataset of critically ill patients after comprehensive confounder control.
Methods: Adult ICU patients from Charité Universitätsmedizin Berlin (2015-2024) and seven publicly available ICU datasets with a serum sodium measurement > 155 mmol/L were eligible for inclusion. The study was approved by the Charité Ethics Committee (EA2/139/20). A fast correction was defined as mean change > 0.5 mmol/L/h during the first 24 h of severe hypernatremia, with slow correction defined as ≤ 0.5 mmol/L/h. The association of fast vs. slow correction rates and in-hospital mortality was analyzed using a multilevel logistic regression model (random center effects), adjusted for age, sex, Elixhauser index, SOFA score, sodium value at inclusion, RRT, and hypernatremia duration prior to inclusion. Additionally, the relationship between mortality and the maximum correction rate—the highest rate of change between two consecutive measurements during the first 24 h—was assessed.
Results: 9,799 eligible patients (7,992 with complete confounder data) were identified, with 48.4% originating from the Charité dataset. In most cases (60.5%), hypernatremia was acquired in hospital. Fast correction was observed in 12.5% of patients. In unadjusted and adjusted analysis, there was no significant association between a fast correction rate (> 0.5 mmol/L/h) and in-hospital mortality (p = 0.472 and p = 0.924, respectively). In crude analysis, a higher maximum correction rate was associated with an increased risk of in-hospital mortality (OR 1.10 per 1 mmol/L/h, 95%CI 1.03-1.18, p = 0.006), but this association was mitigated after adjustment (aOR 0.98, 95%CI 0.89-1.07, p = 0.63).
Conclusions: This large multinational retrospective study found no significant association between high vs. low hypernatremia correction rates and in-hospital mortality. Our findings emphasize the importance of adequate sample sizes and confounder control. Based on our findings, optimal thresholds of hypernatremia correction rates should be assessed prospectively.



Inclusion and exclusion chart.
CORR = Charité Outcomes Research Repository (a database with ICU patients treated at Charité Universitaetsmedizin Berlin). reprodICU = harmonized dataset containing the publicly available AmsterdamUMCdb, eICU, HiRID, MIMIC-III, MIMIC-IV, NWICU, and SICdb datasets.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000118

Inspiratory effort during pressure support ventilation: objective vs. subjective assessment

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Intensive care Medicine Experimental 2025* 13(1):*000118

Introduction: The concern about self-induced injuries to lungs or diaphragm during assisted ventilation involves a growing interest in assessing the patient's inspiratory effort. The negative deflection of airway pressure during end-expiratory occlusion (Pocc) has been

proposed as reliable noninvasive method for assessing the pressure generated by the inspiratory muscles (Pmus,occ = Pocc*0.75) with the ongoing ventilation setting [1]. Occlusion pressure at 0.1 s (P0.1) and pressure muscle index (PMI) are alternative, objective indicators of the inspiratory effort [2,3].

Objectives: In a bicentric (Chur-Lugano, CH) prospective observational study on intubated patients during pressure support ventilation (PSV), the primary outcome was the evaluation of the quality of subjective clinical assessment of patient's effort against the objective reference provided by Pmus,occ. The secondary outcome was the evaluation of the information provided by P0.1 and PMI, against Pmus,occ as reference.

Methods: When clinically indicated, clinicians expressed their subjective evaluation of effort (as low—Group 1, acceptable—Group 2, or high—Group 3) based on physical examination and general overview of data from the ventilator. Then, end-inspiratory and end-expiratory occlusion maneuvers were performed for measurement of Pocc, P0.1 and PMI. The objective evaluation considered low effort for Pmus,occ < 5, acceptable for Pmus,occ of 5-10 and high for Pmus,occ > 10 cmH2O. Differences among groups were evaluated by Kruskal–Wallis test and group matching was tested by Spearman correlation. P0.1 and PMI were compared with Pmus,occ as reference, by Pearson correlation. Demographic data, primary diagnosis and SAPS score were recordered. Results are expressed as % or median (interquartile range).

Results: We performed 364 measurements in 104 patients. SAPS score was 47 (18-87). Main reasons for ICU admission were pneumonia (41%) and sepsis (36%). Pmus,occ was 5.8 (3.7-8.5) in Group 1 (n = 89), 8.0 (5.1-12.3) in Group 2 (n = 180) and 9.6 (6.7-13.4) cmH2O in Group 3 (n = 95). The three groups significantly differed from each other ($p < 0.001$), but the agreement between subjective and objective evaluation of effort was poor (rho 0.29 [CI, 0.2-0.38], Fig. 1). Median Pmus,occ was 7.7 (5.1-11.7), PMI was 1 (0-3) and P0.1 was 1.6 (0.8-2.9). The correlation between P0.1 and Pmus,occ (rho 0.78, $p < 0.001$, Fig. 2) showed good capability by P0.1 in identifying the effort level expressed by Pmusc,occ. The correlation between PMI and Pmus,occ was significant but less good (rho 0.48, $p < 0.001$, Fig. 3).

Conclusions: In our population and setting, a disagreement between subjective and objective assessment of effort was frequent. This finding suggests the importance of implementing systematic measurements of inspiratory effort in clinical practice. P0.1, measurable by mini-occlusion maneuvers, is an interesting alternative to Pmus,occ, while PMI is less performant for discriminating the effort level.

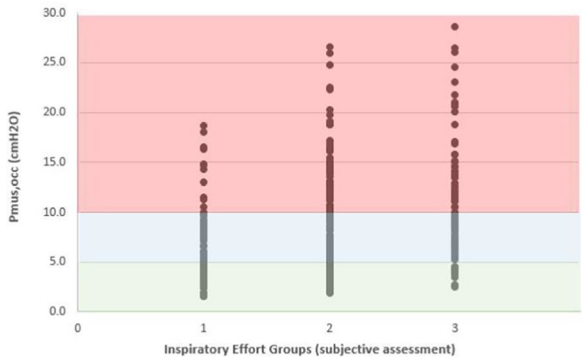


Fig. 1 (abstract 000118) Pmus,occ distribution among three groups according to subjective assessment of effort: 1 low, 2 acceptable, 3 high. Colours distinguish the Pmus,occ zones objectively defining the effort level (low, acceptable and high)

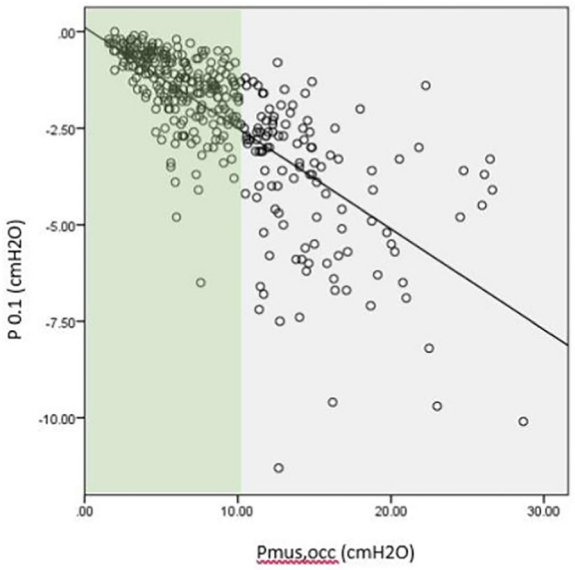


Fig. 2 (abstract 000118) Correlation between P0.1 and Pmus,occ. The grey area indicates high inspiratory effort

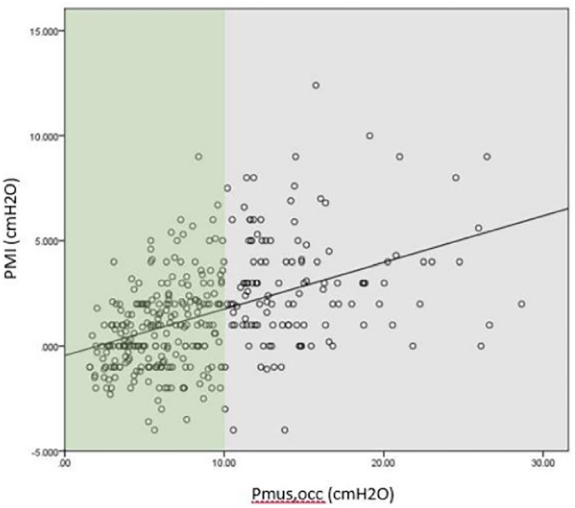


Fig. 3 (abstract 000118) Correlation between PMI and Pmus,occ. The grey area indicates high inspiratory effort

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Topic: Acute respiratory failure and mechanical ventilation

000120

Urinary Biomarkers IGFBP7 and TIMP-2: a prospective study on persistent acute kidney injury and renal replacement therapy

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Introduction: Acute kidney injury (AKI) contributes to high morbidity and mortality in the ICU. Differentiation between transient and persistent AKI, and establishing early need for renal replacement therapy (RRT) is essential for guiding timely interventions [1-7]. TIMP-2 and IGFBP7 are secreted by renal cells in response to stressors and are measured as the NephroCheck® (NC) score calculated as [TIMP-2] · [IGFBP7] [1,6,8,9]. An elevated NC score (> 2.0) predicts moderate to severe AKI. [1,3,7,10].
Objectives: This study evaluates the NC score to differentiate transient from persistent AKI and need for RRT in a heterogeneous critical care population.
Methods: Prospective, multicenter observational study: 455 ICU patients from five hospitals in Barcelona, Spain. Biomarker analysis on urine samples at admission. AKI was classified according to KDIGO criteria. Patients were grouped by NC scores and AKI subtypes. NC score > 0.3 positive biomarker test result. An NC value ≤ 0.3 low risk for AKI, intermediate from 0.3 to 2, and high > 2. Transient AKI = renal function recovery within 48 h. Persistent AKI = AKI lasting more than 48 h. Data were analyzed using Stata version 18.0. The study received approval from the Ethics Committee of each participating center.
Results: Outcomes by AKI subtype
Persistent AKI patients had higher NC scores, required mechanical ventilation (MV) for a longer duration, had lengthier hospital and ICU stays. Transient AKI patients had a higher median SOFA score at admission. There were no differences in age, gender, chronic kidney disease, basal creatinine, proportion of MV patients, need for RRT or mortality (Table 1).

Table 1 (abstract 000120) Outcomes by AKI subtype

	Total AKI 234 (51.4%)	Transient AKI 67 (28.6%)	Persistent AKI 167 (71.4%)	p-value
SOFA M (IQ 25–75)	6 (4–9)	7 (5–10)	6 (3–9)	0.022
NC score M (SD)	0.63 (1.52)	0.31 (0.95)	0.62 (1.43)	0.01
Hosp. days M (SD)	28.94 (30.53)	20.41 (19.18)	32.36 (33.47)	0.003
ICU days M (SD)	11.25 (12.86)	7.88 (9.51)	12.6 (13.77)	0.005
MV days M (SD)	10.08 (11.49)	6.31 (7.68)	11 (12.43)	0.004

Transient v. persistent AKI patients were compared using T-test or Wilcoxon rank-sum test for quantitative variables, and Chi2 or Fisher test for categorical variables.
Nephrocheck as a risk factor for persistent AKI and RRT
Patients with a high NC required RRT more frequently, had more days of RRT and had a higher risk of persistent AKI than those with lower NC (Table 2). NC values showed a positive correlation with the number of RRT days (Fig. 1).

Table 2 (abstract 000120) NC as a risk factor for persistent AKI and RRT

	NC (≤ 0.3) N = 355 (78%)	NC (0.3 – 2) N = 80 (17.6%)	NC (> 2) N = 20 (4.4%)
RRT N (% comparison)	26 (7.3)[a],*	8 (10)	5 (25)[a],*
RRT days (M comparison)	2.84 (3.19)	4 (2.92)[o],*	14.2 (13.51)[o],*
RRT OR (95% CI)	0.55 (0.26–1.08)	1.21 (0.54 – 2.79)	3.93 (1.34–11.47)*
Persistent AKI OR (95% CI)	0.63 (0.40 – 1.00)	1.11 (0.67 – 1.82)	4.3 (1.61–11.41)*

([a]) Proportion comparisons were conducted using a Chi2 test. ([o]) mean comparisons were assessed with a T-test. Logistic regression was performed for unadjusted models of RRT and persistent AKI. *P < 0.05
Conclusions: In a polyvalent ICU the NC score is significantly predictive for AKI complications. A high NC was a risk factor for persistent AKI, RRT and longer RRT duration. The NC value also correlated with the number of RRT days. Differentiating transient from persistent AKI remains inconsistent. Future studies on NC should focus on: specific guided interventions and clarifying AKI etiologies.

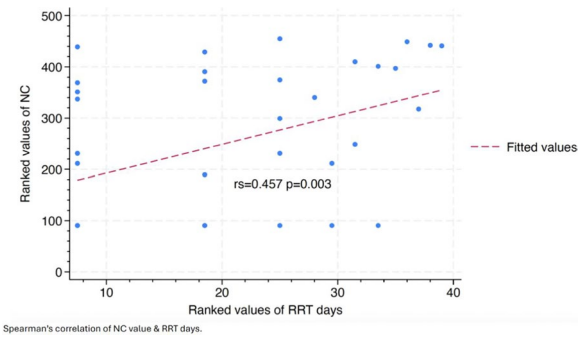


Fig. 1 (abstract 000120) Spearman's correlation of NC value and RRT days

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11. No grants were received

Topic: Acute Kidney Injury and haemofiltration

000121

The neglected ICU care in low-income countries: investigating the status and challenges of providing nutritional support in a tertiary referral centre in Addis Ababa, Ethiopia

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Intensive care Medicine Experimental 2025* 13(1)*:000121

Introduction: Intensive Care Unit (ICU) treatment is costly, and patients often experience malnutrition, leading to poor clinical outcomes. Even previously well-nourished individuals can rapidly develop malnutrition. In certain African countries, malnutrition rates can be as high as 85 percent. The entire cost of ICU treatment, combined with a paucity of resources unfortunately overlooks nutrition and its significant impacts in patient outcomes.
Objectives: To evaluate the difficulties in providing nutritional support in low-resource settings and generate workable alternatives considering all the undesirable ICU complications and outcomes, higher healthcare system costs, and potential prevention.
Methods: Two qualified professionals conducted an evaluation of nutritional practices and interviewed key informants. In light of these findings, recommendations tailored to the specific context were formulated, taking into account feasibility, affordability, accessibility, sustainability, and safety.
Results: The lack of ICU enteral tube feeding provisions has severely impacted Black Lion Hospital critically ill patients, leading to prolonged starvation and its associated consequences. For over two months, gruel has been unavailable, and milk provision has ceased for more than four years due to failed tenders. While eggs are available, they are not regularly supplied as the ICU team did not request them. Furthermore, recommended enteral formulas, total parenteral nutrition, and albumin are either prohibitively expensive or completely unavailable. The absence of a dedicated ICU kitchen and necessary equipment for food preparation exacerbates the situation. There is also a notable lack of formal nutritional assessment and planning due to the insufficient trained workforce. Communication gaps and conflicts of interest hinder collaboration with other ICUs that receive ongoing support.
Conclusions: Long-term action plans and recommendations: structural improvement: (establishing a fully functional and furnished ICU kitchen with the necessary equipment), dietitian support: (exploring the maximum possibilities with the existing potential stakeholders for sustainable professional support to foster better outcomes through patient-centered multi-professional engagement, sustainable service supply and provision: (planning, monitoring and securing uninterrupted nutritional supply of nutrients in collaboration with hospital admins and important stakeholders through continued quality improvement projects and intervention.

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Topic: Health Services Research and Outcome

000122

Opioids Consumption aftEr AdmissioN to Intensive cAre. Multicenter Study. OCEANÍA-MS

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Introduction: Outpatient opioid consumption is a major worldwide problem.
Objectives: The objective of OCEANIA-MS is therefore to evaluate whether opioid administration during ICU admission acts as a risk factor for chronic opioid consumption (COC). Secondary objectives: to study other risk factors involved in COC in ICU admitted patients.
Methods: Multicenter (25 Spanish ICUs) prospective 2-month (Oct-Nov 2023) study. Patients > 18 yo admitted to ICU were included. We excluded ICU deceased patients. Opioid doses recorded as IV equivalents of mg of morphine. Telephone follow-up 3 months after hospital discharge. COC was defined as daily intake of opioids 3 months after hospital discharge. Categorial variables: absolute values and %; quantitative variables: median (IQ25-IQ75). Statistical analysis: X2, U Mann–Whitney and logistic regression.
Results: 1,782 patients included. Age: 64 (52-73) yo, 63.5% males. Pre-ICU opioid consumption (OPI-PRE): 8.9% (159). APACHE II 13 (9-18). Mechanical ventilation (MV) 41.5% (740) with median duration: 22 (6-126) h. In-ICU opioids (ICU-OPI): 48.3% (860), with 701 being opioid naïve (OPI-NAÏVE). Median opioid dose expressed as mg of IV morphine: 149.5 (28-652). 155 (9.0%) were discharged to the ward with an opioid prescription (OPI-WARD) and 140 (8.2%) still had an active prescription at hospital discharge (OPI-DISC). Telephone follow-up was completed in 1,491, and 129 (8.6%) were labeled as COC. Amongst COC, 45% presented with the OPI-PRE + ICU-OPI tandem and 4.7% were OPI-NAÏVE. COC was more frequent in: females (14% vs. 8.6%), older age [66 (56-75) vs 63 (50-73) yo]; OPI-PRE users (56.4% vs. 5.7%); tracheostomized

(18.9% vs. 9.5%); in-ICU administration of IV fentanyl (14.5% vs. 9.3%) and IV midazolam (17.1% vs. 9.5%); longer duration of opioid administration [96 (27-288) vs 43 (13-132) h] and MV [89 (14-288) vs. 22 (6-117) h]. ICU-OPI (13.9% vs. 7.6%); OPI-WARD (47.4% vs. 7.4%) and OPI-DISC (62.4% vs. 5.9%) were also associated, together with hospital length of stay [11 (7-27) vs 9 (5-18) days] and Rankin > 2 at hospital discharge (14.4% vs. 9.6%).
After multivariate analysis COC was associated with: age [OR 1.0 (CI95 1.0-1.03)]; IV midazolam [OR 2.1 (CI95 1.0-4.1)]; OPI-PRE [OR 5.4 (CI95 2.9-10.2)]; OPI-WARD [OR 2.5 (CI95 1.2-5.2)] and OPI-DISC [OR 8.5 (CI95 4.4-16.7)]. OPI- NAÏVE did not lead to COC [OR 0.98 (CI95 0.5-1.8)].
Conclusions: Opioid administration during ICU in opioid naïve patients did not act as a risk factor for COC. Limiting opioid prescription at ICU and hospital discharges together with IV midazolam might contribute to lower COC in ICU admitted patients.

Topic: Sedation, analgesia and delirium

000123

Dynamic light intervention may influence the circadian course of serum melatonin: a randomized-controlled trial

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Intensive care Medicine Experimental 2025* 13(1)*:000123

Introduction: Poor lighting in the ICU is increasingly recognized as a significant factor contributing to disturbances in the circadian rhythm of critically ill patients, potentially limiting their recovery [1]. A recent study suggests that incorporating targeted light therapy into a comprehensive redesign of ICU rooms could help reduce the incidence and severity of delirium by modulating 24-hourserum melatonin levels [2].
Objectives: To investigate the impact of a dynamic light intervention on serum melatonin rhythms in critically ill patients.
Methods: This single-center randomized controlled trial enrolled adult mechanically ventilated patients expected to stay in the ICU for at least five days. Patients were randomly assigned to one of three groups using a different light scheduling algorithm (LSA) delivered by a dynamic light ceiling [3]. LSA-1 provided high-intensity white light with blue-enriched episodes. LSA-2 offered the same without the blue-enriched episodes, and LSA-3 served as the control, mimicking standard lighting. Serum melatonin levels were measured every four hours for up to four 24-h assessment periods (AP-A, AP-B, AP-C, and AP-D), with AP-B, AP-C, and AP-D initiated if the patient's Richmond Agitation Sedation Scale was -3 or higher.
Results: Out of 60 enrolled patients, 56 were included in the data analysis, distributed as follows: LSA-1 (n = 20), LSA-2 (n = 17), and LSA-3 (n = 19). The median age of the participants was 70 years (IQR 62-73), and 52% were women. The Acute Physiology and Chronic Health Evaluation on admission was 22.5 (IQR 17-31), while the Simplified Acute Physiology Score on admission was 39 (IQR 33-49). Within the first assessment period in AP-A, median serum melatonin levels exhibit clear day–night patterns across all groups, with levels declining between 6:00 am and 2:00 pm. In the subsequent AP-B and AP-C, the diurnal curve of serum melatonin shows a flattening trend within all intervention groups. In AP-D, a more distinct day–night pattern in serum melatonin levels is observed in patients with LSA-1 and LSA-2, showing a notable peak in nocturnal melatonin for those with LSA-1 (Fig. 1).
Conclusions: This preliminary descriptive data analysis indicates that high-intensity dynamic white light therapy may affect circadian melatonin rhythms in mechanically ventilated ICU patients. Further statistical analysis and large-scale studies are required to validate this hypothesis.

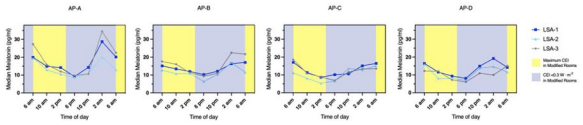


Fig. 1 (abstract 000123) AP = assessment period, AP-A = first day of intervention, AP-B = second day of intervention or later, AP-C = third day of intervention or later, AP-D fourth day of intervention or later. CEI, circadian effective irradiance

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Topic: Sedation, analgesia and delirium

000124

Outcomes and challenges in treating acute subdural hematoma in older adults with a GCS score of 3–5: a nationwide retrospective analysis in Korea

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Intensive care Medicine Experimental 2025* 13(1)*:000124

Introduction: Ultra-severe traumatic brain injury (TBI) is a subgroup of severe TBIs, defined as patients with an initial Glasgow Coma Scale (GCS) score of 3–5. Although life-sustaining management is taken in the initial treatment, patients in this category are characterized by extremely severe injury, very poor prognosis, and low chances of recovery and survival. Therefore, deciding whether to perform aggressive neurosurgical treatment or discontinue treatment in this condition is one of the most frequently encountered but difficult decisions for physicians. Since age has been generally recognized as the most important factor in poor prognosis and increased mortality in many studies on TBI, the increase in the older adult population is becoming an increasingly important issue for those managing TBI. In particular, clear guidelines are lacking, and various ethical, financial, and cultural issues often arise for this population; hence, careful consideration of multiple factors is required when choosing an appropriate neurosurgical strategy.
Objectives: In this study, the author analyzed the current status, characteristics, treatment, and outcomes of geriatric patients with acute subdural hematoma (ASDH) and a GCS score of 3–5, which is known to a condition that account for a large proportion of TBIs and is associated with a poor prognosis. In addition, the benefits of surgical intervention were evaluated to establish future treatment guidelines for ASDH with a GCS score of 3–5.
Methods: We analyzed the data of 205 older adults (aged 65 years or older) with ASDH and a GCS score of 3–5 registered in the Korean Neurotrauma Data Bank System from January 2018 to June 2021. The patients were divided into death and survival groups, and the demographic, clinical, and radiological characteristics; treatment methods; mortality rates; and treatment outcomes were analyzed, along with the relationship between variables and mortality. We also compared the Glasgow Outcome Scale-Extended (GOSE) scores and investigated

whether surgical treatment affected mortality and good recovery rates according to age.

Results: According to the GOSE, 76.1% of patients died, 12.7% survived in a vegetative state, 3.9% had severe disabilities, and only 4.0% showed good recovery. The Glasgow Coma Scale (GCS) score at admission was significantly associated with pupil reactivity; Rotterdam computed tomography score; time interval from injury to operation and arrival to operation; treatment; and hospital stay between patients who died and those who survived. Surgical treatment was significantly associated with a lower mortality rate but not with good recovery rates.

Conclusions: In older adults with ASDH and a GCS score of 3–5, surgical treatment improves survival rates compared to conservative treatment, but many survivors remain in a vegetative state or with severe disability. Therefore, in the treatment of older adults with ASDH and a GCS score of 3–5, the benefit of surgical intervention is limited to improving survival rates. Thus, when treating ASDH with a GCS score of 3–5, it is crucial to consider the patient's and family's acceptable quality of life rather than merely extending life. These findings provide data to guide discussions with families regarding prognosis and may support future treatment guidelines for ASDH with a GCS score of 3–5.

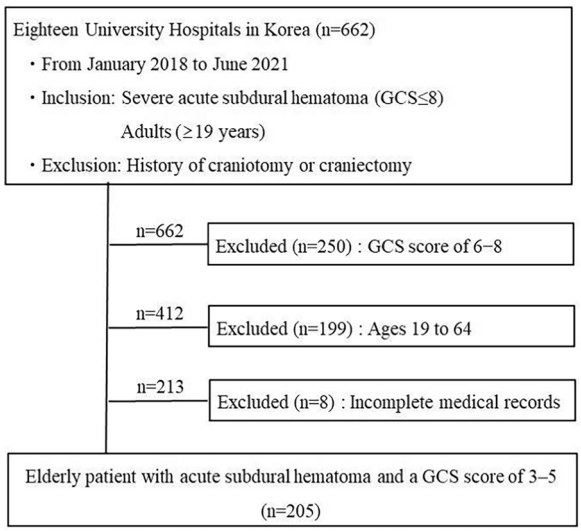


Fig. 1 (abstract 000124) Flow diagram showing the patient selection process

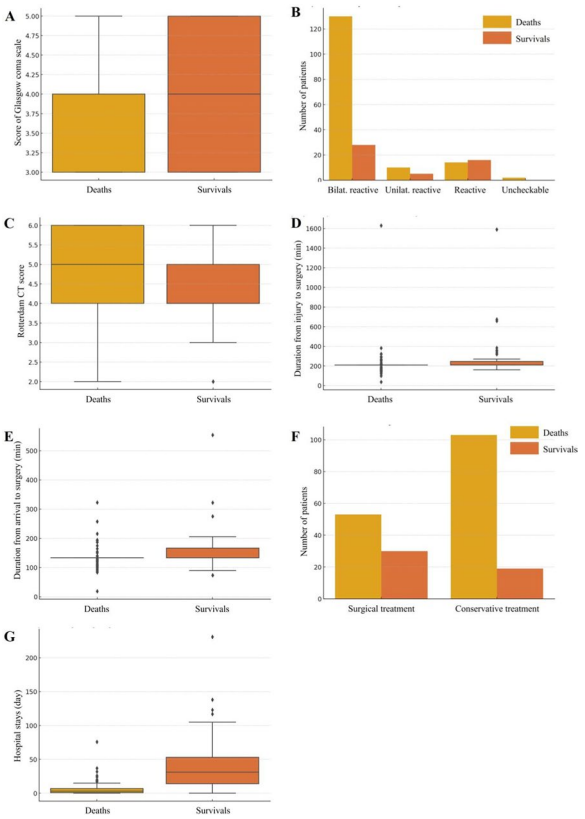


Fig. 2 (abstract 000124) Boxplots and bar charts of significant variables related to death and survival

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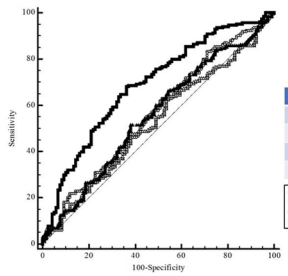
Topic: Trauma

000125

Association between systemic inflammation response index and poor neurologic outcomes in out-of-hospital cardiac arrest patients

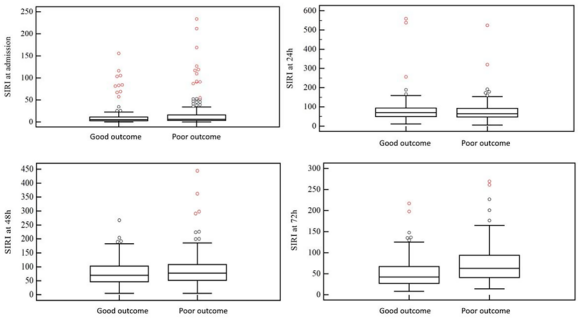
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Intensive care Medicine Experimental 2025* 13(1):*000125

Introduction: Post-cardiac arrest syndrome (PCAS), a systemic inflammatory syndrome following CA, occurs during the reperfusion period after the ROSC. It shares several pathophysiological mechanisms with sepsis, and causes hypoxic brain injury. However, inflammatory markers to the outcome has not yet been fully investigated.An inflammation-related marker, the systemic inflammation response index (SIRI), which was developed in 2016 that can reflect the cancer-related inflammatory response, is calculated as neutrophils × monocytes/lymphocytes.
Methods: In this retrospective, observational single-center study, we tested the hypothesis that SIRI is associated with the neurological outcomes of OHCA patients treated with TTM. Venous blood sample were routinely collected at admission and at 24 h, 48 h and 72 h after the ROSC. The primary outcome was poor neurologic outcome (CPC3-5) at 6 months after CA.
Results: A total of 317 of 516 patients (61.4%) treated with TTM were included in the analysis. 127 of 317 patients (40.0%) had good neurologic outcome, and 190 of 317 patients (60.0%) had poor neurologic outcome. SIRI at 72 h were higher in poor neurologic outcome group, while SIRI at admission, 24 h and 48 h had no significant difference.
Conclusions. SIRI at 72 h after the ROSC were associated with poor neurological outcomes at 6 months after CA in patients treated with TTM.



	AUC	95% CI
SIRI at admission	0.560	0.502-0.617
SIRI at 24h	0.528	0.470-0.586
SIRI at 48h	0.556	0.498-0.613
SIRI at 72h	0.686	0.630-0.738

ROC curve of SIRI



Difference of SIRI score bewteen good and poor outcome

Table 3 (abstract 000123) Odd ratio for poor neurologic outcomes at 6 months after ROSC

	Poor neurologic outcomes at 6 months			
	SIRI at admission	SIRI at 24h	SIRI at 48h	SIRI at 72h
Multivariate	1.006	0.999	1.004	1.010
	(0.994-1.018)	(0.994-1.004)	(0.997-1.010)	(1.001-1.019)
SIRI≥50	1.898	1.110	1.453	2.635
	(0.600-6.099)	(0.552-2.232)	(0.707-2.988)	(1.361-5.103)

Adjusted by Age, Witnessed arrest, Bystander CPR, Initial shockable rhythm, Cardiac cause of arrest, Time from collapse to ROSC, Hypertension, Diabetic mellitus, hs-CRP at admission

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Topic: Cardiac arrest

000127

Understanding perceptions and barriers to developing critical thinking among critical care medicine trainees: a qualitative exploration

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Intensive care Medicine Experimental 2025* 13(1):*000127

Introduction: Critical thinking involves analysing information objectively, evaluating different perspectives and reaching informed Conclusions: Without critical thinking, students rely on heuristics or "shortcuts" that can lead to cognitive biases and clinical errors which can be dangerous in an ICU setting. Critical care trainees are

superspeciality graduates who are adult learners, and inculcating critical thinking in them may be fraught with challenges.
Objectives: To explore the challenges and barriers of faculty in teaching critical thinking (CT) skills in trainees of critical care medicine and their possible solutions
To explore how critical care teachers define and conceptualize critical thinking.
Methods: Study design: qualitative research, phenomenology framework
Inclusion criteria: teaching faculty from critical care medicine departments with more than 1 year teaching experience.
Using purposive sampling, faculty were recruited from 4 tertiary teaching hospitals in South India with a DM/IDCCM critical care training programme. Written informed consent taken.
In-depth interviews were conducted in person or online using MS teams platform. Interviews conducted until thematic data saturation achieved. All interviews were audio recorded and transcribed using an AI software (TurboScribe.AI) interpretative phenomenological analysis (IPA), based on Heideggerian hermeneutics was used to find meaning in the teachers' experiences. Inductive coding of the transcripts was done. Coding was aided by the NVIVO 15 software. Clustering of codes into categories followed by the arrival of larger themes was done to arrive at the first level of thematic analysis.
Results: Demographics of participants have been shared in Table 1. Mean age of participants was 39 years. Thematic analysis identified broad themes of Student related, teacher related and system-related barriers to developing critical thinking. Themes and subthemes derived have been shown in Fig. 1.
Strategies to include critical thinking included (see Table 2)
·Encouraging independent analysis: progressively transitioning from shadowing to autonomous case management.
·Feedback and mentorship: individual mentoring for underperforming students, addressing academic and personal challenges.
·Structured protocols: providing a foundation for systematic decision-making while encouraging deviation when justified.
·Creating a conducive environment
Conclusions: Inculcating critical thinking is essential, however its development is hindered by hierarchical barriers, time constraints, trainee fatigue, and an overemphasis on algorithmic learning.
•Effective strategies such as curriculum reforms, faculty training, creating supportive learning environments and structured mentorship can help in enhancing the critical thinking skills of future intensivists. There is also a need to include assessments for critical thinking in ICU trainees.

Table 1 (abstract 000127) Demographic factors of participants

Demographics	N
Age in yrs :	
40+	3
35-40	7
30-35	4
Males/Females	8/6
MICU/SICU/NICU	9/3/2
Median teaching experience of faculty in Critical Care	8 years

Table 1 : Demographic factors

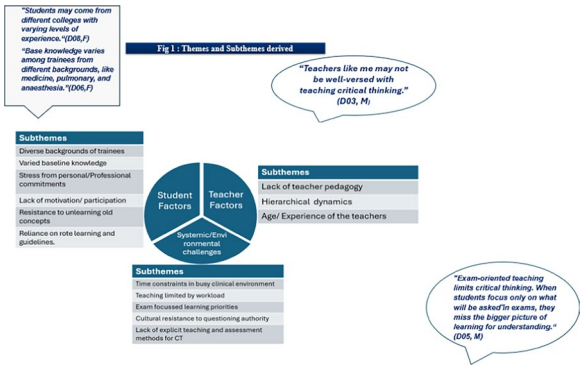


Fig. 1 (abstract 000127) Themes and subthemes derived from thematic analysis

Table 2 (abstract 000127) Strategies to foster critical thinking

Table 2
Strategies to Foster Critical Thinking

- **Encouraging Independent Analysis:** Progressively transitioning from shadowing seniors to autonomous case management.
  Encourage students to ask "why and how"
- **Feedback and Mentorship:** Individual mentoring for students, addressing academic and personal challenges.
- **Balancing Algorithmic and analytical learning approaches:** Providing a foundation for systematic decision-making while encouraging deviation when justified.
- **Creating a Conducive Environment:**
  Allowing room for questions and ensuring students feel safe to express themselves without fear.
  - Foster a welcoming and non-hierarchical teaching culture.
- **Curriculum redesign** to incorporate open-ended evaluations
- Developing **reflective practices** and time for introspection

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Topic:Health Services Research and Outcome

000128

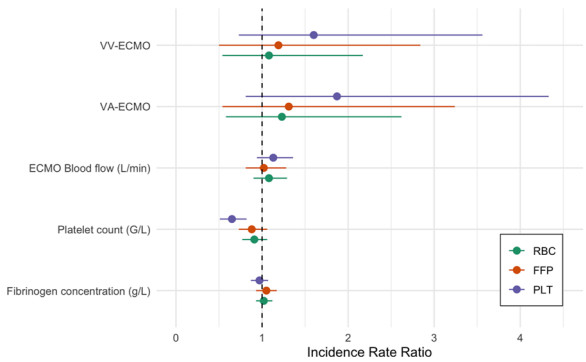
Intraoperative transfusion rates during double lung transplantation in patients with extracorporeal membrane oxygenation as bridge-to-transplant: a retrospective study

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Intensive care Medicine Experimental 2025* 13(1):*000128

Introduction: Double lung transplantation (DLT) is a life-saving intervention for patients with end-stage respiratory failure without other treatment options. For a subset of these critically ill patients, extracorporeal membrane oxygenation (ECMO) has demonstrated its value as an essential bridging therapy while waiting for DLT. Patients bridged with ECMO have a significantly increased risk of perioperative bleeding, but there is insufficient data to identify specific risk factors associated with increased transfusion rates.
Objectives: To evaluate intraoperative transfusion rates in DLT patients bridged with ECMO.
Methods: We performed a retrospective study and screened all adult patients undergoing DLT between 2013 to 2024 at the Medical University of Vienna. We included patients who were admitted to the ICU preoperatively. Exclusion criteria were DLT on cardiopulmonary bypass, multiorgan transplantation and single-lung transplantation. Patients were assigned to one of three groups: i) veno-venous (VV), ii) veno-arterial (VA) or iii) no ECMO bridging. We assessed the number of intraoperative red blood cell (RBC) transfusions as primary outcome. The number of intraoperative fresh frozen plasma (FFP) and platelet transfusions were secondary endpoints. We described baseline characteristics and transfusion requirements separately for each group using median, 1st and 3rd quartiles, as well as absolute and relative counts. We performed negative binomial regression modelling to assess the effect of ECMO bridging, ECMO blood flow, platelet count and fibrinogen concentration on intraoperative transfusion requirements. We adjusted the model for age, ECMO duration and sequential organ failure (SOFA) score.
Results: We screened 1033 patients who underwent DLT within the study period and included 148 patients who had been admitted to an ICU prior to DLT. Of those, 37 (25%) patients did not undergo ECMO, 99 (67%) underwent VV-ECMO and 12 (8%) VA-ECMO bridging. Baseline characteristics are given in Table 1.

	No ECMO	VV ECMO	VA ECMO
Age (years)	55 (36–60)	54 (40–60)	42 (32–49)
Weight (kg)	62 (53–76)	75 (65–85)	63 (50–75)
Height (cm)	170 (165–179)	173 (165–180)	169 (164–178)
Preoperative SOFA score (-)	4 (3–6)	8 (6–9)	8 (7–10)
ECMO duration (days)	0 (0–0)	7 (3–17)	3 (1–11)
Preoperative fibrinogen (g/L)	4.51 (3.86–5.46)	3.97 (2.85–5.23)	4.06 (2.96–4.84)
Preoperative platelet count (G/L)	2.33 (1.82–2.85)	1.41 (1.13–1.91)	1.54 (0.91–2.57)

Patients without bridging received 3 (1–6) RBC concentrates, 3 (1–9) units of FFP and 0 (0–1) platelet transfusions intraoperatively. Patients with VV-ECMO bridging received 5 (2–9) RBC concentrates, 4 (1–11) FFP and 1 (0–2) platelet transfusion during surgery. Patients who were bridged with VA-ECMO, were transfused with 9 (4–11) RBC concentrates, 7 (2–10) FFP units and 1 (1–3) platelet concentrates. Regression analysis showed that preoperative VV-ECMO as well as VA-ECMO were associated with higher transfusion rates, although this was not statistically significant (Fig. 1). ECMO blood flow was not statistically significantly associated with a higher transfusion rate. A higher preoperative platelet count was statistically significantly associated with a lower rate of platelet transfusions (Fig. 1). Fibrinogen concentration was not associated with intraoperative transfusion rates.
Conclusions: In critically ill patients, we observed higher intraoperative transfusion requirements for patients who were bridged to DLT using ECMO. However, after adjusting for baseline differences between patients with and without preoperative bridging, the effects of preoperative VV and VA-ECMO on intraoperative transfusion rates had wide confidence intervals and were not statistically significant. Further studies investigating the underlying mechanisms of coagulopathy in patients supported by ECMO are required to pre-hoc identify patients who will experience intraoperative bleeding during DLT.



Incidence rate ratios showing the effect of preoperative ECMO bridging, ECMO blood flow, platelet count and fibrinogen concentration on intraoperative transfusion requirements. The model was adjusted for age, ECMO duration and sequential organ failure score.

Topic: Transfusion and haemostasis disorders

000130

A nurse-led initiative: exploring nurses' willingness and barriers to adopt pupillometers in the neuroscience intensive care unit (NICU) for future practice

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Intensive care Medicine Experimental 2025* 13(1):*000130

Introduction: Traditionally, pen torches have been used to assess the pupil response as a key component of the Glasgow Coma Scale (GCS) to detect neurological deterioration. However, these assessments are subjective, lacking both precision and reproducibility, which potentially affect clinical decision-making.
With technological advancements, pupillometers have emerged both locally and internationally as a more reliable alternative. Given that nurses routinely perform pupil assessments, their acceptance and willingness to adopt this technology into clinical practice are essential.
Objectives: This study aims to uncover nurses' perspectives and potential to expand pupillometer adoption in the NICU.

Methods: To minimize selection bias, a mixed-methods survey was administered to all 83 NICU registered nurses (RNs) at Tan Tock Seng Hospital who routinely perform pupillary assessments. With an 80.7% response rate, all responses remained anonymous to reduce response bias. The survey incorporated both Likert-scale and closed-ended questions, and data collection which spanned four weeks. Finally, statistical analysis was conducted to identify factors that facilitate or hinder nurses' willingness on the adoption of pupillometer.
Results: This study evaluates the perceptions of nurses who routinely perform pupillary assessment on the adoption of pupillometer. Out of 83 RNs who were invited to participate in the survey, 67 (80.7%) of them had responded. While 67.2% of nurses had prior experience with a pupillometer, a strong majority recognized its advantages, with 82.1% acknowledging its more accurate readings and 86.6% affirming its reliability in providing objective Results: 65.7% acknowledged a pupillometer is safe to be used on patients at the bedside. Additionally, time efficiency was a key factor, with 68.6% of nurses perceiving the pupillometer to take less than 30-60 s for pupillary assessment, demonstrating its potential to streamline assessments and reducing the need for subjective verification by colleagues (74.6%). Although only 37.3% initially preferred it over a pen torch, 59.7% expressed willingness to adopt it, with 85.1% supporting additional training to enhance confidence and competence.
The bar chart further highlights key facilitators for the pupillometer adoption, including the elimination of the need for subjective verification by colleagues (74.6%), followed by 67.2% of nurses who valued the objective outcomes provided, and perceived accuracy based on their experience (65.7%). Other factors including improved availability (62.7%) and accessibility (44.8%) near the nursing counter would also encourage adoption.
Given these findings, integrating pupillometers with structured training, improved accessibility and availability can enhance patient safety, optimize nurses' workflow, and support evidence-based neurological assessments in the ward.
Conclusions: Despite being available for decades, pupillometers remain underutilized. Yet, factors such as cost, perceived lack of necessity, logistical challenges and limited awareness contributed to the barriers. Notably, nurses play a pivotal role in integrating this technology into routine practice, making their willingness to adopt it essential. While NICU nurses have shown readiness, targeted training, improved accessibility, and greater availability are needed to strengthen their confidence.
Although this study was confined to the NICU, expanding research to other specialties could provide broader insights and attitudes towards the pupillometer adoption. Additionally, to facilitate the use of pupillometers as evidence-based neurological assessment in clinical practice, further quantitative studies will be significant in evaluating the clinical impact of pupillometers in neurological assessments.

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Topic: Nursing care and physiotherapy

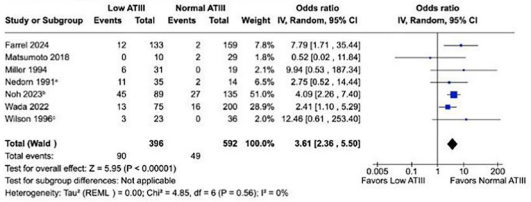
000136

Impact of low antithrombin III levels on clinical outcomes in trauma patients: a systematic review and meta-analysis

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Intensive care Medicine Experimental 2025* 13(1)*:000136

Introduction: Antithrombin III (ATIII) is a key regulator of coagulation, playing a vital role in maintaining hemostatic balance. Reduced ATIII levels have been observed in trauma patients, potentially contributing to an increased risk of mortality, thromboembolic events, and coagulopathy. While ATIII deficiency has been associated with worse clinical outcomes in critically ill patients, less is known about its impact on trauma patient populations.
Objectives: This meta-analysis aims to evaluate the association between low ATIII levels and clinical outcomes, including mortality, thromboembolism, disseminated intravascular coagulation (DIC), and shock in trauma patients.
Methods: PubMed, Embase, and the Cochrane Library databases were searched for randomized controlled trials (RCTs) and observational studies that compared trauma patients with low ATIII levels to those with normal ATIII levels and reported outcomes related to mortality, thromboembolic events, DIC, and shock. Heterogeneity was assessed using the I^2 statistic. A random-effects model was applied to all outcomes to account for potential variations across studies.
Results: We included nine studies with a total of 1,629 trauma patients, all of which contributed data to at least one analyzed outcome. Trauma patients with low ATIII levels had a significantly higher risk of mortality (OR 3.61; 95% CI 2.36-5.50; $p < 0.01$; Fig. 1.1) and thromboembolic events (OR 2.14; 95% CI 1.21-3.80; $p = 0.009$; Fig. 1.2) compared to those with normal ATIII levels. While the risk of DIC was elevated in patients with low ATIII, this association was not statistically significant (OR 3.00; 95% CI 0.78-11.45; $p = 0.08$; Fig. 1.3). Additionally, the incidence of shock was significantly higher in patients with low ATIII levels (OR 3.42; 95% CI 2.51-4.68; $p < 0.01$; Fig. 1.4).
Conclusions: These findings suggest that low ATIII levels are associated with worse clinical outcomes in trauma patient populations. Further research is needed to determine whether targeted ATIII management strategies could improve outcomes in trauma patients.

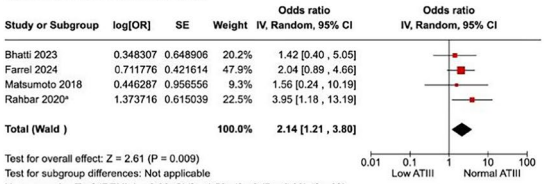
Figure 1.1 Mortality was significantly higher in trauma patients with low ATIII levels compared to those with normal ATIII levels.



Footnotes

[a]In Nedorn et al., Low ATIII was defined as <81%
[b]In Noh et al., Low ATIII was defined as <70%
[c]In Wilson et al., Low ATIII was defined as <70%

Figure 1.2 Trauma patients with lower ATIII have a higher chance of developing any type of thromboembolic event.



Footnotes

[a]Rahbar used <90% ATIII cutoff, while Bhatti, Matsumoto, and Farrell used <80%.

Figure 1.3 The risk of Disseminated Intravascular Coagulation was higher but not significant in trauma patients with low ATIII.

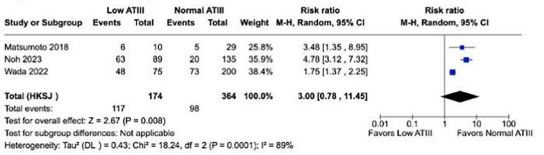
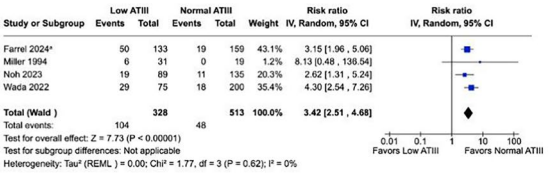


Figure 1.4 The risk of shock was significantly higher in trauma patients with Low ATIII.



Footnotes

[a]Farrell et al. was included in the analysis as their definition of hemorrhage closely aligned with the shock definitions used in other studies.

Forest plots show pooled odds ratios (OR) and risk ratios (RR) with 95% confidence intervals (CI) for clinical outcomes in trauma patients with low ATIII levels. (1.1) Mortality, (1.2) thromboembolic events, (1.3) disseminated intravascular coagulation, and (1.4) shock.

Topic: Trauma

000137

Targeting CD11b signaling enhances myeloid cell function and improves outcomes in sepsis

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Intensive care Medicine Experimental 2025* 13(1)*:000137

Introduction: Sepsis, characterized by dysregulated immune responses leading to multi-organ dysfunction, remains a major cause of mortality (1, 2). Current therapeutic strategies mainly target inflammation, yet effective immune-modulatory approaches are lacking. CD11b, an integrin highly expressed on myeloid cells, critically regulates immune cell adhesion, migration, and pathogen clearance (3). Our previous studies showed increased CD11b expression in peripheral blood mononuclear cells (PBMCs) from septic patients and mouse sepsis models, suggesting its immunoregulatory role in sepsis.
Objectives: We aimed to determine whether pharmacological activation of CD11b signaling enhances innate immunity, improves pathogen clearance, protects against organ injury, and ultimately reduces mortality in sepsis.
Methods: Sepsis was induced in C57BL/6 mice by cecal ligation and puncture (CLP). Mice were randomized into four groups: Control (saline), CD11b blockade (anti-CD11b antibody, 2.5 mg/kg at 3 h and 6 h post-CLP), leukadherin-1 (LA-1) post-treatment (5 mg/kg LA-1 immediately post-CLP), and LA-1 combined treatment (5 mg/kg LA-1 24 h pre- and immediately post-CLP). Survival rates were analyzed using Kaplan–Meier curves (log-rank test) over 14 days. Organ dysfunction was assessed via serum creatinine (Cr), blood urea nitrogen (BUN), CK-MB, AST, and ALT levels at 24 h post-CLP. Lung injury was evaluated histologically (H&E staining); hippocampal dendritic spine density was assessed by Golgi staining. Blood bacterial load was quantified at 24 h post-CLP; macrophage phagocytic activity was determined using fluorescently labeled *Escherichia coli* at 16 h post-CLP. Flow cytometry assessed pulmonary immune cells, including neutrophils, Ly6C + monocytes, and macrophage polarization (M1/M2 ratio).
Results: CD11b blockade significantly decreased 14-day survival ($p < 0.05$, log-rank test). Conversely, LA-1 improved survival in both post-treatment and combined treatment groups. LA-1 treatment significantly ameliorated organ dysfunction, reflected by lower serum creatinine, BUN, CK-MB, AST, and ALT levels (all $p < 0.05$ vs. Control). Histological analyses demonstrated significantly reduced lung injury and increased hippocampal dendritic spine density following LA-1 treatment ($p < 0.05$). Additionally, LA-1 markedly enhanced pathogen clearance, evidenced by reduced blood bacterial load and increased macrophage phagocytosis. Flow cytometry revealed that LA-1 significantly reduced pulmonary Ly6C + monocyte infiltration, increased neutrophil recruitment, and restored macrophage M1/M2 polarization (all $p < 0.05$ vs. Control).
Conclusions: CD11b activation significantly boosts innate immune responses, improves pathogen clearance, reduces organ dysfunction, and increases survival in sepsis. Unlike traditional anti-inflammatory therapies, activation of CD11b signaling represents a novel immunotherapeutic strategy with potential for clinical translation.

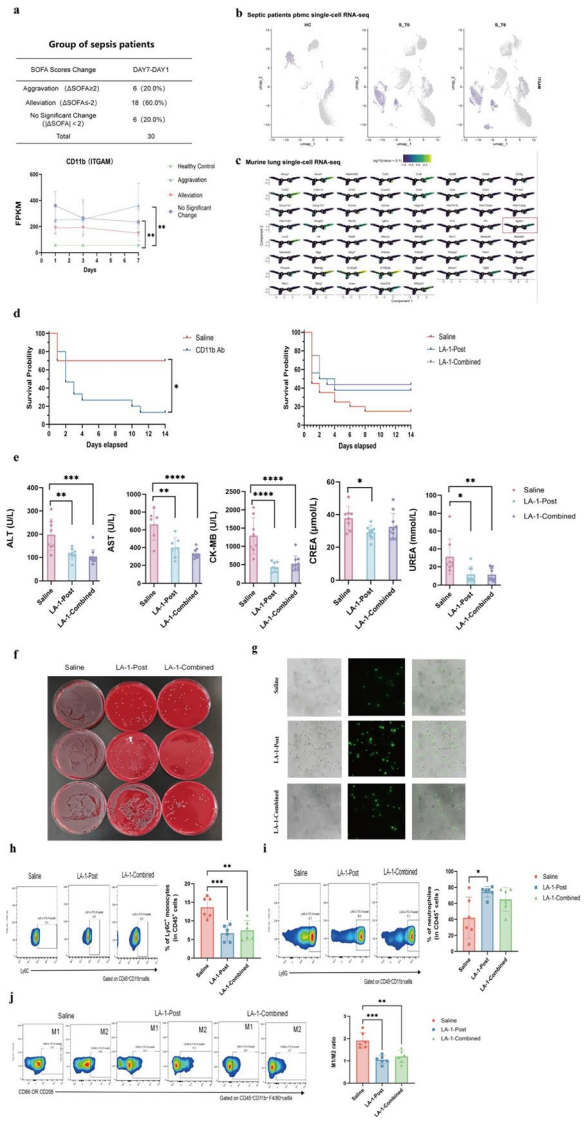


Fig. 1 (abstract 000137) Activation of CD11b signaling enhances innate immune function and improves outcomes in septic mice. (a) Transcriptomic analysis showing significantly elevated CD11b (ITGAM) expression in peripheral blood mononuclear cells (PBMCs) from septic patients on Days 1, 3, and 7 compared to healthy controls. (b) Single-cell RNA-seq (GSE167363) confirmed CD11b upregulation at diagnosis (S_T0) and 6 h post-diagnosis (S_T6) across multiple immune subsets in septic patients. (c) Trajectory analysis of murine lung single-cell RNA-seq (GSE207651) confirmed increased CD11b expression during sepsis progression. (d) Kaplan–Meier survival curves demonstrated significantly decreased 14-day survival following CD11b antibody blockade (*P < 0.05 vs. Control) and significantly improved survival after leukadherin-1 (LA-1) post-treatment or combined treatment (Log-rank test). (e) LA-1 treatment significantly attenuated organ dysfunction post-sepsis, indicated by lower serum creatinine (CREA), blood urea nitrogen (BUN), CK-MB, aspartate aminotransferase (AST), and alanine aminotransferase (ALT) levels (*P < 0.05, **P < 0.01, ***P < 0.001, ****P < 0.0001 vs. Control). (f-g) LA-1 significantly enhanced pathogen clearance, reducing blood bacterial load (f) and improving macrophage phagocytic capacity (g) compared to controls (g). (h-j) Flow cytometry analysis of pulmonary immune cells at 24 h post-CLP revealed decreased Ly6C + monocyte proportions (h), increased neutrophil infiltration (i), and maintained macrophage M1/M2 polarization balance (j) in LA-1-treated mice compared to controls (j) (*P < 0.05, **P < 0.01, ***P < 0.001). Data are mean ± SD, analyzed using ANOVA or log-rank tests as appropriate

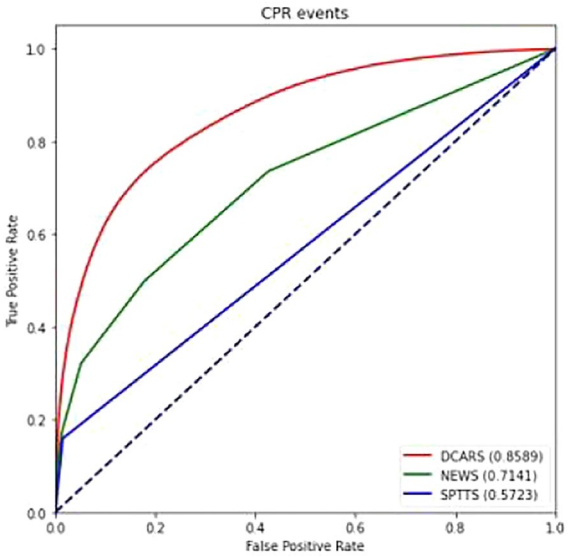
Topic: Sepsis

000140

Enhancement of prediction of in-hospital cardiac arrest of deep learning based Early Warning Score (DEWS) in a single tertiary hospital

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Intensive care Medicine Experimental 2025* 13(1):*000140

Introduction: In-hospital cardiac arrest (IHCA) is an event that significantly impacts on patient safety. In previous studies, Deep learning-based early warning scoring (DEWS) has been effective in predicting IHCA and to reduce false alarms.
Objectives: We examined whether DEWS outperforms MEWS in IHCA prediction while reducing false alarms and improving with site-specific learning
Methods: DEWS analyzes age, blood pressure, heart rate, respiratory rate, and body temperature (DeepCARSTM, VUNO Inc, Korea). A retrospective analysis was conducted on adult patients admitted to general wards. The implementation period was from January 2022 to January 2023 and the site-specific learning period was from December 2022 to November 2023. The model was trained using one year of data for each period. The improvement in IHCA prediction was compared between the two periods.
Results: During the implementation period, 27,962 admissions were recorded, while 23,649 admissions were analyzed during the learning period. During implementation and learning period, there were 2.22 and 2.36 cardiac arrests per 1,000 admissions, respectively. During the implementation period, the AUROC of DEWS was 0.832 (p < 0.01), higher than 0.732 in MEWS, with a sensitivity of 38.8% and a specificity of 98%. False-positive alarms decreased by 43% in DEWS. During the learning period, the AUROC of DEWS and MEWS was 0.859 and 0.714, respectively. With a cutoff of 91 in DEWS, sensitivity was 21.7% and specificity 99%, while for a cutoff of 5 in MEWS, sensitivity was 17.1% and specificity 99%. DEWS predicted 6 additional IHCA earlier than MEWS in the 18 h pre-IHCA interval.
Conclusions: Our study showed that DEWS outperformed MEWS in predicting IHCA and that site-specific customization enhanced IHCA prediction performance.



The ROC analysis demonstrates that DCARS (AUC = 0.8589) outperforms NEWS (AUC = 0.7141) and SPTTS (AUC = 0.5723) in predicting cardiac arrest.

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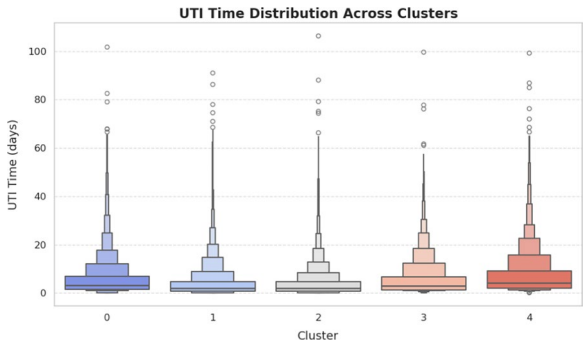
Topic: Information systems and Data Science

000141

Identification of sepsis subphenotypes using clustering analysis of ICU data: a step toward personalized diagnosis and treatment

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Intensive care Medicine Experimental 2025* 13(1)*:000141

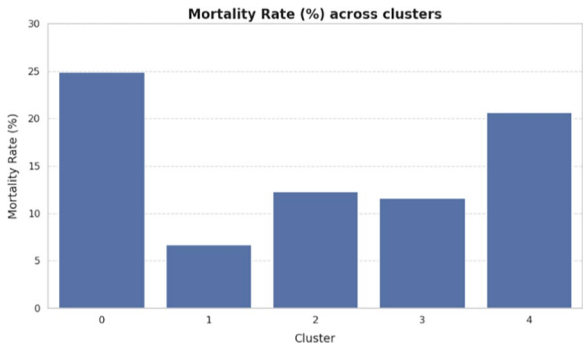
Introduction: The high variability in patient responses to sepsis presents a significant challenge to early diagnosis and increases the risk of mortality. The current international consensus sepsis-3, based on the SOFA score, applies a uniform classification to septic patients, overlooking their inherent heterogeneity.
Objectives: This study aims to address this limitation by identifying sepsis subphenotypes through the clustering of ICU data, enabling a more personalized approach to diagnosis and treatment.
Methods: We analyzed data from the publicly available MIMIC-IV database, identifying a total of 36,581 septic patients. These included individuals diagnosed with sepsis at admission (14,753) and those who developed the condition during hospitalization (21,828). Laboratory test results, vital signs, and demographic data were collected, with the most abnormal values recorded within the first 24 h of ICU stay. Missing data were imputed using the MissForest technique, and dimensionality was reduced through Uniform Manifold Approximation and Projection (UMAP). Clustering was performed using the Gaussian Mixture Model (GMM) to identify sepsis subphenotypes. To evaluate the quality of the clustering, we applied the silhouette score, a metric that measures cluster cohesion and separability.
Results: Our clustering analysis identified five distinct sepsis subphenotypes, achieving a silhouette score of 0.29.
Conclusions: The identification of five distinct sepsis subphenotypes in this study supports the hypothesis of the condition's inherent heterogeneity. These findings underscore the need for further research to develop new metrics that effectively capture this variability, enabling more tailored diagnostic and therapeutic approaches.



Cluster 4 performed with the longest ICU stay among all (48.14—221.98), followed by Cluster 0 (39.37—168.29), Cluster 3 (33.65—159.87), Cluster 2 (21.66—114.84), and Cluster 1 (18.25—115.97).



Cluster 0 performed with the highest SOFA scores (6.00—11.00), followed by Cluster 4 (5.00—10.00), Cluster 3 (4.00—8.00), Cluster 2 (3.00—6.00), and Cluster 1 (2.00—5.00).



Cluster 0 showed the highest mortality rate (24,89%), followed by Cluster 4 (20,6%), Cluster 2 (12,3%), Cluster 3 (11,6%), and Cluster 1 (6,7%).

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7. We would like to thank MIMIC-IV database, which was paramount for this study and further ones to be done.

Topic: Information systems and Data Science

000143

Evaluation of the concordance of transcranial Doppler pulsatility index in the middle cerebral artery and internal carotid artery

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Intensive care Medicine Experimental 2025* 13(1):*000143

Introduction: The pulsatility index (PI) derived from transcranial Doppler is a valuable monitoring tool in neurointensive care. However, the approach through the temporal bone is reportedly unsuccessful in 10-20% of cases due to poor ultrasound penetration and presents technical challenges, necessitating trained personnel for accurate measurements. In contrast, the approach through the mandibular angle offers a relatively simpler and more feasible alternative.
Objectives: To evaluate the consistency between PI obtained by measuring the middle cerebral artery (MCA) from the temporal bone and the internal carotid artery (ICA) from the mandibular angle via transcranial ultrasound.
Methods: This is a single-center retrospective observational study. It includes cases from our ICU between May and September 2024 in which transcranial ultrasound was performed during the treatment of neurological disorders. Cases in which measurement through the temporal bone window was not possible were excluded. Measurements of MCA taken through the temporal bone are considered the gold standard, and we calculated the agreement rate with measurements of the ICA taken from the mandibular angle, and the correlation coefficient of the PI between the temporal bone and mandibular angle windows.
Results: Data from 46 cases, totaling 116 measurements, were analyzed. The patient demographics showed 40% male, with a median age of 50 years. The primary diagnoses were subarachnoid hemorrhage in 40% and intracerebral hemorrhage in 30% of cases. A significant correlation ($p < 0.001$) was found between the PI of the MCA through the temporal window and the PI of the ICA through the mandibular window with a correlation coefficient of 0.946. The accuracy for detecting a PI $\geq$ 1.5 at the temporal bone in the ICA was as follows: sensitivity of 93.0%, specificity of 81.3%, positive predictive value of 96.9%, and negative predictive value of 65.0%. We explored factors leading to lower underestimation of measurements in the mandibular angle window than in the temporal bone window. No significant effects could be identified in patient background such as age or gender, but patients with cerebral hemorrhage and subarachnoid hemorrhage tended to have lower measurements in the mandibular angle window (OR: 6.34, 95%CI 1.96-20.5, and OR: 2.72 95%CI 1.08-6.85). Measurements in the mandibular angle window tended to be higher when the Hb concentration at the time of measurement was below 10 g/dL (OR: 0.42, 95%CI 0.19-0.93).
Conclusions: Despite the inclusion of various diseases, the PI of the MCA through the temporal window and the PI of the ICA through the mandibular window were shown to be strongly correlated. To further validate the usefulness of this method, prospective studies and multicenter research are needed.

Topic: Neurointensive care

000144

The ESICM GenIUS educational pathway—a holistic, comprehensive, and sustainable approach to critical care ultrasound training

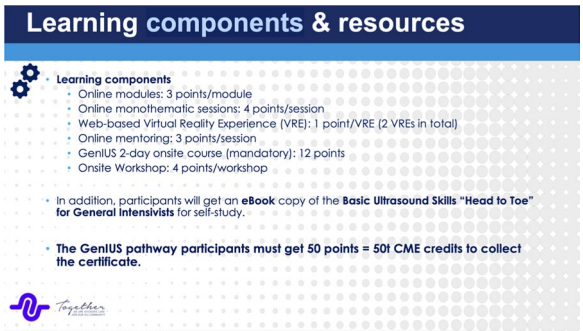
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Intensive care Medicine Experimental 2025* 13(1):*000144

Introduction: Point-of-care ultrasound (POCUS) is revolutionizing critical care, yet a globally recognized, standardized training pathway remains elusive. The European Society of Intensive Care Medicine (ESICM) has launched the General Intensive Care Ultrasound (GenIUS) pathway—a comprehensive, sustainable and holistic educational framework designed to transform ultrasound education for intensivists. Unlike existing programs, GenIUS is not merely a course but a structured, competency-based pathway, integrating cutting-edge learning modalities while fostering long-term sustainability through the development of local trainers. Importantly, its development has been informed by existing ESICM educational initiatives, including the European Diploma of Echocardiography (EDEC) and the Intensive Care Fundamentals (ICF) course, ensuring alignment with established critical care training standards.
Objectives: The GenIUS pathway aims to:

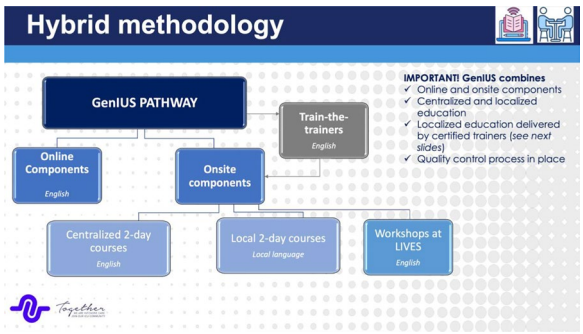
1. Establish a holistic training model covering cardiac, thoracic, abdominal, neuro, and vascular ultrasound, ensuring comprehensive critical care assessment.
2. Deliver a groundbreaking hybrid educational approach that seamlessly integrates online modules, virtual reality experiences, live mentoring, and hands-on training.
3. Empower local trainers through a robust train-the-trainer (TtT) model, ensuring the program's scalability and sustainability.
4. Align with and complement existing ESICM learning pathways to create a cohesive ultrasound training ecosystem.

Methods: GenIUS follows a meticulously designed blended learning strategy, combining online self-directed modules (including a dedicated eBook), interactive monothematic sessions, web-based virtual reality experiences, and structured online mentoring. The

onsite component consists of mandatory two-day immersive courses, delivered both centrally at ESICM events and locally through certified trainers. The Faculty Development Day, a core feature of GenIUS, establishes a network of certified regional educators, ensuring standardized, high-quality ultrasound training across diverse healthcare settings. By leveraging insights from EDEC and ICF, the pathway incorporates best practices from previous ESICM educational models.
Results: By merging technology-enhanced learning with practical skill development, the GenIUS pathway is redefining how intensivists acquire and retain ultrasound skills. The localized faculty model ensures long-term sustainability by shifting expertise to regional trainers, reducing dependency on external faculty while maintaining educational rigor through ESICM oversight and quality control mechanisms. The 2025-2026 pilot phase will provide crucial data on learner engagement, competency acquisition, and the success of the decentralized training model.
Conclusions: The GenIUS pathway offers a comprehensive approach to CCUS training, by integrating innovative digital learning, immersive hands-on training, and a scalable faculty development strategy. Its alignment with **EDEC and ICF** reinforces its role within the broader ESICM educational framework, ensuring that ultrasound competency is developed in a structured and progressive manner. More than just a certification, it is a movement toward universal ultrasound competency.



Learning components and resources of pathway



Online and onsite components of pathway

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3. We would like to acknowledge the countless colleagues and faculty at ESICM who have offered their time and expertise to promoting ultrasound training across Europe

Topic: Imaging in intensive care

000145

Exposed to the unexpected: a qualitative study of bereaved relatives' experiences and perspectives on donation after a family member's circulatory death in out-of-hospital cardiac arrest

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Intensive care Medicine Experimental 2025* 13(1)*:000145

Introduction: Insufficient availability of organs results in long organ-transplant waiting lists and subsequent suffering and death among people in need of organs. Introducing novel donation processes such as uncontrolled donation after circulatory death has the potential to increase the donor pool and thus help reduce the gap between demand and supply of donor organs.
Objectives: Protocols for uncontrolled donation after circulatory death have only been implemented in a few countries in Europe. The present study aimed to explore relatives' experiences following a family member's circulatory death after out-of-hospital cardiac arrest, and to explore relatives' perspectives on being asked to decide about organ donation in this situation.
Methods: Using a qualitative approach, we conducted semi-structured interviews with 13 participants. Data were analysed using thematic analysis with an inductive, descriptive approach.
Results: The analysis generated three themes: 'fluctuating between hope and despair', which describes relatives' experiences of their family member's sudden cardiac arrest; 'exposed to vulnerability', concerning their experiences of death and perspectives on decision-making about donation; and 'Balancing a major life change', which involves experiences of facilitators and barriers to dealing with the loss. Knowing the wishes of the deceased helps family members to make their decision about consent to donate their loved one's organs. Otherwise, this decision could be experienced as unmanageable. Factors that could facilitate family members' experiences of donation after out-of-hospital cardiac arrest and death are being able to confirm the death themselves and having enough time to say farewell. Experiences of loneliness arise when losing a family member in out-of-hospital cardiac arrest, and in this situation trust in healthcare professionals and other people affects how experiences are perceived.
Conclusions: To provide comprehensive, high-quality care for relatives, specific guidelines are needed for structured proactive support and follow-up, taking into consideration the specific context, communication and needs of relatives.

Participant	Sex	Age (yrs)	Relation to the deceased	Present in the emergency department	Deceased persons sex	Deceased persons age (yrs)	Cause of death	Time between death and interview (months)
1	Female	58	Wife	Yes	Male	58	Myocardial infarction	12
2	Female	77	Wife	Yes	Male	72	Cardiomyopathy	19
3	Female	54	Mother	Yes	Female	29	Pulmonary embolism	6
4	Female	71	Wife	Yes	Male	73	Unknown	27
5	Female	71	Wife	No (Covid)	Male	72	Unknown	30
6	Female	75	Wife	Yes	Male	75	Myocardial infarction	23
7	Male	40	Son	Yes	Female	70	Unknown	30
8	Female	68	Sibling	No	Male	56	Unknown	20
9	Male	54	Father	Yes	Female	29	Pulmonary embolism	8
10	Male	31	Son	Yes	Male	64	Unknown	13
11	Female	37	Wife	Yes	Male	37	Unknown	48
12	Male	39	Son	Yes	Female	62	Unknown	17
13	Female	58	Wife	Yes	Male	62	Unknown	3

Demographic characteristics of the participants and their deceased family member

Themes	Sub-themes
Theme 1: Fluctuating between hope and despair	
Theme 2: Exposed to vulnerability	1. Experiences of trust in health care professionals 2. Difficult stances in a vulnerable situation
Theme 3: Balancing a major life change	1. Sense making 2. Sharing grief 3. Need for support 4. Using self-comforting and disperse thoughts

Themes and sub-themes

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9. Region Stockholm

Topic: Ethics and end of life care

000148

Clinical characteristics and outcomes of neonates with congenital diaphragmatic hernia at the Vietnam National Children's Hospital: a retrospective observational study

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Intensive care Medicine Experimental 2025* 13(1)*:000148

Introduction: Congenital diaphragmatic hernia (CDH) has a high mortality rate, particularly in low- and middle-income countries (LMICs) due to variations in neonatal intensive care quality. Postnatal predictors of mortality have been studied, including prematurity or low birth weight, large defect size, associated cardiac defects, severe pulmonary hypertension, the need for extracorporeal membrane oxygenation (ECMO), birth at non-tertiary centres, and poor gas exchange early postnatally. These factors highlight the need for targeted interventions to reduce mortality. Vietnam, an LMIC, faces significant challenges in managing neonates with CDH due to limited resources and a lack of advanced diagnostic and treatment options. Central hospitals, designated to handle severe cases, often experience delays in treatment initiation, impacting neonates' outcomes. Understanding Vietnam-specific risks and prognoses for CDH is crucial for mitigating adverse outcomes and reducing mortality.

Objectives: This study aimed to investigate the mortality rate and associated factors in neonates with CDH in Vietnam

Methods: This retrospective observational study included neonates with CDH admitted to a central children's hospital in Vietnam between November 2021 and September 2023. We collected data on neonates' characteristics, management, complications, and outcomes, comparing these data between neonates who survived and those who died in the hospital. We also employed logistic regression analysis to identify factors associated with hospital mortality.

Results: Of 74 CDH neonates, 64.9% (48/74) were male, and 50.0% (37/74) died in the hospital. The median gestational age at birth was 38 weeks (interquartile range [IQR]: 38-39), and the median age at admission was 5.2 h (IQR: 3.0-15.8). All neonates were transferred from various prior hospitals to our study site, with an immediate postnatal intubation rate of 83.8% (62/74). Our neonates presented in severe conditions, characterized by significant differences in pre- and post-ductal SpO2 levels (2.5%; IQR: 1.0-10.0), elevated mean pulmonary artery systolic pressure (PASP) at admission (51.7 mmHg; standard deviation: 18.3), high median Oxygenation Index measured 6 h after birth (13.3; IQR: 6.8-28.2), and increased median Vasoactive Inotropic Score at its peak during surgical intensive care unit stay (35.0; IQR: 15.0-80.0). Despite more than half of the neonates receiving high-frequency oscillatory ventilation (HFOV) as the initial ventilation mode (52.7%; 39/74), a small proportion received management with ECMO (6.8%; 5/74). The rate of surgical repairs performed was also relatively low (70.3%; 52/74). Greater pre-ductal and post-ductal SpO2 differences (adjusted odds ratio [AOR]: 1.386; 95% CI: 1.045-1.840), higher admission PASP (AOR: 1.080; 95% CI: 1.015-1.150), and the use of HFOV as the initial ventilation mode (AOR: 9.700; 95% CI: 1.341-70.176) were independently associated with an increased risk of hospital mortality.

Conclusions: This study investigated a selected cohort of neonates with CDH admitted to a central children's hospital in Vietnam, revealing a high mortality rate. The neonates presented with severe conditions and received limited intensive neonatal care, with a low rate of surgical repairs. Greater pre- and post-ductal SpO2 differences upon admission, higher PASP at admission, and utilization of HFOV as the initial ventilation mode were independently associated with an increased risk of hospital mortality. These findings highlight the importance of enhancing neonatal intensive care and ensuring the availability of surgical repairs in Vietnam to reduce mortality rates in neonates with CDH.

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Topic: Perioperative care

000150

Prevalence of and factors associated with perceived inappropriateness of care: a cross-sectional nationwide survey among intensive care unit clinicians in the Netherlands

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Intensive care Medicine Experimental 2025* 13(1)*:000150

Introduction: Clinicians in intensive care units (ICUs) perceive the care they provide as inappropriate when they feel that it clashes with their personal beliefs and/or professional knowledge. Clinicians who provide care perceived as inappropriate may experience moral distress. This situation may jeopardize the quality of care and increase staff turnover.
Objectives: First, to determine the prevalence of perceived inappropriateness of care among Dutch ICU clinicians. Second, to identify personal, professional, departmental, and work-related characteristics associated with clinicians' perceived inappropriateness of care, mental well-being and intention to leave the job. Third, to explore solutions to reduce perceived inappropriate ICU care.
Methods: In November 2024, we conducted a single-day cross-sectional study among physicians and nurses providing bedside care in 47 (68%) adult ICUs in the Netherlands. Perceived inappropriateness of care, relevant characteristics and solutions were assessed with online questionnaires. Validated measures were used to assess job strain [1], the ethical work environment [2], and symptoms of burn-out [3]. Multilevel modeling was used to identify associated factors.
Results: Of 1477 clinicians, 1058 completed the questionnaire (72% overall response). Perceived inappropriateness of care in at least one patient was reported by 276 clinicians (26%); 23% among nurses, 36% among physicians. Of these 276 individuals, 227 reported 259 situations of inappropriate care. The most common reports were perceived disproportionate care (n = 172; 66%; Fig. 1) of which 61% referred to "too much care". Independently associated with perceived inappropriateness of care rates were being an ICU nurse versus physician (odds ratio [OR], 1.78; 95% CI, 1.37-2.33; p < .001), the number of ICU beds (OR, 0.97; 95% CI, 0.94-0.99; p = .004), a culture of avoiding end-of-life care decisions (OR, 1.92; 95% CI, 1.51-2.45; p < .001); and a culture of mutual respect within the interdisciplinary team (OR, 0.84; 95% CI, 0.70-1.00; p = .045; Fig. 2). Perceived inappropriateness of care was independently associated with higher emotional exhaustion (β, .07; 95% CI, 0-.15; p = .049) and higher intent to leave the job (OR, 1.59; 95% CI, 1.13-2.23; p = .008). Commonly mentioned solutions to reduce inappropriate ICU care were: moral deliberation and multidisciplinary meetings to discuss ethical dilemmas, involving ICU nurses more in end-of-life care decisions, patient education about the implications of ICU treatment, mandatory and more frequent family meetings, increase of nursing capacity to improve patient flow to the nursing ward, and more uniform ICU admission criteria.
Conclusions: Among Dutch ICU clinicians, especially nurses, perceptions of inappropriate care were frequently reported and were inversely associated a good ethical work environment and team climate. Providing care they perceive as inappropriate puts ICU clinicians at risk for burn-out and leaving the job.

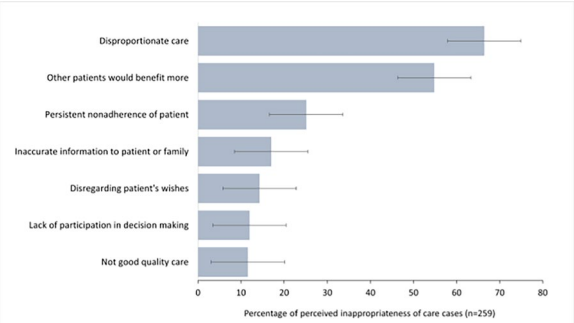


Fig. 1 (abstract 000150) Reasons and rates of perceived inappropriateness of care reported by ICU clinicians

Perceived inappropriateness of care rate*		
Factors	**OR [95% CI]**	***p***
Nurse versus physician (ref)	1.78 (1.37, 2.33)	<0.001
Number of operational ICU beds	0.97 (0.94, 0.99)	0.004
Culture of avoiding End of Life decisions‡	1.92 (1.51, 2.45)	<0.001
Culture of mutual respect within interdisciplinary team‡	0.84 (0.70, 1.00)	0.045
Random covariance	**Estimate [95% CI]**	***p***
Hospital	0.12 (0.04, 0.38)	0.096
Intention to leave the job*		
Factors	**OR [95% CI]**	***p***
Nurse versus physician (ref)	1.43 (1.05, 1.96)	0.024
Perceived inappropriateness of care rate	1.59 (1.13, 2.23)	0.008
Age	0.92 (0.89, 0.95)	<0.001
Work experience in the ICU	1.06 (1.02, 1.09)	0.002
Job control†	0.68 (0.60, 0.77)	<0.001
Social support†	0.61 (0.50, 0.75)	<0.001
Culture of mutual respect within interdisciplinary team‡	0.71 (0.58, 0.87)	<0.001
Culture of avoiding End of Life decisions‡	1.49 (1.14, 1.93)	0.003
Random covariance	**Estimate [95% CI]**	***p***
Hospital	0.67 (0.36, 1.25)	0.002
Emotional exhaustion*‖		
Factors	**F**	**β (95% CI)**	***p***
Perceived inappropriateness of care rate	3.88	0.07 (0, 0.15)	0.049
Female versus male (ref)	9.78	0.08 (0.03, 0.13)	0.002
Work experience in the ICU	21.67	-0.01 (-0.01, 0)	<0.001
Job control†	55.25	-0.10 (-0.12, -0.07)	<0.001
Social support†	21.80	-0.11 (-0.15, -0.06)	<0.001
Job demand†	227.92	0.25 (0.22, 0.28)	<0.001
Practice and culture of ethical awareness‡	13.26	-0.11 (-0.15, -0.06)	<0.001
Culture of avoiding End of Life decisions‡	109.90	0.26 (0.21, 0.31)	<0.001
Intraclass Correlation Coefficient: 0.07			

Abbreviations: OR, odds ratio; CI, Confidence Interval; ICU, Intensive Care Unit.

* A range of personal, professional, departmental and work-related variables were first tested with univariate analysis. Univariate associations with p < 0.05 were entered into the multivariable model after testing for collinearity. A stepwise backward elimination procedure was applied. Only statistically significant associated factors (p<0.05) are presented in the model.

† Subscale of the Job Strain Questionnaire.[1]

‖ Subscale of the Dutch version of the Maslach Burnout Inventory, (Utrecht Burnout Scale, UBOS).[3]

‡ Subscale of the Ethical Decision-Making Climate Questionnaire (EDMCQ).[2]

Fig. 2 (abstract 000150) Multilevel (multivariate) regression models

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Topic: Ethics and end of life care

000151

Comparison of incidence of malposition of E-Z blockers and left-sided double-lumen tubes during patient positioning in patients requiring one-lung ventilation: randomized controlled trial

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Intensive care Medicine Experimental 2025* 13(1)*:000151

Introduction: Double-lumen tubes (DLT) are the most commonly used devices for one-lung ventilation (OLV), but they are prone to malpositioning during patient positioning. The EZ blocker (Teleflex Life Sciences Ltd., Athlone, Ireland) has shown promise in providing effective OLV.

Objectives: This study compared the incidence of malposition between the two devices during patient positioning in adult patients undergoing OLV. The primary outcome was an incidence of malposition during patient positioning. Secondary outcomes were time taken for device placement, number of attempts for successful placement, ease of insertion, quality of lung collapse, and adverse effects.

Methods: The trial started after approval of the institutional ethics committee (AIIMS/IEC/2022/5251), CTRI registry (REF/2022/11/047711), and written informed consent from patients. Patients were randomly assigned to two groups: EZB and DLT (n = 42 each). Device position was assessed by fibreoptic scope (3.7 ID) before and after patient positioning. Time, attempts for device placement, quality of lung collapse, and adverse effects were also noted.

Quantitative variables were presented as mean ± SD or median (IQR). Categorical variables were expressed as numbers or percentages. Continuous data were analysed using Student's t-test, and categorical data using the Chi-square test. The Mann–Whitney U test was used for ordinal variables and quantitative variables with a non-normal distribution

Results: There was no significant difference in the incidence of malposition during positioning between the EZB group and DLT group (Table-1). The median time taken for device placement was significantly longer in EZB group (480 s) compared to the DLT group (300 s). There was no significant difference in the quality of lung collapse between the groups (Fig-1)

Table 1 (abstract 000151) Comparison of endpoint variables between study groups

	EZB group (n = 42)	**DLT group (n = 42)**	**Mean difference (95% CI)**	**p-value***
Incidence of malposition	9 (21.4%)*	6 (14.3%)		0.57
Time for device placement (Sec)	480 (300–795) **	300 (180–600)	180 (25.33–366.09)	0.04
No. of intubation attempts (1/2/3)	24/15/3***	23/14/5		0.812

* Values are in absolute number/percentage
** values are in median (IQR)
*** values are in absolute number

Conclusions: Although the time for device placement was longer with the EZ blocker, the incidence of malposition during patient positioning was comparable between the two devices.

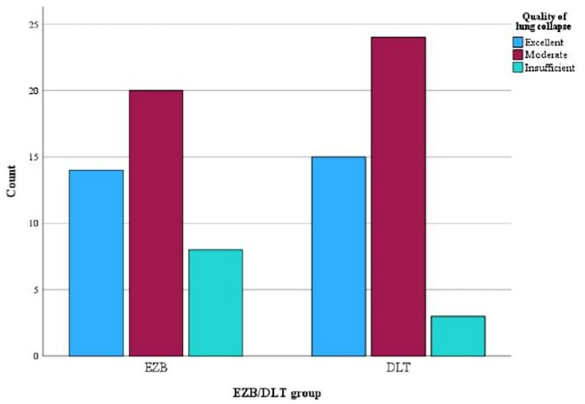


Fig. 1 (abstract 000151) Comparison of the quality of lung collapse in the EZB and DLT groups

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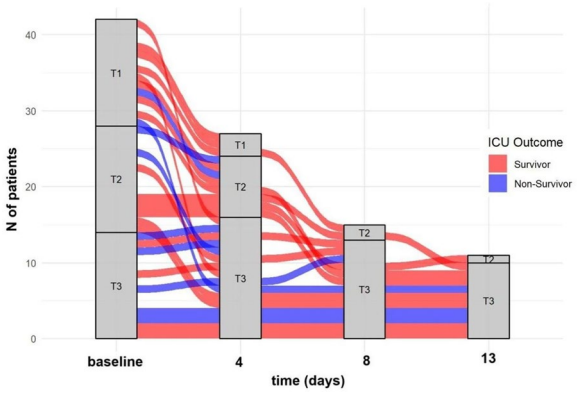
Topic: Perioperative care

000152

Association between longitudinal changes in serum soluble Pd-L1 levels and neutrophil PD-L1 mRNA expression with outcome in a heterogeneous general ICU population

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Intensive care Medicine Experimental 2025* 13(1)*:000152

Introduction: Immunosuppression is a common phenomenon in critically ill patients, regardless of sepsis presence. The interaction between programmed cell death-1 (PD-1) and programmed cell death-ligand 1 (PD-L1) is believed to play a significant role in immune suppression.
Objectives: The primary aim of this study was to investigate the association between the dynamic changes of two negative co-stimulatory markers, neutrophil PD-L1 mRNA expression and serum soluble PD-L1 (sPD-L1) levels, and clinical outcome in a heterogeneous population of patients admitted to a general intensive care unit (ICU). Additionally, a subgroup analysis was conducted to assess these markers in trauma patients.
Methods: This prospective study included critically ill patients admitted to a multidisciplinary ICU. Baseline levels of interleukin (IL)-6, IL-8, IL-10, and tumor necrosis factor (TNF)-α were measured. Serum sPD-L1 and neutrophil PD-L1 mRNA relative expression were measured within 24-48 h of admission (baseline) and on days 4, 8, and 13, using ELISA. Data were analyzed using mixed-effects linear and logistic regression models.
Results: A total of 42 patients were included in the final analysis, with 25 (60%) being male. The median age (IQR) was 57 (41-71) years, and the median APACHE II and SOFA scores were 16 (12-20) and 8 (7-10), respectively. Trauma was the admission diagnosis for 21 (50%) patients, and the all-cause ICU mortality rate was 35%. Admission serum sPD-L1 was positively correlated with C-reactive protein and IL-6, 8 and 10. Baseline neutrophil PD-L1 mRNA expression was positively correlated with γ-globulins and TNF-α. While serum sPD-L1 levels significantly increased over time in the overall cohort, neutrophil PD-L1 mRNA expression remained unchanged. The longitudinal change in serum sPD-L1 levels was identified as an independent risk factor for ICU mortality (OR: 2.58, 95% CI: 1.17-5.72, P = 0.02). We found no association between sPD-L1 and trauma.
Conclusions: The dynamic change in serum sPD-L1 levels over time was independently associated with ICU outcome, highlighting their potential role as a prognostic marker. It could also guide immunomodulatory treatment in critically ill patients with severe immunosuppression.



Alluvial plot depicting the trajectory of serum sPD-L1 levels over time in survivors and non-survivors, with patients grouped into tertiles of baseline serum sPD-L1 levels values. N, number; T, tertile.

Reference
1. None.

Topic: Trauma

000155

Effect of remifentanil vs. fentanyl on delirium incidence in mechanically ventilated critically ill patients: a retrospective observational study

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Intensive care Medicine Experimental 2025* 13(1)*:000155

Introduction: Remifentanil, an ultra-short-acting opioid analgesic characterized by organ-independent metabolism, has been approved in Japan since 2022 for use in critically ill patients requiring mechanical ventilation. Previous studies (1) have primarily investigated remifentanil's potential to reduce mechanical ventilation duration; however, recent evidence (2) suggests it may also decrease the incidence of delirium among critically ill medical patients. Nevertheless, these prior reports have not directly compared remifentanil monotherapy with fentanyl monotherapy. Thus, direct comparisons between remifentanil and fentanyl monotherapy in medically critically ill patients are necessary.
Methods: This was a single-center retrospective observational study conducted among patients admitted to the intensive care unit (ICU) requiring mechanical ventilation between April 2021 and May 2024. The study included patients who underwent mechanical ventilation for more than 24 h. Patients were excluded if they were postoperative, post-cardiac arrest, readmitted to the ICU, did not initiate mechanical ventilation within 24 h of ICU admission, had a mechanical ventilation duration of less than 12 h, had an unknown transfer status or sedation dose, received both remifentanil and fentanyl, had a tracheostomy at ICU admission, or had a history of convulsive seizures.
Multivariate logistic regression analysis was performed to adjust for baseline patient characteristics. The primary outcome was the incidence of delirium during mechanical ventilation, reported as an odds ratio (OR) with a 95% confidence interval (CI).
Results: Among 582 patients admitted to our ICU and placed on mechanical ventilation, 198 met the eligibility criteria, with 41

receiving remifentanil and 157 receiving fentanyl. After adjustment for covariates including age, sex, BMI, neuromuscular blockade, vasopressor use, and APACHE II score, remifentanil use was associated with a reduced incidence of delirium, although this association did not reach statistical significance (OR 0.42; 95% CI, 0.14–1.29; P = 0.13) (Table 1).
Conclusions: In this study, the use of remifentanil was not significantly associated with a reduction in the incidence of delirium among mechanically ventilated critically ill patients. However, due to the limited sample size, the possibility of a clinically meaningful effect cannot be ruled out. Further large-scale, well-designed studies are warranted to clarify the potential impact of remifentanil on delirium.

Table 1 (abstract 000155) Association between remifentanil use and delirium: multivariate logistic regression analysis

VARIABLE	ADJUSTED OR (95% CI)	P-VALUE
Remifentanil (vs. Fentanyl)	0.42 (0.14–1.29)	0.13
Age	1.07 (0.81–1.40)	0.63
Male sex	0.81 (0.39–1.68)	0.57
BMI (kg/m²)	0.88 (0.61–1.26)	0.48
Neuromuscular blockade	0.93 (0.44–1.98)	0.85
Vasopressor use	1.29 (0.62–2.69)	0.50
APACHE II score	1.18 (0.90–1.56)	0.23

APACHE II :Acute Physiology and Chronic Health Evaluation II, BMI : body mass index, CI :confidence interval, OR : odds ratio.

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1. PMID: 39,185,471
2. PMID: 38,234,321
3. None

Topic: Sedation, analgesia and delirium

000156

Proactive desmopressin plus 3% saline (PD-3S) therapy for severe hypotonic hyponatremia in ICU—a practical approach

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Intensive care Medicine Experimental 2025* 13(1)*:000156

Introduction: Severe hypotonic hyponatremia (SNa < 120 mmol/L) can cause symptoms from malaise to seizures. Rapid correction risks osmotic demyelination syndrome. Variability in treatment can lead to inconsistent sodium corrections and increased workload from frequent intravenous fluid adjustments and monitoring.
Objectives: To evaluate the safety and efficacy of a standardized approach—**P**roactive **D**esmopressin plus **3**% hypertonic **s**aline (PD-3S) protocol—in treating severe hypotonic hyponatremia patients.
Methods: We conducted a descriptive, observational, single-center study from January 2023 to December 2024 at North District Hospital ICU. The study included adult patients (age ≥ 18) with severe hypotonic hyponatremia (SNa < 120 mmol/L) without renal or liver failure or neurosurgical conditions. PD-3S therapy aims for a controlled increase in serum sodium levels [1,2], with an increase in SNa of less than 10 mmol/L within the first 24 h and a maximum of 18 mmol/L within 48 h [3]. After obtaining baseline renal function tests, paired serum and urine osmolality, and electrolytes, desmopressin is administered immediately (2 mcg IV) and then every four hours (1 mcg IV). The 3% NaCl infusion is initiated based on body weight through a peripheral intravenous cannula (< 50 kg: 10 ml/h, 50-70 kg: 15 ml/h, > 70 kg: 25 ml/h). Serum and urine biochemistry are monitored every six hours. If the rate of SNa increases is inadequate, the infusion rate will be increased by 5 ml/h; if the rises in SNa are considered too rapid, a 250 ml bolus of 5% dextrose will be administered over 30 min and pausing the saline infusion during this period. Daily morning reviews guides adjustments as needed. The PD-3S protocol is discontinued and patients are discharged from the ICU only when SNa is higher than 120 mmol/L.
Results: The study included 19 patients (median age 72, 79% female). The median SNa [interquartile range] was 106 mmol/L [103-112], and the median serum osmolality was 224 mOsm/kg [215-236]. The causes for hyponatremia were due to SIADH (37%, n = 7), polydipsia (26%, n = 5), diuretics (21%, n = 4) and reduced solute intake (16%, n = 3). On presentation, all patients exhibited symptoms attributed to hyponatremia, including 10% (n = 2) with seizures, 20% (n = 4) in a stupor state, and 78% (n = 15) with symptoms such as nausea and malaise. The two patients with seizures had no more seizures after initiation of PD-3S and anticonvulsive therapy. The length of utilizing PD-3S therapy was 56 h [38-84] and total ICU length of stay was 72 h [58-106]. The rate of changes in SNa is illustrated in Fig. 1. No overcorrection, hypertonic saline extravasation, or thrombophlebitis occurred in the study patients and none exhibited osmotic demyelination syndrome at the three-month follow-up.
Conclusions: The standardized PD-3S treatment protocol for severe hypotonic hyponatremia was effective and safe in critically ill patients.

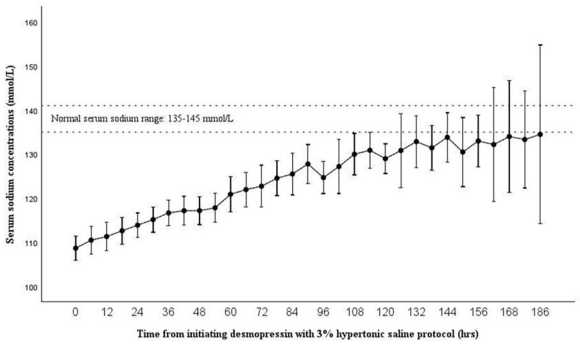


Fig. 1 (abstract 000156) Trend in the changes in serum sodium concentrations (SNa) over time since initiation of the PS-3S protocol

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Topic: Metabolism, endocrinology, liver failure and nutrition

000158

Creatinine clearance based on 6 h urine collection can improve 90-day mortality prediction of SOFA score

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Intensive care Medicine Experimental 2025* 13(1):*000158

Introduction: The Sequential Organ Failure Assessment (SOFA) score, designed to reflect organ failure, is a well-established prognostic score in the ICU setting. Its kidney component is based on serum creatinine (Scr) and 24-h urine output. The limitations of Scr in acute kidney injury assessment are well recognized. We evaluated the role of 6 h urine collection creatinine clearance (CrCl6hr) as a predictor of 90-days (90d) mortality.
Objectives: Comparing between Scr, CrCl6hr, kidney SOFA component, and categorized CrCl6hr, SOFA score and SOFA score based on categorized CrCl6hr, in 90d mortality prediction.
Methods: A prospective observational study in an 18-bed mixed medical-surgical ICU in a tertiary university-affiliated hospital. Urine collection was performed from midnight to 06:00 in the first two days of admission of all ventilated patients admitted to the ICU. Patients were included if their ICU admission lasted more than 48 h. Urine collection volume was recorded, and creatine level at the collection was evaluated. Serum creatinine was assessed each morning. CrCl6hr was calculated in the first two admission days (based on the formula: CrCl6hr = urine creatinine * urine volume / Scr * 360); patents were grouped to 5 groups based on their CrCl6hr according to KADIGO categories (0—≥ 90 ml/min, 1 -60-89 ml/min, 2—30-59 ml/min, 3—15-29 ml/min, 4—< 15 ml/min). Using logistic regressions, Scr and CrCl6hr were evaluated as 90d mortality predictors; categorized CrCl6hr and kidney SOFA component were evaluated as 90d mortality predictors; SOFA score, and SOFA score using the categorized CrCl6hr instead of the kidney component were evaluated as 90d mortality predictors. ROC were plotted for each comparison. We compared the predictive strength for 90d mortality in each comparison using the c-index (AUC) from logistic regressions.
Results: 164 patients were included. Mean Scr was 1.38 mg/dl (IQR 0.74, 1.68) in the 1st day, and 0.92 mg/dL (0.69, 1.61) in the 2nd day. Mean CrCl6hr was 75.52 ml/min (24.88, 106.83) in the 1st day, and 72.83 ml/min (35.08, 95.24) in the 2nd day.
The comparisons of the different AUCs of all assessed factors are presented in Table 1. The ROCs are presented in Figs. 1 to 3.

Table 1 (abstract 000158) Comparison of area under the curve of receiver operator curves of the different variables examined as 90d mortality predictors

	Scr	CrCl6hr	p value
Continuous variable			
1st admission day	0.65	0.73	0.004
2nd admission day	0.63	0.75	0.0002
Kidney SOFA component based on			
1st admission day	0.65	0.71	0.07
2nd admission day	0.64	0.74	0.0051
Total SOFA score based on			
1st admission day	0.61	0.65	0.022
2nd admission day	0.65	0.71	0.0001

Scr – serum creatinine; CrCl6hr—creatinine clearance based on 6 h urine collection.

Conclusions: Performing 6 h urine collection is feasible. It allows better 90d mortality prediction compared to the currently used SOFA score.

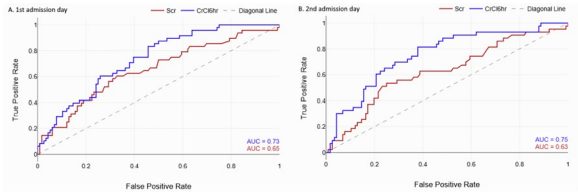


Fig. 1 (abstract 000158) ROC of serum creatinine and CrCl6hr for 90-d mortality in the first and second admission days. Scr—serum creatinine; CrCl6hr—creatinine clearance based on 6 h urine collection; AUC – area under the curve

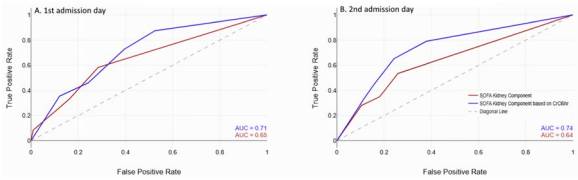


Fig. 2 (abstract 000158) ROC of SOFA kidney component, and SOFA kidney component based on CrCl6hr for 90-d mortality in the first and second admission days. Scr—serum creatinine; CrCl6hr—creatinine clearance based on 6 h urine collection; AUC—area under the curve

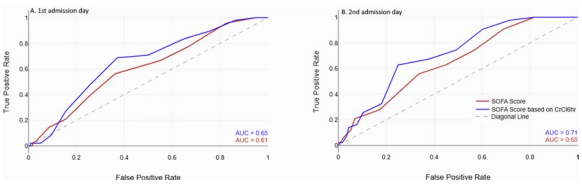


Fig. 3 (abstract 000158) ROC of SOFA score and SOFA score based on CrCl6hr for 90-d mortality in the first and second admission days. Scr—serum creatinine; CrCl6hr—creatinine clearance based on 6 h urine collection; AUC—area under the curve

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Topic: Health Services Research and Outcome

000159

Reducing unnecessary chest X-ray in ICU: quality improvement project

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Intensive care Medicine Experimental 2025* 13(1):*000159

Introduction: Since 2011, the international guidelines recommended against obtained daily CXR for ICU patients. However, despite this recommendation, a restrictive approach has not been uniformly accepted, and at the majority ICUs daily CXR remains the standard

Objectives: To assess the feasibility and the safety of the reduction of unnecessary CXR in ICU and its outcomes and economic impacts.
Methods: This project included two periods. Retrospective period (pre-intervention period, from 01 March 2024 to 31 May 2024) followed by interventions and prospective period (post-intervention, from 01 June 2024 to 31 August 2024). We collect for all admitted patients in ICU, the demographic data, number of CXR performed during ICU stay, the indication of any CXR performed during prospective period, the intubation requirement, the duration of intubation, ICU length of stay (LOS) and ICU mortality. During the post-intervention period all CXR performed must be justified and reported. The CXR was ordered at ICU admission (if clinical indicated), after any intra-thoracic procedures or any acute clinical deterioration. The primary outcome was a reduction of the rate of utilization of CXR in ICU to more than 50% within 3 months. The secondary outcomes were the assessment of the ICU LOS, the duration of mechanical ventilation, the ICU mortality and the cost saving. The interventions were based mainly on Staff education and awareness, optimize communication within the ICU staff, encourage collaboration between intensivists, radiologists, and other specialists involved in the ICU patients care to develop strategies and reach consensus on appropriate indication for CXR use. All statistical analysis was performed by using Microsoft Excel and SPSS 20.0.
Results: During pre-intervention period, 290 patients were included versus 257 patients in the post-intervention period. The age, gender APACHE II were similar between the two groups. Intubation was required in 38.3% of patient in pre-intervention period and 42% of the patient in the post-intervention period ($p = 0.372$). During the pre-intervention period, 1619 CXR was performed versus 502 CXR in the post-intervention period. The average number of CXR per patient was 5.6 in the pre-intervention period versus 1.95 in the post-intervention period ($p < 0.001$). The average number of CXR per patient days was 1.12 in the pre-intervention period versus 0.4 in the post-intervention period ($p < 0.001$) with reduction of CXR performed by 64%. The average number of CXR per ventilation days was 2.72 in the pre-intervention period versus 0.9 in the post-intervention period ($p < 0.001$) with a reduction of CXR performed by 67% for intubated patients. The ICU LOS, duration of intubation and ICU mortality were similar between the two periods. The direct cost saving was 36,890 € in three months with decrease of direct cost by 70%.
Conclusions: The performance improvement project decreased the CXR utilization in ICU patients by more than 60% and direct cost reduction by 70% without concomitant negative impact on the outcomes.

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3. We are indebted to the doctors and all staff with the Intensive Care Medicine Service who provide care for the patients included in the study.

Topic: Imaging in intensive care

000160

Noninvasive monitoring of intracranial pressure in patients with acute liver failure using transcranial Doppler ultrasonography

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Intensive care Medicine Experimental 2025* 13(1)*:000160

Introduction: Acute liver failure (ALF) leads to cerebral edema and intracranial hypertension, necessitating early detection and management. Standard imaging and EEG cannot provide an accurate correlate of increased intracranial pressure (ICP).
Objectives: This early pilot study investigates the use of transcranial Doppler (TCD) ultrasound to assess cerebral hemodynamic patterns, with the future aim of guiding goal-directed hypertonic and/or hyperosmolar therapy.
Methods: Seven ALF patients admitted to the Intensive Care Unit (ICU) at North Shore University Hospital in NYC, USA, with encephalopathy were monitored using TCD on the day of admission, the day prior to orthotopic liver transplant (OLT), and postoperatively to assess cerebral blood flow velocities and infer ICP changes. Waveform features of the right middle cerebral artery (MCA), obtained via temporal windows, including mean flow velocity (MFV), pulsatility index (PI), peak systolic velocity (PSV), and end-diastolic velocity (EDV), were analyzed. Symmetrical TCD data were also collected. The following flow patterns were defined: low-flow pattern when MFV was below normal reference values, independent of PI; high-resistance pattern with normal MFV and elevated PI; and hyperemia pattern when MFV was elevated, independent of PI.
Results: Preliminary results from seven ALF patients with varying etiologies, including postpartum ALF, EBV hepatitis, HBV reactivation, and acetaminophen intoxication, demonstrated distinct cerebral hemodynamic patterns across different hepatic encephalopathy (HE) severities (West Haven Criteria Grade 1–4). TCD findings indicate that low cerebral blood flow with high resistance (elevated pulsatility index [PI]) correlates with worsening encephalopathy (Table 1). Three patients with Grade 4 HE exhibited markedly elevated PI (≥ 2.0) and reduced mean flow velocity (MFV ≤ 53 cm/s), consistent with cerebral edema on CT scan and ICP. Notably, in Case 1 (postpartum ALF, Grade 4 HE), TCD spectral Doppler studies demonstrated a progressive increase in PI (1.47 to 2.28) prior to OLT followed by a dynamic reduction in PI from 2.28 pre-transplant to 1.25 post-transplant, aligning with clinical improvement (Fig. 1). In patient case 7, who was intubated for Grade 4 encephalopathy, serial TCDs showed decreasing PI and normalization of flow velocities over time, paralleling neurological recovery and successful extubation (Fig. 2).
Conclusions: Preliminary findings suggest TCD is a valuable non-invasive tool for assessing ICP in ALF patients. The most common cerebral hemodynamic pattern observed was low flow with high resistance. Ongoing data collection may help refine its role in monitoring neurological complications, guiding hypertonic/hyperosmolar therapy, and providing insights into prognosis and the timing of interventions such as liver transplant. Multi-center studies are needed to evaluate multimodal ICP assessment when invasive monitoring is contraindicated and to validate TCD as a standard of care for ALF patients.

Table 1 (abstract 000160) This table summarizes the clinical characteristics, hepatic encephalopathy severity, and transcranial Doppler (TCD) hemodynamic parameters of seven patients with acute liver failure (ALF). Most patients with severe encephalopathy (Grade 3-4) exhibited a low-flow, high-resistance waveform pattern, indicative of intracranial hypertension (ICH). In contrast, one patient (Case 4) showed hyperemia, suggesting altered cerebral autoregulation. Encephalopathy severity (West Haven Criteria) ranged from Grade 1 to 4. TCD parameters include mean flow velocity (MFV), pulsatility index (PI), peak systolic velocity (PSV), and end-diastolic velocity (EDV)

Cases	Age	Sex	ALF etiology	OLT	Encephalopathy grades	MFV (cm/s)	PI	PSV (cm/s)	EDV (cm/s)	Waveform pattern
1	35	F	Post-partum	Yes	4	53	2.28	143	21	Low flow, High resistance
2	30	F	EBV hepatitis	Yes	1	45	1.02	77	30	Low flow, High resistance
3	59	F	HBV reactivation	Yes	4	32	0.91	51	22	Low flow, High resistance
4	27	F	Acetamino phen intoxication	No	No	79	0.78	116	54	Hyperemia
5	27	M	Acetamino-phen and alcohol intoxication	No	2	53	1.45	108	32	High resistance
6	61	M	HBV reactivation	Yes	3	48	1.6	99	22	Low flow, High resistance
7	29	M	Alcohol intoxication	No	3	63	1.64	141	38	High resistance

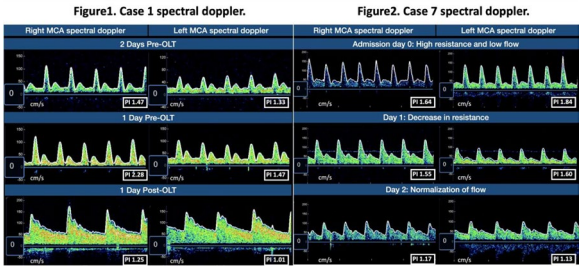


Fig. 1 (abstract 000160) Serial TCD spectral Doppler waveforms in Case 1 (postpartum ALF with Grade 4 encephalopathy)
This figure illustrates the progression of cerebral hemodynamics in a patient with ALF secondary to postpartum etiology, who developed severe hepatic encephalopathy (Grade 4) and underwent orthotopic liver transplantation. TCD spectral Doppler recordings of the right and left middle cerebral arteries (MCA) are shown at three time points. These findings suggest that TCD can track dynamic changes in ICP and cerebral autoregulation in ALF patients, potentially serving as a noninvasive monitoring tool to guide timely interventions.
Figure 2. Serial TCD spectral Doppler waveforms in Case7.
The patient was intubated for Grade 4 encephalopathy, serial TCDs showed decreasing PI and normalization of flow velocities over time, paralleling neurological recovery and successful extubation.

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8. No external funding or grants were received for this study.

Topic: Neurointensive care

000161

Engaging ICU patients and family members in research: identifying strategies

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Intensive care Medicine Experimental 2025* 13(1):*000161

Introduction: The COVID-19 pandemic and resulting limitations in family visitation practices in the intensive care unit (ICU) dramatically changed the way patients and family members are recruited and participate in research. As a result, there is an urgent need to identify strategies for involving patients and family members to foster patient centered outcomes research.
Objectives: The objectives of this session are to review results from a 2-year project which focused on identify barriers and strategies to enlisting ICU patients and family members in research in the ICU.
Methods: Group Concept Mapping, a mixed-methods approach for stakeholder engagement, was used to solicit input on perceived barriers to conducting research in the ICU. Four virtual sessions held with 16 patients/family members and 23 healthcare professionals (clinicians, researchers). Participants then sorted the barriers into conceptually similar domains and rated them on feasibility and impact of addressing.
Results: A total of 98 unique barriers were identified and organized into 7 clusters: Negative Experiences Surrounding ICU Stay, Difficult Research Logistics, Patient & Family Characteristics, ICU Setting Limitations, Post-Critical Illness Issues, Research Fears, and (Mis)perceptions About Research. Strategies were then identified to address the perceived barriers.
Conclusions: A number of strategies can be used by ICU clinicians and researchers to engage patients and family members in research. This session will review the project results, highlighting implications for clinical research.

Topic: Health Services Research and Outcome

000162

Code ICH: impact of first-hour ED intervention on hematoma expansion in non-traumatic intracerebral hemorrhage

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Intensive care Medicine Experimental 2025* 13(1):*000162

Introduction: Hematoma expansion is a major determinant of poor outcomes in patients with intracerebral hemorrhage (ICH). The first hour following emergency department (ED) presentation is a critical window to initiate interventions that may limit expansion risk.

Objectives: This study describes the implementation of a Code ICH protocol at Staten Island University Hospital (SIUH) and evaluates the impact of tranexamic acid or desmopressin (TXA/DDAVP), antithrombotic reversal, blood pressure control, and black hole signs on CT on hematoma expansion.
Methods: A retrospective cohort study included 139 non-traumatic ICH patients admitted between January 2023 and December 2024 at SIUH, New York City. A Microsoft Teams group chat was used to alert the care team upon ED identification of ICH. Key variables included the use of an ICH order set within the first hour and black hole signs on initial CT. The order set included blood pressure control, glucose and temperature management, and TXA/DDAVP administration, with a scheduled repeat head CT at three to six hours. The primary outcome was hematoma expansion, defined as a $\geq$ 5 mL volume increase on follow-up CT. Secondary outcomes included the association between early implementation of the ICH order set and expansion rate and the modified Rankin Scale (mRS) at discharge. Logistic regression was used for predictive analysis.
Results: Of the 139 patients, 11 (7.9%) experienced hematoma expansion. Expansion occurred in four patients (5%) in 2023 and five (8%) in 2024. Among patients with expansion in 2023, three cases were attributed to hypertension and one had an unknown etiology. In 2024, four cases were attributed to hypertension and one the lack of reversal. TXA/DDAVP administration was not significantly associated with hematoma expansion. Use of the ICH order set increased from 53% in 2023 to 68% in 2024, representing a 14.8% increase. Earlier order set use was associated with more consistent reversal and blood pressure management. Higher systolic blood pressure was associated with worse functional outcomes (mRS > 3), though no clear threshold was identified. Black hole signs were correlated with expansion but were present in a small subset.
Conclusions: This is one of the first retrospective cohort studies to evaluate the impact of initiating ICH management within the first hour of ED presentation through a Code ICH protocol. While hematoma expansion was infrequent, earlier implementation of the order set that included blood pressure control and antithrombotic, anticoagulation reversal, was associated with more consistent adherence to guideline-based care. These findings suggest that faster ED-based intervention may help improve outcomes, warranting further prospective validation. While black hole signs on head CT appeared predictive, the impact of TXA and DDAVP on expansion remains inconclusive. Future prospective studies with larger cohorts are needed to better characterize predictors of hematoma expansion and functional outcomes in ICH.

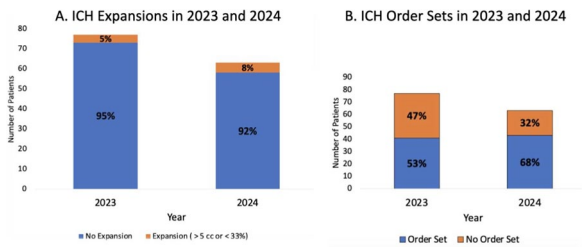


Fig. 1 (abstract 000162) ICH expansion rates and ICH order set use in 2023 and 2024. A. Hematoma expansion rates among ICH patients in 2023 and 2024. In 2023, 95% of patients showed no expansion, while 5% did. In 2024, 92% had no expansion and 8% experienced expansion. Expansion was defined as a > 5 mL increase in hematoma volume between the initial and 6-h CT scan. **B.** ICH order set utilization rates. In 2023, 53% of patients had an order set placed compared to 68% in 2024. Abbreviations: ICH, intracranial hemorrhage

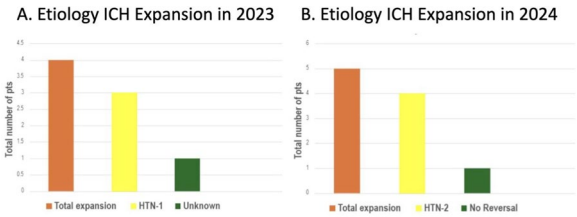


Fig. 2 (abstract 000162) Etiology of ICH expansion in 2023 and 2024. A. Etiology of ICH expansions in 2023. Among 77 ICH cases, four patients experienced expansion. Three were associated with hypertension (HTN-1), and one had an unknown etiology. **B.** Etiology of hematoma expansion in 2024. Among 63 ICH cases, five patients experienced expansion. Four were attributed to hypertension (HTN-2), and one was associated to lack of reversal. Abbreviations: ICH, intracranial hemorrhage; pts, patients; HTN, hypertension

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Topic: Neurointensive care

000164

Early enteral nutrition was associated with reduced mortality in septic patients with lower dosage of vasopressors

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Intensive care Medicine Experimental ***2025*** **13(1)**:***000164***

Introduction: Enteral nutrition in septic shock patients is a double-edged sword. The impact of early enteral nutrition (EEN) on mortality of septic shock patients remains uncertain, and whether this association is modified by vasopressor dosage remains unclear.
Objectives: The study aimed to investigate the association between EEN and 28-day in-hospital mortality in patients with septic shock, and to explore whether the association varied within different dosage of vasopressors during the first 24 h

Methods: Data were extracted from the Database in Intensive Care. Adult septic patients who received vasopressors within 24 h after Intensive Care Unit admission were eligible for inclusion. The primary exposure was whether the patients received early nutrition within the first 24 h after ICU admission (EEN Group). The primary outcome was 28-day mortality. Multivariate Cox regression models were employed to explore the association between EEN group and 28-day mortality in the overall population and in patients receiving different dosages of vasopressors.
Results: A total of 10,263 patients were screened, and ultimately 1184 patients met the inclusion criteria. The median sequential organ failure assessment (SOFA) score was 9 (interquartile range (IQR): 7–11) and the Acute Physiology and Chronic Health Evaluation (APACHE) II score was 19 (IQR: 14–25). The 28-day in-hospital mortality rate was 19.6%. Compared to patients in the EEN group, patients in the late enteral nutrition (LEN) group had a higher vasopressor (7.5 vs 9.57 ug/min, $p = 0.002$), and higher 28-day mortality (15.5% vs.21.3%, $p = 0.027$). After adjusting for confounders, EEN was associated with a decreased risk of mortality (hazard ratio (HR) 0.722, 95% confidence interval (CI) (0.528-0.985), $p = 0.04$). This result was persisted in patients with vasopressor < 15 ug/min (norepinephrine equivalents) (HR 0.618, 95% CI (0.404-0.946)), other than in patients with vasopressor ≥ 15ug/min (norepinephrine equivalents) (HR 0.818, 95% CI (0.512-1.307); $p = 0.40$).
Conclusions: Early enteral nutrition was associated with improved outcome in septic shock patients, especially in patients with low dosage of vasopressor.

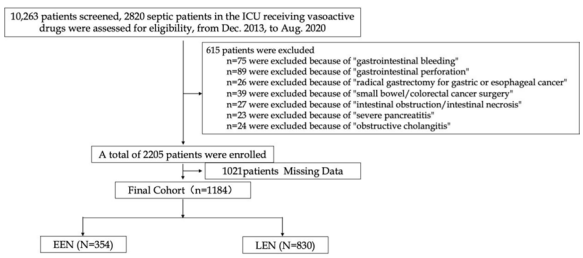


Fig. 1 (abstract 000164) Flowchart of patient selection. ICU, intensive care unit; EEN, early enteral nutrition; LEN, late enteral nutrition

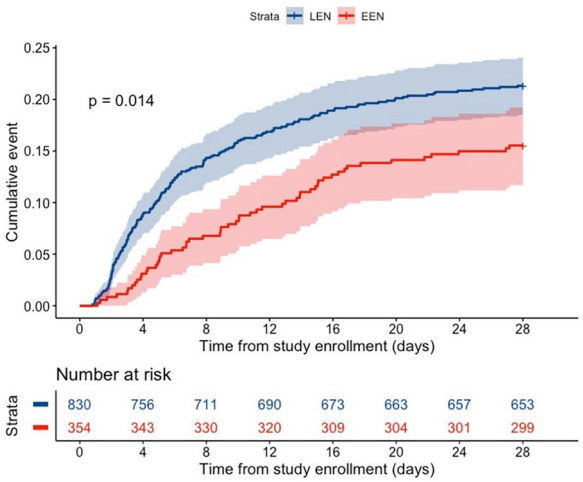


Fig. 2 (abstract 000164) Kaplan–Meier estimates of cumulative incidence for septic patients, comparing EEN and LEN groups. EEN: early enteral nutrition; LEN: late enteral nutrition

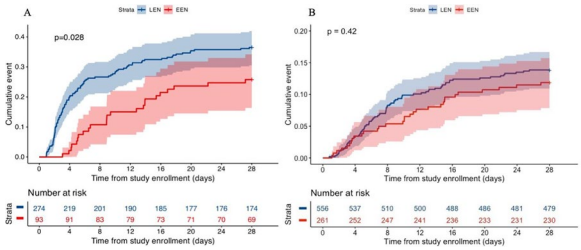


Fig. 3 (abstract 000164) Kaplan–Meier curves illustrating the cumulative incidence in septic patients, comparing the EEN and LEN groups, stratified by vasopressor dosing intensity (VDI) of < 15 μg/min (A) and ≥ 15 μg/min (B). EEN, early enteral nutrition; LEN, late enteral nutrition; VDI, vasopressor dosing intensity

Reference

1. Not Applicable

Topic: Metabolism, endocrinology, liver failure and nutrition

000168

Population pharmacokinetics and optimal sampling design for caspofungin in critically ill children

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Intensive care Medicine Experimental 2025* 13(1):*000168

Introduction: Caspofungin, an echinocandin antifungal, is often used to treat invasive candidiasis in children. Its pharmacokinetics (PK) vary significantly in critically ill pediatric patients, leading to unpredictable behavior in this population. Despite these challenges, comprehensive PK studies on caspofungin in critically ill children are still lacking, highlighting the need for more research. Pediatric clinical studies are further complicated by ethical concerns, recruitment difficulties, and sample collection challenges. [1-2] Optimizing study design, particularly the number and timing of sampling points, can maximize information utilization while minimizing risks and discomfort, ultimately developing more effective sampling plans and enhancing pediatric PK research in larger population.
Methods: The final PPK model was developed using data from critically ill children who received a once-daily, 1-h intravenous infusion of caspofungin for antifungal treatment. Steady-state PK data were collected five days after the initial dose, with samples taken at six potential time points per patient: pre-dose, 1 h, 2 h, 4 h, 8 h (if possible), and 16 h (if possible) post-administration.
The PPK model was developed using the non-linear mixed-effects modeling software NONMEM (version 7.5, ICON Development Matrixs, MD, United States) with the first-order conditional estimation with interaction (FOCE-I) algorithm. Allometric scaling for body size, such as weight (WT), body surface area (BSA), and body mass index (BMI), calculated as WT / (height)2, was employed a priori.
Design software, including $DESIGN in NONMEM [3] and PopED package (version 0.6.0), were utilized to explore design elements such as the number of subjects, sampling size, and sampling windows. The designs were evaluated to ensure the precise estimation of typical PK parameters, defined as a relative standard error (RSE) of less than 50%. The final sampling design was further validated through SSE. In the second phase of the study, approximately 40 participants will be recruited to receive a daily 1-h intravenous infusion of caspofungin.
Results: A total of 80 plasma samples were collected from 14 critically ill pediatric patients. The median (range) age and weight were

4.63 years (0.33-16) and 15.9 kg (4.9-64), respectively. All baseline blood biochemistry results were within normal ranges (**Table 1**).

A two-compartment model with allometric scaling on WT (an exponential of 1 for volume (V) and ¾ for clearance (CL)) was found to accurately describe the time course of caspofungin. After stepwise covariate modeling, baseline aspartate aminotransferase (AST) was identified as a significant covariate for the exchange rate between the central and peripheral compartments (Q). All pharmacokinetic parameters were precisely estimated (RSE < 45%), indicating the model's robustness (**Table 2**). GoF and VPC plots (**Fig. 1**) further confirmed that the final PPK model effectively represents caspofungin's observed time course.

Four sampling points per subject were sufficient for precise parameter estimation (RSE < 50%). The optimized sampling time points were identified as 119 h, 121 h, 126.5 h, and 144 h (**Table 3**). The sampling windows showed that effectiveness reaches 95% within the time intervals of 119-120 h, 120.5-121.5 h, 126-127 h, and 143-144 h. Sensitivity analysis indicated that covariates had minimal impact on the outcomes of the optimized sampling design (**Table 4**). SSE results demonstrated that PK parameters and inter-individual variability could be estimated with greater precision (RSE < 45%) using these sampling windows (**Fig. 2**).

Conclusions: The developed PPK model for caspofungin well described the PK profiles of critically ill pediatric patients. The proposed sampling design allowed fewer blood samples and flexible sampling windows, without the loss of precision in PK parameter estimates.

Table 1 (abstract 000168) Demographic and laboratory information of patients

Characteristics	Median[min,max] (n=14)
ECMO (Yes/No)	3/11 [21.4%/78.6%]
Demongraphic information	
Age (years)	4.63 [0.330, 16.0]
Sex (Male/Female)	5/9 [35.7%/64.3%]
Weight (kg)	15.9 [4.90, 64.0]
Height (cm)	97.5 [54.0, 160]
BSA (m^2)	0.655 [0.286, 1.69]
Laboratory information	
White Blood Cell (10^9/L)	6.37 [1.56, 22.5]
Red Blood Cell (10^{12}/L)	2.67 [1.88, 5.25]
Hemoglobin (g/L)	77.0 [51.0, 153]
Platelet (10^9/L)	134 [18.0, 434]
Albumin (g/L)	36.0 [24.7, 49.9]
Total Protein (g/L)	61.6 [36.8, 75.4]
Alanine Aminotransferase (U/L)	17.0 [3.51, 223]
Aspartate Aminotransferase (U/L)	52.5 [18.3, 631]
Total Bilirubin (umol/L)	26.6 [2.10, 357]
Direct Bilirubin (umol/L)	13.1 [1.10, 228]
Serum Creatinine (μmol/L)	27.7 [14.0, 223]
Uric Acid (umol/L)	177 [87.0, 736]

Table 2 (abstract 000168) Parameter estimates of the final caspofungin population pharmacokinetic model

Fixed Parameters	Final Estimates	RSE[a]
CL/F, L/h	0.477	18%
V_1/F, L	11.8	15%
Q/F, L/h	0.512	23%
V_2/F, L	19.2	41%
*The effect of **weight** on CL*	0.75 FIX	/
*The effect of **weight** on V_1*	1 FIX	/
*The effect of **weight** on Q*	0.75 FIX	/
*The effect of **weight** on V_2*	1 FIX	/
*The effect of **AST** on Q*	0.898	16%
Residual error	**Estimates**	**RSE**
Add. err, mg/L	1.58	16%
Inter-individual variability(%CV)	**Estimates**	**RSE [SHR][b]**
CL	64.4%	15.8% [0%]
V_1	50.3%	25.1% [2%]
Cor_{CL-V1}	82.4%	34.06%

CL = 0.477 x (weight/70)$^{0.75}$; V_1 = 11.8 x (weight/70)^1; Q = 0.512 x (weight//70)$^{0.75}$ x (AST/52.5)$^{0.898}$; V_2 = 10.2 x (weight/70)^1

a. RSE: relative standard error; b. SHR: shrinkage

CL clearance; V_1, volume of distribution of the central compartment; Q, atrioventricular exchange rate; V_2, volume of distribution of the peripheral compartment; F, bioavailability; AST, Aspartate aminotransferase

Table 3 (abstract 000168) Results of optimization and SSE

Item	$DESIGN	SSE
%RSE(CL)	12%	14.75%
%RSE(V_1)	6%	9.43%
%RSE(Q)	12%	24.12%
%RSE(V_2)	43%	45.02%
%RSE(Add.err)	16%	7.33%
%RSE(var(CL))	12%	35.02%
%RSE(var(V_1))	14%	29.61%
%RSE(var(Cor_CL_V_1))	13%	30.45%
Sample Time 1	119	119-120
Sample Time 2	121	120.5-121.5
Sample Time 3	126.5	126-127
Sample Time 4	144	143-144

Table 4 (abstract 000168) Sensitive analysis for covariates on the results of optimization

Weight	15.9kg (median)				4.9kg (lower limit)				61kg (upper limit)			
	119	121	126.5	144	119	120.82	124.97	144.07	119	121	127.97	144
AST	52.5U/L (median)				18.3U/L (lower limit)				631U/L (upper limit)			
	119	121	126.5	144	119.12	121	128.01	143.98	120	121	125.09	145.89

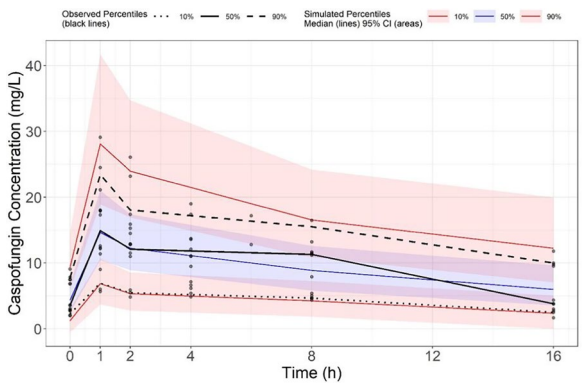


Fig. 1 (abstract 000168) Visual predictive check of the final population pharmacokinetic model in steady state. Black lines represent the 10% (dashed), 50% (solid), and 90% (dashed) percentiles of the observed data. Shaded areas represent 95% confidence intervals of the 10% (red), 50% (blue), and 90% (red) percentiles of the model prediction

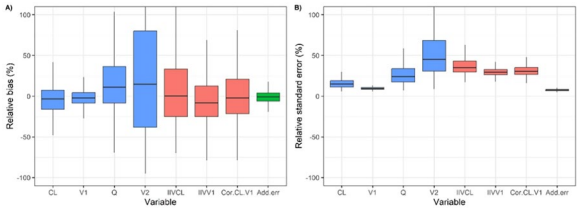


Fig. 2 (abstract 000168) SSE results of optimized sampling design (119-120 h, 120.5-121.5 h, 126-127 h, and 143-144 h). A) Relative bias (%) of PPK parameters estimation; B) Relative standard error (%) of PPK parameters estimation. Box lines: upper quartile, lower quartile, and median value; variables: CL clearance, V1, volume of distribution of the central compartment, Q, atrioventricular exchange rate, V2, volume of distribution of the peripheral compartment, IIV inter-individual variability; Cor.CL.V1 correlation between CL and V1

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[4] None

Topic: Pharmacology and Toxicology/Poisoning

000170

Erector spinae plane block in thoracic trauma: effects on pain control and clinical outcomes

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Intensive care Medicine Experimental 2025* 13(1)*:000170

Introduction: Thoracic trauma (TT) causes significant morbidity and mortality, with hemothorax, pneumothorax and pneumonia as common complications. [1]
Analgesia is key to preventing respiratory complications. [2] Erector spinae plane block (ESPB) improves pain and respiratory function with < 3% of complications. [3, 4]
Objectives: The objective of this study is to evaluate ESPB in TT patients, its impact on opioid use and outcomes.
Methods: Observational ambispective study of TT patients (Jan 2022–Oct 2024). Qualitative variables compared using χ^2 or Fisher's test. Quantitative variables analyzed with Student's t-test for normal data or the Mann–Whitney test otherwise. A significance level of 5% was considered. Analysis performed with IBM SPSS v26.
Results. 124 patients were analyzed, 24 received ESPB. Mean age was 48 years, 72% were male. Median ICU stay was 3 days, and hospital stay was 12 days. 92% had blunt TT. The most frequently associated injuries were traumatic brain injury (51%) and orthopedic trauma (48%). Three required thoracic surgery. The most common thoracic injuries were pulmonary contusion (54%), pneumothorax (21%) and hemothorax (21%).
25% needed high-flow oxygen therapy (HFOT), and 44.4% invasive mechanical ventilation (IMV). The median duration of IMV was 3 days,

and 11.3% required a tracheostomy. Pneumonia was the most common respiratory complication (12.9%), followed by acute respiratory distress syndrome (ARDS) (3.2%). Acute kidney injury (AKI) occurred in 17.7%. The mortality rate in our series was 9.7%.
Among the 24 patients with ESPB, all had blunt TT, one was anticoagulated. Catheter placement was not associated with complications. ICU stay ranged from 1-7.75 days without ESPB and 3-4.75 days with ESPB, while hospital stay was 13.5 and 9 days, respectively.
IMV was required in 16.7% of patients with ESPB and 51% without ESPB (p0.002), with a duration of 1-4.7 days versus 1-13 days. No patient with ESPB required tracheostomy. There were no differences in the need for HFOT or ARDS. One patient with ESPB developed pneumonia compared to 15 in the non-ESPB group (p0.305).
AKI occurred in 20% of patients without ESPB and in 8.3% with ESPB (p0.241). Mortality was 11% in patients without ESPB compared to 4.2% in those with ESPB (p0.458).
Opioids were required in 73% of TT patients, with fentanyl (55%) and morphine (19%) being the most commonly used. The daily infusion dose was 0.6 mg for non-ESPB patients and 0.45 mg for ESPB patients (p0.1). Total stay opioid rescue doses were 0.75 mg for non-ESPB patients and 0.15 mg for ESPB patients (p0.79). 79% of patients who received ESPB did not require opioids after its insertion.
Conclusions: ESPB reduced opioid use in TT. 79% of patients did not need opioids after insertion. It decreased the need and duration of IMV, hospital stay and complications such as pneumonia, renal failure and mortality (without statistical significance).
In conclusion, the use of the ESP block minimizes the use of opioids and improves clinical results in patients with TT.

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Topic: Trauma

000172

Differentiating PEEP induced recruitment from overdistension in severe ARDS: insights from time constant and dynamic compliance ratio

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Intensive care Medicine Experimental 2025* 13(1)*:000172

Introduction: Acute respiratory distress syndrome (ARDS) presents with heterogeneous lung parenchyma, including collapsed, normal, consolidated, and distended alveolar units, each with unique mechanics. Positive end-expiratory pressure (PEEP) is commonly applied to recruit collapsed units and improve compliance. However, excessive PEEP may overdistend normal lung units, increase dead space, worsen compliance, and elevate driving pressure, leading to complications such as tidal hyperinflation. Optimal PEEP determination is challenging, as driving pressure alone cannot always distinguish under-recruitment, overdistension, or tidal hyperinflation.
Objectives: This multicenter observational study evaluates the utility of time constant exp (TCe) and dynamic compliance ratio (C20/Cdyn) for guiding PEEP titration, aiming to optimize recruitment while minimizing adverse effects on cardiac output.
Methods. Patients who satisfied select criteria for moderately severe ARDS on mechanical ventilation were included in this study. All patients were paralyzed or deeply sedated. Initial ventilatory settings included volume controlled mode, tidal volumes of 6 mL/kg and PEEP of 5–8 cm H2O, at the discretion of bedside intensivists. Ventilatory parameters (PF ratio, PEEP, driving pressure, TCe, C20/Cdyn) were recorded within two hours of intubation, titrated to minimize driving pressure, and re-recorded post-titration. Additional data included ventilatory ratio, PaCO2 gap (surrogates for dead space ventilation and cardiac output), and vasopressor requirements. Standard ARDS management guidelines were followed, including prone positioning.
Results: Of the cohort, 39 out of 89 (43.8%) required vasopressor support, and 73 out of 89 patients (82%) underwent prone positioning. Logistic regression revealed ventilatory ratio (OR = 147.34, p = 0.047, estimate = 4.99) and PaCO2 gap (OR = 3.49, p = 0.004, estimate = 1.25) independently predicted vasopressor requirements. ROC curve analyses established cutoffs for PaCO2 gap (≥ 7), ventilatory ratio (≥ 2), C20/Cdyn (< 0.92), and TCe (≥ 0.48) as predictors of vasopressor need. Linear regression identified predictors of PaCO2 gap (R^2 = 0.57), which included C20/Cdyn before and after PEEP application, PEEP value immediately after intubation, driving pressure immediately after intubation. Predictors for ventilatory ratio (R^2 = 0.83) using linear regression revealed PEEP, PF ratio, C20/Cdyn, Tce before and after titration. A co-relation matrix was drawn using a heat map that identified decrease in C20/cdyn with near sustenance of TCe were predictive of the need for vasopressors. Multiple modeling of Spearman co-relation revealed time constant and compliance ratio (C20/Cdyn) had significant co-relation with ventilatory ratio (r = 0.356 and -0.793, respectively), and CO2 gap (r = 0.487 and -0.626, respectively). Using ROC approach, the cut-off was identified using highest Youden index. The cut-off for CO2 gap was 7 (66.67% sensitivity, 100% specificity) and ventilatory ratio of 2 (100% sensitivity and 62% specificity) for the vasopressor need. Similarly cut-off for C20/Cdyn and TCe for the vasopressor need was identified as < 0.92 (45.95% sensitivity, 100% specificity, AUC of 0.724) and 0.48 (21.62% sensitivity, 87.1 specificity with AUC 0.405). The cut-off of c20/Cdyn, TCe, driving pressure for the need for prone position were 0.83 (100% sensitivity, 19.64% specificity), 0.35 (100% sensitivity, 1.79% specificity) and 16 (16% sensitivity and 85% specificity). These co-relations were further confirmed by agreement analysis using Bland–Altman technique.
Conclusions: Driving pressure alone is insufficient for PEEP titration in ARDS. Parameters such as TCe and C20/Cdyn improve recruitment assessment and overdistension detection. Sustained TCe (> 0.48) with reduced C20/Cdyn (< 0.92) during PEEP titration indicates overdistension, while reduced TCe (< 0.35) with sustained C20/Cdyn (> 0.92) suggests effective recruitment. These findings underscore the importance of comprehensive ventilatory strategies in ARDS management.

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Topic: Acute respiratory failure and mechanical ventilation

000173

Clinical features and outcomes of necrotizing pneumonia in an intensive care unit in Portugal

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Intensive care Medicine Experimental 2025* 13(1):*000173

Introduction: Necrotizing pneumonia (NP) is a rare complication of community-acquired pneumonia (CAP), with an estimated incidence of approximately 10%. It is characterized by the rapid progression of consolidation areas to cavitation and necrosis, associated with pulmonary vascular obstruction due to thrombus formation. These alterations in the lung tissue favor the growth of the bacterial inoculum and impair the action and penetration of antibiotics, thereby being associated with high morbidity and mortality.
Objectives: The aim of this abstract is to present the clinical features of patients with NP admitted to the Intensive Care Unit (ICU) of a peripheral hospital in Portugal and to compare them with existing literature.
Methods: A literature review was conducted, followed by a retrospective study of data from electronic medical records from patients with CAP who developed NP during their stay at the ICU, between January 2023 and July 2024.
Results: A total of 3 patients were included, 2 of them female, and with a mean age of 48.3 ± 8.7 years. The most relevant comorbidities were hypertension (n = 2), smoking (n = 2) and alcoholism (n = 1). All patients were admitted with severe respiratory failure, requiring mechanical ventilation due to bilateral CAP (mean C-reactive protein 40.5 ± 8.1 mg/dL). The pathogens identified were methicillin-susceptible *Staphylococcus aureus* (n = 1), *Streptococcus pneumoniae* (n = 1), and *Klebsiella pneumoniae* (n = 1) all with bacteremia. Patients exhibited cardiovascular dysfunction, requiring vasopressor support with norepinephrine (mean dose 0.4 ± 0.2mcg/kg/min), hepatic dysfunction with coagulopathy (mean international normalised ratio 1.56 ± 0.29) and renal dysfunction (mean creatinine level 1.58 ± 0.30 mg/dL). The mean APACHE II was 15.3 ± 2.3 points. 1 patient initiated continuous venovenous hemodiafiltration with an HA380 hemoperfusion cartridge (Jafron Biomedical Co., Ltd.) due to rhabdomyolysis and persistent metabolic acidosis. All patients received targeted antibiotic therapy within the first 24 h. Following clinical deterioration, NP diagnosis was confirmed by chest CT, with bilateral pulmonary areas of necrosis and cavitation, on the 6th (n = 2) and on the 11th day (Picture 1). 2 patients were transferred to a tertiary hospital for venovenous extracorporeal membrane oxygenation due to refractory hypoxemic respiratory failure. The patient with the later diagnosis and more comorbidities died on the day of the diagnosis due to refractory shock. The average length of ICU stay was 9.3 ± 2.3 days.
Conclusions: Despite the small sample size, this study's results are consistent with the literature regarding risk factors for NP, clinical progression, and the most common pathogens. Furthermore, they have contributed to promoting active discussion about this condition within the medical team. Since NP remains a condition that requires specific management recommendations, early suspicion in cases of CAP with unfavorable progression, optimized medical therapy, and the timely decision for surgical intervention are essential in order to achieve better outcomes.



Picture 1 (abstract 000173) chest computed tomography of the deceased patient showing bilateral necrotizing pneumonia, with multiple cavitations and extensive areas of consolidation

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Topic: Sepsis

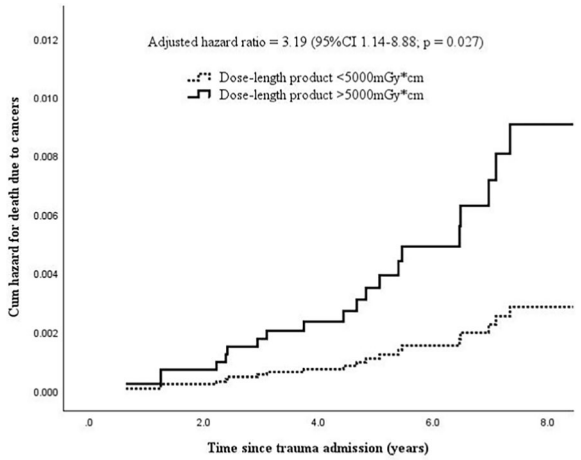
000178

Association between intensity of radiation exposure and subsequent risks of developing new-onset cancers and dying from them

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Intensive care Medicine Experimental 2025* 13(1):*000178

Introduction: The association between the intensity of radiological examinations related to computed tomography (CT) after severe trauma and subsequent risk of cancers in adults is not well characterized [1,2].
Objectives: This study aims to assess whether cumulative radiation exposure during the first (index) trauma admission is related to the subsequent risk of developing malignant neoplastic conditions, and the risk of dying from a neoplastic cause.
Methods: This was a statewide cohort study utilizing data from all public and private hospitalizations, as well as death and cancer registries, for trauma patients who experienced their first trauma admission between 2004 and 2020, with no documented cancers within 5 years prior to trauma admissions [3]. Radiation exposure from CT scans during the entire index trauma admission was calculated using the dose-length product (DLP). A whole-body CT scan protocol may result in a DLP exposure close to 3000 mGy*cm.
Results: Of the 2,669 patients included, 2,024 (75.8%) were males. The median (interquartile range [IQR]) age of the cohort was 41 years. While alcohol use (n = 1,330, 49.8%) and smoking (n = 1,240, 46.5%) were common, coexisting medical illnesses prior to the index trauma admission, including diabetes mellitus (5.3%), chronic pulmonary

disease (1.8%), ischaemic heart disease (1.5%), and congestive heart failure (1.5%), were uncommon. The median injury severity score (ISS) was 17 (IQR 6-22). Of the 374 patients (14.0%) who died during the follow-up period (median 5.9 years, IQR 4.0-7.9), 21 (5.6% of all deaths) died from a malignant neoplastic disease.
The median total number of X-rays and CT scans performed on patients during the entire index trauma admission were 6 (IQR 3-12) and 3 (IQR 1-5), respectively. The median DLP exposure from CT scans of the cohort was 1,940.5 mGy*cm (IQR 636.5-3,388.0), and this was significantly associated with the severity of injury (Pearson correlation coefficient with ISS = 0.444, p = 0.001). In multivariable logistic regression analyses, after adjusting for age, major comorbidities, smoking, and alcohol use, radiation exposure during trauma admission was quantitatively associated with an increased risk of both new-onset cancers after trauma (OR 1.15 per 1,000 mGy*cm increment, 95%CI 1.03-1.29; p = 0.015) and cancer-related mortality (n = 21 [0.8%], OR 1.08 per 1,000 mGy*cm increment, 95%CI 1.01-1.16; p = 0.048, hazard ratio for the DLP > 5,000 mGy*cm = 3.19, 95%CI 1.14-14.88; p = 0.027) (**Fig. 1**). Lung cancers (19%), glioblastoma multiforme (14%), and pancreatic cancers (14%) were the most common causes of cancer-related deaths.
Conclusions: Radiation exposure from CT scans during trauma admission demonstrated a dose-related association with the risk of new-onset cancers and subsequent cancer-related mortality. These findings suggest that the immediate diagnostic benefits of CT scans for major trauma patients should be carefully weighed against their potential long-term risks for cancer outcomes.



Difference in time to death due to cancers between patients exposed to radiation at dose–length product < 5000 mGy*cm and those > 5000 mGy*cm during index trauma admission (N = 2669).

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Topic: Trauma

000179

Infections in external ventricular drainage: unmasking the hidden enemy

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Intensive care Medicine Experimental 2025* 13(1):*000179

Introduction: External ventricular drains (EVDs) are temporary devices inserted into the lateral ventricles to drain excess cerebrospinal fluid (CSF), manage intracranial hypertension, monitor intracranial pressure, and administer medications. These devices are crucial in neurocritical care and are generally considered closed systems, meaning they do not allow direct communication between the CSF and the external environment under standard conditions. However, manipulation or disconnection of the system can compromise this integrity. Complications are frequent and include haemorrhage, infection, and CSF overdrainage. The infection rate associated with EVDs is reported to be below 10%, with a rate of approximately 11.4 infections per 1000 catheter days. Importantly, the risk of infection increases with the duration of catheterization, with a higher incidence observed beyond 5 days of EVD placement.
Objectives: We conducted a retrospective observational cohort study of patients with EVDs admitted to the Polivalent Intensive Care Unit (ICU) of a tertiary hospital, from January 2022 to December 2023. We characterized the population with respect to demographic variables, clinical variables and infectious complications. We assessed the risk factors for EVD-associated infections, including the number of EVD days and the indications for placement.
Methods: Patients admitted to the polyvalent ICU between January 2022 and December 2023 with an EVD implanted prior to or during their ICU stay were included. Exclusion criteria were: patients who had undergone any neurosurgical procedure prior to EVD placement, those with a CSF fistula, and those with an active central nervous system (CNS) infection before catheter insertion. Infection was defined according to CDC criteria, namely a positive CSF culture with suggestive clinical presentation and/or CSF pleocytosis. For negative cultures, infection was defined based on clinical symptoms and CSF cytological changes (pleocytosis, hypoglycorrhachia, elevated lactate).
Results: We identified 73 patients with EVDs of whom 10 were excluded, leaving 63 patients. The majority were male (60%), with a mean age of 61. The most common indication for EVD placement was non-traumatic subarachnoid hemorrhage with or without intraventricular hemorrhage (59%), followed by intracranial tumor (32%), and traumatic brain injury with hemorrhage (6%). The mean EVD duration was 12 days. Infectious complications occurred in 27% of patients, with an infection rate of 22 infections per 1000 EVD days. Infections were diagnosed on average 19 days after EVD placement, with 65% of infections occurring after 12 days. The predominant pathogen was *S. epidermidis* (23%). The overall in-hospital mortality rate was 41%.
Conclusions: Our findings reveal an infection rate higher than what has been reported in the literature, with infections occurring later, on average after 19 days. This suggests that prolonged EVD duration may have contributed to the increased risk of infection. To further explore the high infection rate, a larger-scale study is proposed. This would include additional risk factors such as infections at other sites, prior or ongoing antibiotic therapy, and the number of EVD cultures drawn. Further research is essential to refine management strategies and improve patient outcomes in neurocritical care.

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Topic: Infections and prevention

000183

Safety and efficacy of neostigmine as an adjunctive therapy in septic shock—a randomized controlled trial

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Introduction: Sepsis and septic shock are life-threatening conditions caused by an uncontrolled immune response to infection, leading to severe circulatory and organ dysfunction 1. The cholinergic anti-inflammatory pathway has shown promise in regulating inflammation, mediated by vagus nerve fibers and nicotinic receptors 2. Research supports the use of cholinesterase inhibitors like physostigmine and neostigmine to modulate immune responses in sepsis, potentially improving recovery and reducing organ failure 3. This study aims to evaluate neostigmine's role in enhancing recovery specifically in patients with septic shock, emphasizing its potential therapeutic benefits**.** SOFA and APACHE II score were also compared at Day 1 and 5 along with 28 days mortality.
Methods: This trial enrolled 92 adult ICU patients with septic shock, randomly assigning them to Group N (neostigmine treatment) or Group C (placebo/control). Neostigmine was administered via continuous infusion pump over five days @ 0.2 mg/hour, while Group C received normal saline as placebo. Standard sepsis management included antibiotics based on blood culture Results: Baseline data collection encompassed demographics, vital signs, laboratory tests, and severity scores (APACHE II, SOFA). Parameters monitored included vasopressor adjustments, shock reversal duration, Procalcitonin levels, and ICU stay. Short-term outcomes, including 28-day mortality, were assessed. Daily observations covered a wide range of clinical parameters, and specific endpoints were evaluated on Day 1 and Day 5, focusing on shock recovery duration and mortality rates.
Results: In Group N, a total of 35 out of 40 patients (87.5%) recovered, with a mean recovery duration of 7.94 $\pm$ 2.59 days. In Group C, 26 out of 40 patients (65%) recovered, with a mean recovery duration of 12.58 $\pm$ 3.75 days with a statistically significant difference ($p < 0.001$) (Table 1).
On day 1 of therapy, the SOFA scores for Group N and Group C were 11.55 $\pm$ 2.22 and 10.80 $\pm$ 2.09, respectively, ($p = 0.125$). By day 5, the SOFA score for Group N was 9.65 $\pm$ 1.31, whereas for Group C it was 13.8 $\pm$ 2.32, indicating a statistically significant difference ($p < 0.001$). The SOFA score after 120 h had a decrease of 1.90 points in Group N, while Group C showed an increase of 3.0 points, which was statistically significant (p-value < 0.001) (Table 2).
In Group N, 14 out of 40 patients (35%) died within 28 days, whereas in Group C, 25 out of 40 patients (62.5%) died. This difference was statistically significant ($p = 0.014$) (Table 3).
Conclusions: Neostigmine has shown encouraging outcomes in treating septic shock, such as accelerated patient recovery, lowered Sequential Organ Failure Assessment (SOFA) scores, decreased mortality rates within 28 days, and reduced dependability on vasopressors. These results imply that neostigmine could provide substantial advantages in enhancing outcomes for individuals with septic shock.

Table 1 (abstract 000183) Comparison of mean duration of recovery from start of treatment between the two groups. (n=80)

Duration of recovery in days	Mean (SD)		p-value
	Group N (n = 40)	Group C (n = 40)	
	7.94 (2.59)	12.58 (3.75)	<0.001

Comparison of mean duration of recovery from start of treatment between the two groups

Table 2 (abstract 000183) Comparison of SOFA score between the two groups. (n=80)

SOFA score	Mean (SD)		p-value
	Group N (n = 40)	Group C (n = 40)	
D1	11.55 (2.22)	10.80 (2.09)	0.125
D5	9.65 (1.31)	13.80 (2.32)	<0.001
Change in SOFA score	-1.90	3.00	<0.001

Comparison of SOFA score between the two groups

Table 3 (abstract 000183) Distribution of cases according to 28-day mortality in two groups. (n=80)

28-day mortality	Group N (n = 40)	Group C (n = 40)	p-value
Present	14 (35%)	25 (62.5%)	0.014
Absent	26 (65%)	15 (37.5%)	

Distribution of cases according to 28-day mortality in two groups

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4. None.

Topic: Sepsis

000184

Comparison of success rate with short axis v/s long axis ultrasound-guided caudal block in children—a randomised controlled trial

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Intensive care Medicine Experimental 2025* 13(1)*:000184

Introduction: Epidural caudal block is commonly used for paediatric infra-umbilical surgeries under general anaesthesia (GA). The landmark technique has many complications; hence, ultrasound-guided

(USG) blocks are in vogue to overcome them. Aims of our study was to compare first-attempt success rates between short and long-axis USG guided caudal blocks as primary objective and to compare the time taken for performing a successful caudal block, the number of skin punctures, and the incidence of complications between the two groups as the secondary Objectives:
Methods: This prospective randomized trial was conducted in a tertiary care centre after approval from IRB with IEC no. AIIMS/IEC/2022/4155 and was registered with Clinical Trial Registry of India (CTRI/2022/12/048325). 136 ASA I/II paediatric patients aged 0-6 years, undergoing infra-umbilical surgeries under GA, were randomly assigned to two groups: Group S (short-axis) and Group L (long-axis). The caudal blocks were given under USG guidance by short or long axis as per the randomisation in both groups. The first attempt success rate, block performing time, number of skin punctures and complications were noted in Group S and L.
Results: The first attempt success rate was comparable for Group S and Group L ($p = 0.836$) (Fig. 1). The number of attempts for block ($p = 0.719$), the mean time for performing the block ($p = 0.286$) (Fig. 2), and associated complications ($p = 0.722$), all had no statistically significant difference.
Conclusions: Our study found that the first attempt success rate of USG-guided caudal block with short-axis (Group S) and long-axis (Group L) view was comparable to the findings of Gupta K et al. [1]. Group L had a slightly higher block performing time than Group S which was similar in a systematic review and meta-analysis done by Jain D et al. [2]. The number of attempts between two groups suggests no difference as was observed in Erbüyün K et al. [3]. Our study compared the complications like swelling in the back, intravascular puncture, inadvertent subarachnoid injection, and bleeding and was found to be comparable in the two groups as complied with the study of Erbüyün K et al. [3].
We concluded that USG guided caudal block with short axis v/s long axis has a comparable first-attempt success rate in children < 6 years. The block performing time, and the associated complications are comparable as well.

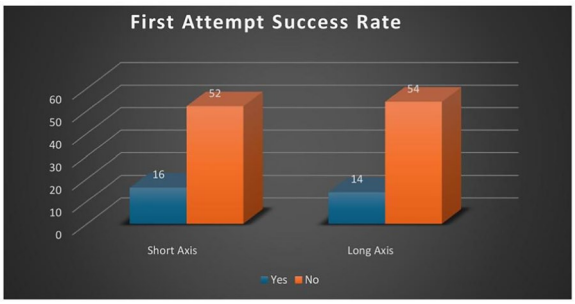


Fig. 1 (abstract 000184) Bar graph showing First attempt success rate in Group S and Group L
First attempt success rate in Group S and Group L

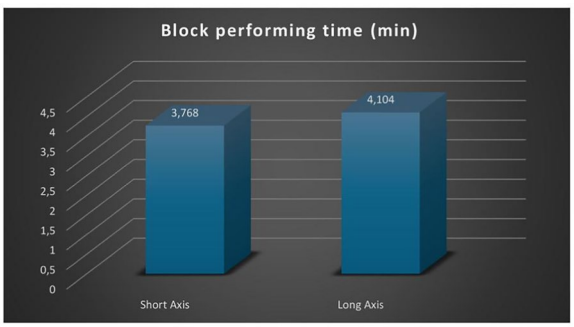


Fig. 2 (abstract 000184) Bar graph showing the time taken to perform the block in Group S and Group L
The time taken to perform the block in Group S and Group L

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4. None

Topic: Perioperative care

000185

Cervical Spinal Cord Injury: A Review of Ventilator and Tracheostomy Weaning in a London Major Trauma Centre

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Intensive care Medicine Experimental 2025* 13(1)*:000185

Introduction: Spinal cord injury (SCI) is an insult to the spinal cord that can result in an impairment to the motor, sensory and autonomic pathways. High SCI injury can have a significant impact on respiratory function, due to weakness or paralysis of the diaphragm and respiratory muscles (1). Insult to the cervical spinal cord often sees a requirement for invasive ventilation and subsequent tracheostomy insertion. SCI weaning is a specialist practice, with the Respiratory Information in Spinal Cord Injury (RISCI) guidelines (2) recommended by national SCI centres as best practice to guide ventilator weaning (3). However, little data on current practice is available at the hyper-acute stage.
Objectives: The aim of this study was to observe trends in ventilator and tracheostomy weaning in cervical SCI patients admitted to the intensive care unit (ICU).
Methods: This was a retrospective, observational cohort study of ICU patients admitted following a cervical SCI that required invasive mechanical ventilation via a tracheostomy. Data were collected between June 2022 and June 2024. Data extracted included: tracheostomy insertion date, duration of weaning, date of decannulation, documented use of RISCI guidelines to guide weaning, airway clearance modality utilised for secretion management, incidents of ventilator acquired pneumonia (VAP) and use of oral drying agents and mucolytic agents.
Results: 10 patients with a SCI who required invasive ventilation via a tracheostomy were reviewed. The median (range) ICU length of stay was 61 days (25-196). Time from intubation and tracheostomy insertion was 12 days (6-48). Time from intubation to commencement of ventilator free breathing trials was 18 days (8-51). Time from intubation to the first trial of a one-way speaking valve was 15 days (8-51). 50% (n = 5) of the sample were decannulated prior to discharge from the hospital. Decannulation occurred a median of 40 days (29-153) following tracheostomy insertion. RISCI guidelines were used by clinicians to guide weaning for all patients. All patients required use of mucolytic agents. 20% (n = 2) required drying agents for oral secretion management and all patients had at least one incidence of VAP. The most commonly utilised airway clearance modality was cough assist, used by 100% (n = 10) of the sample. 80% (n = 8) had a documented airway complication and 80% (n = 8) of the sample had dysphagia.
Conclusions: Results demonstrate consistent use of the RISCI weaning tool and cough augmentation modalities across the sample of cervical SCI patients. However, there is notable variation in the duration of ventilator and tracheostomy weaning, reflective of the known complexities of the SCI cohort. Further research would be beneficial, exploring the factors that can impact the weaning process, including incidence of secondary complications, psychosocial factors and rehab practices.

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Topic: Nursing care and physiotherapy

000186

Artificial intelligence based early prediction of bacteremia in patients admitted in medical ICU—experience from a tertiary care hospital in Southern India

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Intensive care Medicine Experimental 2025* 13(1)*:000186

Introduction: Bacteremia is a frequent and challenging condition with mortality ranging between 3 and 21%. A timely diagnosis and prompt treatment with antibiotics is pivotal for survival. Even though blood culture is the gold standard in bacteremia diagnostics, it is having certain flaws like low true positivity rate, false positivity rate related to contamination is up to 8%, and there is a time lag for reports. Whether machine learning algorithms can be exploited for early prediction of bacteremia is the question which is addressed in our study.
Objectives: To develop and externally validate an Artificial Intelligence Bacteremia Prediction Model (AI BPM)
To evaluate its impact on bacteremia prediction by comparing AI BPM prediction with blood culture reports.
Methods. Parameters used to train the AI model

Age, sex	Presence of fever, hypotension, tachycardia, tachypnea,desaturation, altered mental state
Comorbidities	Labs: raised leukocytes, neutrophils, CRP, Lactate, RFT, LFT
H/o recent hospitalisation	Use of immunosuppressive medications
Recent H/o antibiotic use	Signs of localisations
Recent surgical interventions	Contact with healthcare settings
Presence of indwelling devices	APACHE 4 score

This is a prospective, observational study conducted in the Department of Critical Care Medicine, GG Hospital, Trivandrum, We included all patients admitted in the Medical ICU with at least one set of blood cultures taken. An AI expert created AI model, which was customised to our study criteria, using Random Forest Classifier and implemented using Python version 3.7.3. 566 patients are included in the study, of which 80% dataset is used to train the AI model and 20% dataset is used to test the model performance. Parameters used to train the AI model has been included as a table.
Results.

Model performance metrics and explanation

Metric	Value	Explanation
Accuracy	98%	Percentage of correctly predicted cases out of all cases
Precision	100%	Measures how many predicted positive cases are actually correct. High precision reduces false positives
Recall (sensitivity)	90%	Measures how many actual bacteremia cases were correctly detected. High recall reduces false negatives
F1 Score	95%	Harmonic mean of precision and recall. Used to balance false positives and false negatives
AUROC	0.93	Measures model's ability to distinguish between bacteremia vs no bacteremia. Closer to 1 means better discrimination.

Conclusions: The AI tool developed in our study had a good AUROC of 0.93 to predict bacteremia. The comparatively higher AUROC in our study could be probably due to the larger number of parameters which we took to train the AI model. The sensitivity of 90% and specificity of 100% is also high in our study compared to other peer group studies. With more studies showing the validation of AI model in clinical practice, it can definitely be a promising tool to help clinicians when there is uncertainty regarding the use of empirical antibiotics.

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5. Special thanks to Mrs Shijitha K Basheer who developed the AI tool for our study. I also express my sincere gratitude to Dr Anvar M Ahammed for his constant support and guidance during this study.

Topic: Infections and prevention

000187

Diagnostic and therapeutic impact of upper gastrointestinal endoscopy in mechanically ventilated critically ill patients with suspected gastrointestinal bleeding

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Intensive care Medicine Experimental 2025* 13(1)*:000187

Introduction: Upper gastrointestinal bleeding (UGIB) is frequently suspected in mechanically ventilated critically ill patients. The performance and benefit of upper gastrointestinal endoscopy (UGE) in this setting in still debated. We report the diagnostic and therapeutic impact of UGE in a cohort of unselected mechanically ventilated patients.
Methods: Monocentric, retrospective study in a mixed intensive care unit (ICU).
All the patients who underwent an UGE during their ICU stay between January 2019 and December 2023 were identified. Cases of suspected UGIB were selected from medical records. Patients primarily admitted for gastrointestinal bleeding or in whom UGE was performed for other reason that suspected UGIB were excluded.

Results: 43 patients underwent UGE for suspected ICU-related UGIB
Mean age (years) was 62.2 ± 14.6; mean SAPS II was 50 ± 19; sex ratio (M/F) was 30/13.
48 UGE were performed 17.6 ± 12.5 days after ICU admission. They were motivated by anemia in 28 cases, melena in 10 cases, hematochezia in 6 cases, low transfusion efficiency in 3 cases, and hematemesis in 2 cases.
36 UGE are performed after transfusion of at least one red blood cells pack (2.3 ± 1.4) in the previous 48 h.
UGE was normal in 21 cases, otherwise the main findings were users in 14 cases, esophagitis in 10, gastritis in 4, esophageal varices in 4.
A hemostatic procedure was done during 8 UGE.
Conclusions: If a hemostatic procedure was performed in only 16.7% of UGE, 56% of the endoscopic examinations were abnormal potentially leading to a medical treatment.
The limited number of per-endoscopic hemostatic procedures is an argument to stratify timing of UGE () using recently described dedicated scores. (1)

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Topic: Metabolism, endocrinology, liver failure and nutrition

000189

Inter-operator reproducibility of ultrasound assessment of gastric residual volume in critically ill patients

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Intensive care Medicine Experimental 2025* 13(1)*:000189

Introduction: Gastric residual volume (GRV) is a key metric in assessing feeding tolerance among critically ill patients receiving enteral nutrition. Ultrasound (US) has emerged as a non-invasive, bedside tool for GRV estimation. However, its inter-operator reproducibility remains insufficiently validated.
Optimal nutrition is a cornerstone of managing critically ill patients in intensive care units (ICUs), with enteral nutrition (EN) being the preferred method due to its benefits in preserving gut integrity, reducing infection risk, and improving outcomes. However, achieving feeding goals in critically ill patients is often hindered by gastrointestinal intolerance, with gastric residual volume (GRV) serving as a key indicator of feeding tolerance.
Traditionally, GRV is assessed through nasogastric aspiration, a method that, despite being widely used, has several limitations. These include procedural discomfort, variability in measurements, risk of tube displacement, and the potential for nutrient loss. Frequent GRV monitoring can also disrupt enteral feeding, leading to caloric deficits that negatively impact recovery. Given these drawbacks, there is a growing interest in using ultrasound (US) as a non-invasive, bedside tool for GRV assessment.
Ultrasound offers several advantages over nasogastric aspiration, including its ability to provide real-time, reproducible measurements without disrupting feeding or causing discomfort. However, its reliability in clinical practice depends on ensuring inter-operator reproducibility and validating its accuracy compared to the current standard.
Objectives: This study aimed to evaluate the reproducibility of GRV measurement using ultrasound among intensivists and to compare these measurements with traditional nasogastric aspiration.
Methods: A prospective observational study was conducted at Alexandria Main University Hospitals on critically ill patients receiving enteral nutrition. GRV was assessed by ultrasound in the right lateral decubitus position using a standardized protocol, with two attending intensivists performing measurements after specific training. The reproducibility was analyzed using Pearson's correlation, Lin's concordance correlation coefficient, and Bland–Altman plots. GRV measured by ultrasound was compared with nasogastric aspirate values to assess agreement and proportional bias.
Results: The study enrolled 60 patients (57% male, median age 52 years). The Pearson correlation coefficient (r) for ultrasound measurements among intensivists was 0.992, with a concordance correlation coefficient (ρc) of 0.992. Bland-Altman analysis revealed minimal bias (-1.5 mL; 95% CI: -3.7 to 0.7) and narrow limits of agreement, indicating excellent reproducibility. Comparison between ultrasound and nasogastric aspirate GRV measurements showed a high correlation (r = 0.973, ρc = 0.948) with a mean positive bias of 21 mL (95% CI: 15 to 27). Ultrasound demonstrated proportional bias at higher GRVs, with values diverging from nasogastric aspirate.
Conclusions: Ultrasound is a highly reproducible tool for GRV estimation among trained intensivists, with results closely aligning with nasogastric aspiration. Despite minor proportional biases at higher GRVs, ultrasound offers a non-invasive and efficient alternative for assessing feeding tolerance in critically ill patients. Further studies may explore its role in guiding clinical decision-making and optimizing enteral nutrition strategies.

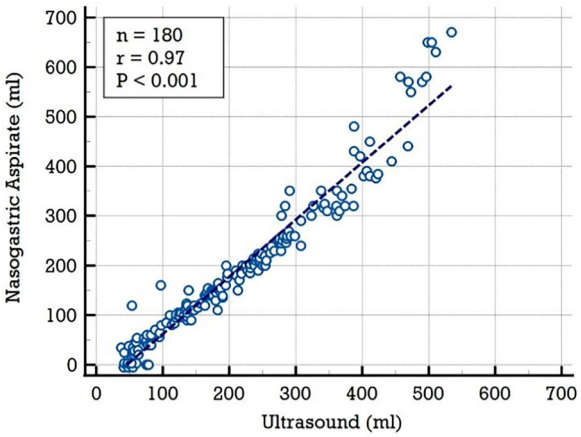


Fig. 1 (abstract 000189) Scatter plot for the correlation between GRV measured by ultrasound via the researcher and nasogastric aspiration

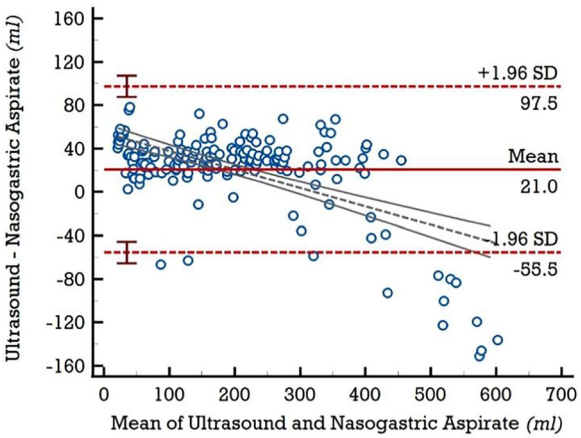


Fig. 2 (abstract 000189) Bland–Altman plot showing the mean bias between ultrasound and nasogastric aspirate GRV values (solid red line), with the 95% limits of agreement (red-dotted lines) and its confidence intervals (red error bars), as well as proportional bias regression line (grey-dotted line) and its confidence intervals (solid grey line)

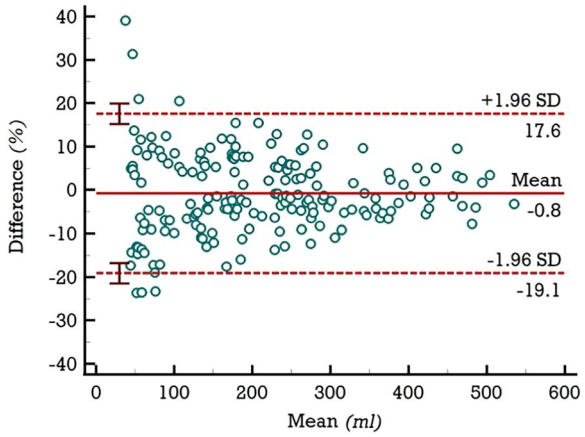


Fig. 3 (abstract 000189) Bland–Altman plot for the reproducibility of ultrasound measurements of GRV done by the two intensivists showing the mean bias (solid red line), with the 95% limits of agreement (red-dotted lines) and its confidence intervals (red error bars)

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11. Dina Hassan El-Sayed Zidan: Conceptualization, methodology, writing – review & editing, supervision, project administration
12. Mohamed Abdulsalam Megahed: Conceptualization, methodology, writing – review & editing, supervision, project administration
13. Mahmoud Mohamed Ahmed Mohamed: Data curation, formal analysis, methodology, visualization, writing – original draft, writing – review & editing
14. Aya Mohamed Ahmed Abdel Galeel: Visualization, writing – review & editing

Topic: Imaging in intensive care

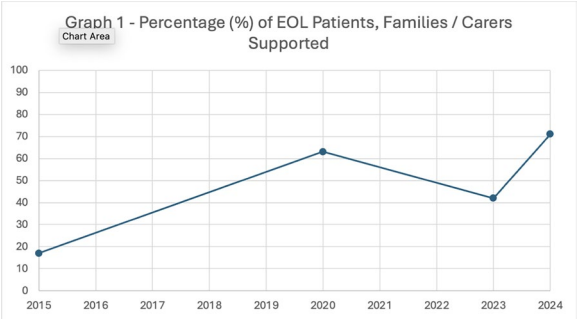
000190

Embedding pastoral and spiritual support in ICU

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Intensive care Medicine Experimental 2025* 13(1):*000190

Introduction: Good end-of-life (EOL) care focuses on person-centred, compassionate care, prioritising comfort, dignity and the individual's wishes while also providing emotional, practical and spiritual support for families. Providing opportunities for pastoral support and spiritual reflection help patients and their families cope with the EOL journey. At the end of a person's life the ability to talk to someone about spiritual and existential suffering, which is the morbid suffering relating to loss of hope, futility, remorse, and fear of death, can relieve considerable distress and provide great peace and comfort to a dying person.1
Palliative care in the ICU focuses on preventing and relieving suffering through identification and treatment of pain and other physical, psychological, social and spiritual issues. Spiritual care, however, is not systematically integrated into everyday ICU practice. 2
We challenge the existing approach of care provision in ICU EOL care and argue for using the title of "Pastoral and Spiritual Specialists" rather than "Chaplaincy". These specialists show concern and compassion, provide an avenue for patients and families to open up about their distress and worries and argue for holistic care to be embedded in ICU patient care.
Methods: The percentage of ICU patients, families or carers supported by Chaplains or Pastoral & Spiritual Specialists, was audited over 4 points across a 10-year period from 2015-2024 at Kingston Hospital NHS Foundation Trust (KHFT), a district general hospital in London, UK. Two major changes occurred during this period:
1) At the beginning of COVID-19 Pandemic in 2020, hospital chaplains worked alongside healthcare staff on the clinical frontline at Kingston Hospital to keep families, who were restricted from visiting, updated and supported. From that time, chaplains became an integral part of the ICU team being present in the morning handover and MDT meetings.
2) A name change from "Chaplains" to "Pastoral and Spiritual Specialists" was accompanied with an education programme to improve the level of understanding of Chaplains in EOL care and demonstrate the benefits of spiritual and emotion support to patients, families and staff.
After the above changes were implemented confidential surveys3 with both quantitative and qualitative data were collated and analysed from a total of 30 multidisciplinary (MDT) ICU staff members. We compared data from audits performed in 2015 and 2020 to data in 2023 and 2024 to close the audit loop.
Results: There was a significant increase in percentage of EOL patients, families or carers supported from 27 to 63% (36% increase) when the COVID-19 pandemic started in 2020, as "Chaplains" team were used extensively in Kingston Hospital to keep families, who were otherwise restricted from visiting, updated and supported.
After tailored teaching was provided to enhance ICU doctors' and nurses' knowledge and skills in addressing pastoral, spiritual and cultural needs of ICU service users, there was an increase in the percentage of EOL patients, families/carers supported from 42 to 71% (29% increase)—Graph 1.
The survey highlighted that 13% of staff preferred the use of "Chaplain", 73% preferred a new name change of "Pastoral & Spiritual Specialist", and 14% were "undecisive" (Graph 2). The qualitative data from the survey indicated that there were barriers using term "chaplain" during referrals as it had a religious connotation which resulted in those

who were non-religious to deny the services. The 13% who voted against were concerned if the change of name would lead to those with religious needs being neglected.
Conclusions: ICU-embedded chaplains are a key member of the ICU team who can provide spiritual care and emotional support to critically ill patients and families, acting as a bridge between families and medical staff, particularly during difficult times such as EOL decisions. As we respect the religious and cultural diversities in our increasingly secular society, renaming "Chaplains" to "Pastoral & Spiritual Specialist" offers a more inclusive title, which reduces barriers to communication, addresses patients' unrecognised existential suffering at EOL, and prioritises holistic ICU care. Educating staff about the uncertainties and misunderstandings around the role of Chaplains is significant.



Graph 1 (abstract 000190) .



Graph 2 (abstract 000190) .

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Topic: Ethics and end of life care

000191

Dynamic glycemic variability is associated with increased mortality in septic patients: A cohort Study

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Intensive care Medicine Experimental 2025* 13(1):*000191

Introduction: Sepsis is a severe form of systemic inflammatory response syndrome that is caused by infection. Dysglycemia is a common complication in sepsis and associated with poor prognosis. Compared with static glucose parameters, glycemic variability may be more relevant to the prognosis of critically ill patients. However, prior studies primarily emphasized cross-sectional assessments of glycemic variability, neglecting dynamic fluctuations influenced by clinical interventions and disease trajectories. The association between dynamic glycemic variability and mortality in septic patients remains unexplored.
Objectives: To explore the association between the time-varying glycemic coefficient of variation (GCV) and 28-day mortality in septic patients.
Methods: A retrospective observational cohort study. Adults patients (≥ 18 years) with sepsis admitted to the Department of Critical Care Medicine, Zhongda Hospital, Southeast University, China, between August 2016 and December 2024 were included. Patients with intensive care unit (ICU) length of stay less than 24 h, or fewer than two blood glucose measurements within the first 24 h of ICU admission were excluded. Glycemic variability was quantified as the GCV, calculated daily using the ratio of standard deviation and the mean blood glucose levels. The primary outcome was 28-day mortality. Time-varying Cox models and restricted cubic spline regression were employed to estimate the association between time-varying GCV and 28-day mortality in septic patients.
Results: A total of 2,414 patients were included, with a mean age of 69 years, 66.4% patients were male. The overall 28-day mortality rate was 23.9%. After adjustment for age, body mass index, underlying conditions and severity of disease, baseline GCV (HR 1.08 per 10% increase; 95% CI, 0.96-1.20, $P = 0.189$) was not significantly associated with 28-day mortality, while time-varying GCV (HR 1.28 per 10% increase, 95% CI 1.14-1.43, $P < 0.001$) during the first 14 days was significantly associated with an increased risk of 28-day death. Further analyses indicated that compared to patients with GCV ≤ 0.13, patients with GCV≧0.28 were significantly associated with 28-day mortality (HR 1.48 per 10% increase, 95% CI 1.09-2.01, $P = 0.012$). Subgroup analyses demonstrated that the association between dynamic GCV and mortality was stronger in patients with SOFA scores ≥ 8, lactate levels ≥ 2 mmol/L, non-diabetic individuals, and those requiring renal replacement therapy or mechanical ventilation.
Conclusions: Dynamic glycemic variability is independently associated with increased 28-day mortality in septic patients. Larger prospective studies are required to confirm these findings.

Topic: Sepsis

000192

Segregation of healthcare waste in the intensive care unit: a single centre pilot study in Singapore

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Intensive care Medicine Experimental 2025* 13(1):*000192

Introduction: Singapore's healthcare sector contributes 3.4% of total carbon emissions, ranking Singapore as second globally in healthcare per capital emisions. Locally, medical waste has increased over the

past 5 years from 4400 to 5700 tonnes. Many opportunites to recycle are often missed due to perceived barriers.
Objectives: We aim to increase staff awareness and uptake of plastic waste segregation to facilitate recycling in our hospital.
Methods: We conducted a 2-phase pilot study in 1 Intensive care unit in Singapore for the segregation and recycling of plastic waste in collaboration with a recycling company. In phase 1, we conducted a 1-day trial in a 16-bed ICU whereby a recycling bin was set up for segregating plastic waste. Nursing staff were educated on the types of plastics to be recycled according to the plastic resin identification codes and the recycled waste was weighed. The data collected were used to design the second phase. In phase II, we conducted a 6-week trial in the same ICU where staff were instructed to segregate specific plastic items into a recycling bin for which these bins were weighed daily. In both phases, staff were given a questionaire to fill in during the study period.
Results: In phase 1, the amount of pastic waste generated per patient per day was 0.35 kg. 88.2% of the nursing staff expressed interest in recycling and 61.7% were likely to actively segregate ICU waste. Some barriers included perceived infectious risks, decreased work efficiency and lack of recycling infrastructure.
In phase 2, nurses were asked to segregate 3 specific plastic items—apron covers, water irrigation bottles, and bottle caps. An average of 49.6 kg of plastic waste was segregated per week, averaging 0.44 kg of plastic waste per patient per day. More than 68% of respondents were able to accurately detail the appropriate process of recycling these items. They also suggested including a greater variety of recyclable paper and metal wastes.
Conclusions: Our pilot study highlights the active interest in and feasibility of recycling healthcare waste. Ongoing efforts with our infectious disease department have highlighted greater possibilities for recycling more healthcare waste. Recycling efforts can further be extended hospital wide.

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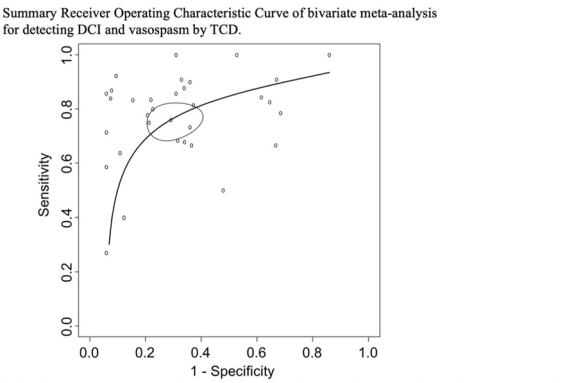
Topic: Information systems and Data Science.

000193

Diagnostic accuracy of transcranial Doppler for delayed cerebral ischemia in aneurysmal subarachnoid hemorrhage: a systematic review and meta-analysis

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Intensive care Medicine Experimental 2025* 13(1)*:000193.

Introduction: Point-of-care ultrasound use has increased. A systematic review is needed to reevaluate transcranial Doppler (TCD) for assessing cerebral vasospasm in aneurysmal subarachnoid hemorrhage.
Objectives: To assess diagnostic accuracy of TCD for detecting vasospasm and delayed cerebral ischemia (DCI) in adults with aneurysmal subarachnoid hemorrhage.
Methods: We conducted a systematic literature search of MEDLINE, Cochrane Central Register of Controlled Trials, Embase until June 17, 2024, and manually searched the reference lists of the relevant articles. Only English-language publications were included. The publication period was not restricted. Selection and exclusion of studies and data extraction were blinded and checked by two independent researchers. A third reviewer acted as an arbiter. The following data were extracted by pre-defined data extraction form: study characteristics, patient characteristics, index test, reference standard, and diagnostic accuracy parameters. The index test of interest was TCD for assessing DCI. Reference standard in our study was defined as a blinded clinical diagnosis synthesizing test results such as neurological examination, cerebral angiography, computed tomography, or magnetic resonance imaging, due to the absence of a definitive test for DCI in previous studies. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines and assessed study quality using the Quality Assessment of Diagnostic Accuracy Studies 2 tool. Meta-analysis was conducted to pool the diagnostic accuracy of TCD for detecting vasospasm and DCI. The study protocol was prospectively registered in PROSPERO (CRD42024542692).
Results: Of the 3100 studies identified, 80 studies were full-text reviewed, and 32 studies with 3594 patients were included in the meta-analysis. Pooled sensitivity and specificity were 76% [95% confidence interval: 70—81%] and 77% [68—84%] for spasm and DCI. The area under the receiver operating characteristic curve was 0.82 (Figure). The positive likelihood ratios was 3.4. The negative likelihood ratio was 0.3. Subgroup analysis showed sensitivity and specificity of 75% [69–81%] and 74% [63–83%] using a blood flow velocity $\geq$ 120 cm/s in the middle cerebral artery (19 studies, n = 2302), 80% [49–94%] and 88% [69–94%] using a Lindegaard ratio $\geq$ 3 (5 studies, n = 663), and 79% [72–85%] and 82% [66–91%] in studies with low risk of bias (9 studies, n = 1223).
Conclusions: TCD shows promising diagnostic accuracy for detecting cerebral vasospasm and DCI. Limited studies assessed the Lindegaard ratio accuracy, warranting further research.



*The plots show sensitivity and 1-specificity of individual studies on the diagnostic accuracy of TCD.
*TCD thresholds followed the settings in each study.

SROC curve of bivariate meta-analysis.

Topic: Neurointensive care.

000195

Predictors of outcome in critically ill patients with stroke: a prospective observetional study

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Intensive care Medicine Experimental 2025* 13(1)*:000195.

Introduction: Stroke is the leading cause of mortality and long-term disability world-wide. The accurate way to predict the likely long-term outcome (prognosis) for individual patients would help clinicians manage their patients and help relatives and patients come to terms with their changed circumstances. The present study aimed to find out the potential factors that can predict outcome of the critically ill stroke patients using the easily available data like demographics,

comorbidities, clinical presentation and blood investigations (routine plus inflammatory marker) along with the other scores.
Methods: We enrolled a total of 124 patients of either sex, aged above 18 years, diagnosed with ischemic or hemorrhagic stroke and admitted to ICU. The data recorded for each patient included demographic data, comorbidities, drug history, vitals, scores like GCS, NIHSS, APACHE II, routine investigations (CBC, KFT, LFT, TFT, PT, Lipid profile, HbA1C, Serum electrolytes), inflammatory markers, anticoagulation profile (protein C, protein S, antithrombin III), complications and therapies. The primary objective was to find an association between these data and in-hospital mortality. Secondary objectives included association between these data and mortality at 3 months and to find out the functional impairment at 3 months.
Results: Total 124 patients were included in final analysis; out of them 47 patients were diagnosed with hemorrhagic stroke and the remaining 77 with acute ischemic stroke. In the univariate analysis previous history of TIA/stroke; use of anti-hypertensive; hemorrhagic type of stroke; higher NIHSS and APACHE II (both at admission and at 24 h); higher WBC count, NLR, PLR, blood urea, serum creatinine, serum lactate, and serum ferritin; lower GCS, serum T4, protein S, and antithrombin III; and requirement of vasoactive drug infusion, mechanical ventilation and renal replacement therapy were significantly different between survivors and non-survivors (p-value < 0.05). Among these, APACHE II at 24 h [OR (95% CI) 1.34 (1.07 to 1.7); p value = 0.01], need for vasoactive drug infusion [OR (95% CI) 1.63 (0.71 to 3.75); p-value = 0.024] and requirement of mechanical ventilation [OR (95% CI) 14.63 (1.78 to 115.5); p-value = 0.012] were found to be independent predictor of in-hospital mortality. These were also independent predictor [odds ratio (95% CI) 1.79 (1.22 to 2.64), p = 0.003; 2.47 (1.04 to 5.87), p = 0.01 and 11.1 (1.67 to 74.2), p = 0.039, respectively] of 90-day mortality. Around one-third (19 out of 58) of the patients had good functional outcome (mRS 0–2) at 90 days after hospital discharge.
Conclusions: In critically ill stroke patients APACHE II score at 24 h, vasoactive drug infusion and requirement of mechanical ventilation during ICU stay are independent predictors of in-hospital and 90-day mortality.

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Topic: Neurointensive care

000197

The role of infectious disease consultation on antimicrobial de-escalation and clinical outcomes in ICU patients with Gram-negative bacteremia: an observational study

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Introduction: Antimicrobial de-escalation represents a key stewardship strategy in critical care. However, it is underutilized in practice, possibly due to clinical uncertainty and concerns about patient deterioration. Infectious disease (ID) specialists may assist critical care specialists to overcome these barriers through expert consultation and guidance.
Objectives: To evaluate the influence of ID consultation on antimicrobial de-escalation decisions and clinical outcomes in patients with Gram-negative bacteremia.
Methods: A prospective observational study of patients with Gram-negative bacteremia was performed in a general ICU for 6 months. We recorded demographics, ICU length of stay, ICU day of positive blood culture (ICU-POS), antibiotic treatment, blood culture results, time to results, treatment decisions after the results (escalation, de-escalation, or no change), ID consultation, appropriateness of treatment and clinical outcomes.
Results: Out of 68 patients included, 54 (79%) were men. Only six were not treated with antibiotics on ICU-POS. Patient characteristics are summarized in Table 1. Pathogens are summarized in Table 2. Escalation of treatment was performed in 32(47%) patients. Treatment decision was deemed appropriate in 44(65%) patients. Among patients receiving ID consultation (n = 26), recommendations were implemented in 24 cases(92%). Time from blood culture draw to results showed no significant association with treatment appropriateness (p = 0.16) or patient outcomes (p = 0.92). Treatment appropriateness did not significantly affect patient outcomes (p = 0.201). As ID consultation significantly influenced treatment decisions (p < 0.001), antimicrobial de-escalation occurred exclusively in the consultation group (4 patients) and necessary escalation was performed in 20(76.9%) patients. Patients receiving ID consultation demonstrated significantly better clinical outcomes (p = 0.015), with 4.44 times higher odds of improvement and 42% lower odds of mortality compared to the rest.

Table 1 (abstract 000197) Characteristics of patients with Gram-negative bacteremia

	Mean ± SD	Median	IQR [Q25-Q75]	n
Age (years)	69.5 ± 14.0	72	11 [66–77]	68
ICU length of stay (days)	84.1 ± 59.9	84	51 [53–104]	68
ICU-POS day*	46.2 ± 35.0	36.5	59 [15–74]	68
Time from blood draw to results (days)	5.1 ± 1.8	5	8 [3–6]	68

*ICU-POS day = ICU day when positive blood culture was drawn

Table 2 (abstract 000197) Gram-negative pathogens isolated from blood cultures in ICU patients

	n	%
Providencia stuartii	16	23.5
Proteus mirabilis	16	23.5
Acinetobacter baumannii	12	17.6
Klebsiella pneumoniae	12	17.6
Pseudomonas aeruginosa	10	14.7
Stenotrophomonas maltophilia	2	2.9
Total	68	100

Conclusions: Infectious diseases specialists play a crucial role in treatment decisions for Gram-negative infections, significantly improving patient outcomes. Although the appropriateness of treatment decision alone does not appear to significantly influence patient outcomes in this sample, a larger sample size would be needed to detect a true effect.

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Topic: Infections and prevention

000198

Video monitoring in the ICU: a "Blessing" or a "Curse"?

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Intensive care Medicine Experimental 2025* 13(1)*:000198.

Introduction: The General Intensive Care Unit (GICU) at the Sheba Medical Center, a tertiary medical center in central Israel, recently relocated to a new facility, designed to address technological advancements and safety concerns. The new unit, a fortified structure with isolated individual rooms, replaces the previous open-plan ICU. Due to the size and the inability to directly observe patients in multiple rooms, the GICU was equipped with a 98-inch screen in each room and HD PTZ (pan-tilt-zoom) cameras for real-time monitoring. The screens also provide access to electronic health records and multimedia content for patients and families. These innovations enhance safety and care but raise ethical dilemma between patient's privacy and continuous surveillance.
Objectives: To discuss the clinical, operational, and ethical implications of continuous video monitoring in the GICU. To describe the importance of finding balance between safety benefits, workflow efficiency, and ethical challenges affecting patients, families, and staff when using the video monitoring.
Methods: The system employs centralized, high-resolution cameras that enable nurses to monitor patients' physical changes, such as altered breathing, convulsions and signs of delirium or other issues requiring attention. Since the nursing ratio in the GICU is 1:2, when a nurse is caring for one of her patients, the system enables her to view the other patient remotely. This in addition to the option of remote monitoring of the physiological signs on the bedside monitor. We summarized the general feedback that raised from staff, patients, and families to evaluate perceptions of privacy, dignity, and the ethical acceptability of using the security camera monitoring.
Results: Although the continuous video monitoring may have advantages improving detection of clinical deterioration, preventing adverse events or near-miss events, ethical challenges emerged. Conscious or semi-conscious patients expressed discomfort or distress knowing they were constantly observed. Families raised concerns about their loved ones' dignity, especially when monitoring occurred during sensitive moments. Staff reported ongoing struggles to reconcile enhanced safety with preserving patient privacy and dignity in their daily practice. Therefore, the staff may turn-off the cameras and the patients then monitored with the physiological bedside monitor without camera.
Conclusions: Modern multimedia technologies in ICUs improve safety and operational efficiency but pose ethical dilemmas. Continuous video surveillance challenges fundamental principles of privacy and dignity for vulnerable patients. To optimize these systems, we must balance their potential to reduce adverse events against their psychological and ethical impacts. Further research should quantify surveillance efficacy and explore ways such as automating the video analysis and only alerting for potential adverse events without human observation of the video.

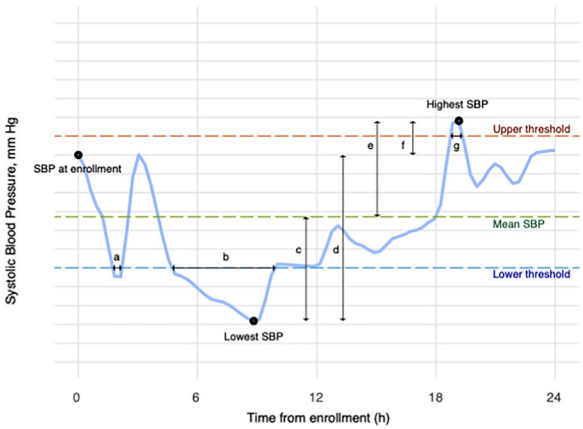
Topic: Nursing care and physiotherapy.

000200

Blood pressure threshold and clinical outcome after successful endovascular thrombectomy in acute ischemic stroke

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Intensive care Medicine Experimental 2025* 13(1)*:000200.

Introduction: Despite successful endovascular thrombectomy (EVT), functional independence remains suboptimal. Blood pressure (BP) management post-EVT is crucial, but the optimal BP target remains unclear.
Objectives: This study aimed to analyze BP parameters, thresholds, and their association with clinical outcomes.
Methods: This post hoc analysis of the OPTIMAL-BP trial included patients with successful EVT randomized to intensive (< 140 mm Hg) or conventional (140–180 mm Hg) BP management. Systolic BP (SBP) parameters, variability, and threshold exceedance durations were analyzed. Outcomes included the modified Rankin Scale (mRS) at 3 months and symptomatic intracranial hemorrhage (sICH) within 36 h.
Results: A total of 302 patients were analyzed with 11,461 BP measurements recorded during the first 24 h after EVT. SBP below 100 mm Hg for prolonged continuous durations was associated with worse mRS outcomes (adjusted OR [aOR] 1.18 per hour, 95% CI [1.01–1.42]; P = 0.047) and increased sICH risk (aOR 1.36 per hour, 95% CI [1.11–1.74]; P = 0.009). SBP surges above 190 mm Hg were linked to mRS worsening (aOR 2.90, 95% CI [1.17–7.28]; P = 0.022), but upper thresholds were not significantly associated with sICH.
Conclusions: Prolonged hypoperfusion below 100 mm Hg and extreme surges above 190 mm Hg, rather than overall BP variability, were associated with poor outcomes. These findings highlight the need for a threshold-based BP management approach post-EVT to minimize prolonged hypotension and excessive surges.



a+b: total duration below the lower threshold
b: continous duration below the lower threshod
c: maximum SBP decrease from the mean SBP
d: maximum SBP decrease from the SBP at enrollment
e: maximum SBP increase from the mean SBP
f: maximum SBP increase from the SBP at enrollment
g: total and continous durations exceeding the upper threshold

The schematic graph displays each patient's SBP at enrollment, lowest SBP, highest SBP, and the 24-h mean SBP (green dotted line). It illustrates the differences between mean SBP and lowest SBP (c) as well

as highest SBP (e). Additionally, it shows the differences between SBP at enrollment and lowest SBP (d) as well as highest SBP (f). The total duration (a + b) and the continuous duration (b) during which SBP remained below the lower threshold (blue dotted line) are depicted, along with the total duration and continuous duration (g) during which SBP remained above the upper threshold (red dotted line).

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3. The authors have no financial conflicts of interest.

Topic: Neurointensive care.

000201

Fidaxomicin versus vancomycin for the treatment of fulminant Clostridioides difficile Infection

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Introduction: Fulminant Clostridioides difficile infection (FCDI) is characterized by severe symptoms such as hypotension, shock, ileus, and toxic megacolon, leading to high mortality rates in critically ill patients. Current guidelines recommend vancomycin plus metronidazole for FCDI. In non-severe and severe CDI, current treatment guidelines recommend fidaxomicin over vancomycin and metronidazole due to higher clinical cure rates and lower CDI recurrence. However, fidaxomicin has not been extensively studied for FCDI, so it is unknown if fidaxomicin would be as effective as vancomycin in this population.
Objectives: We aimed to compare clinical outcomes of fidaxomicin treatment versus vancomycin in critically ill patients with FCDI.
Methods: This clinical effectiveness study utilized the Premier database and included ICU patients > 18 years old admitted to one of over 900 US hospitals between January 1, 2016 and December 31, 2021 who were treated with fidaxomicin or vancomycin therapy for a diagnosis of FCDI. Patients were placed into fidaxomicin or vancomycin groups based on the first 2 days of FCDI treatment. The primary outcome was hospital mortality. Secondary outcomes included clinical cure (survival to discharge), clinical failure (escalation of treatment or mortality), and readmission within 60 days for CDI. Outcomes were compared between vancomycin and fidaxomicin groups. Multivariable logistic regression was used to adjust for differences in baseline covariables.
Results: A total of 81,227 patients were evaluated, 1,355 in the fidaxomicin group and 79,872 in the vancomycin group. Patients were 65 ± 15 years old, 52% female, and 75% white. The most common comorbidities were diabetes (43%), pneumonia (16%), COPD (15%), and respiratory failure (90%). Proton pump inhibitor use was present in 68% of patients and all received broad spectrum antibiotics and vasopressor therapy for shock during their ICU stay. Sixty percent of patients were being treated for an initial episode of CDI. Fidaxomicin patients were more likely to be treated for a recurrent CDI episode compared to vancomycin (27% vs 8%, $p < 0.01$). Metronidazole was co-administered in 48% of fidaxomicin patients and 58% of vancomycin patients ($p < 0.01$). In hospital mortality was similar between groups (15.2% fidax vs. 16.8% vanc, $p = 0.1$). Clinical failure occurred in 16% of fidaxomicin versus 17% of vancomycin patients ($p = 0.34$). Bezlotoxumab use (0.66% fidax vs 0.03% vanc, $p < 0.01$) and fecal transplantation (0.22% fidax vs 0.06% vanc, $p = 0.01$) were used in a small number of patients. Readmission for recurrent CDI occurred more frequently in the fidaxomicin group (5% vs. 2.4%, $p < 0.01$). No difference in mortality, clinical failure, or readmissions were observed after adjustment for covariables ($p > 0.05$ for all).
Conclusions: Fidaxomicin is uncommonly used in critically ill patients with FCDI and was more frequently utilized in patients with a recurrent CDI episode. Fidaxomicin was associated with similar outcomes when compared to treatment with vancomycin. Fidaxomicin may be a reasonable alternative to vancomycin for the treatment of patients with FCDI. Further research is needed.

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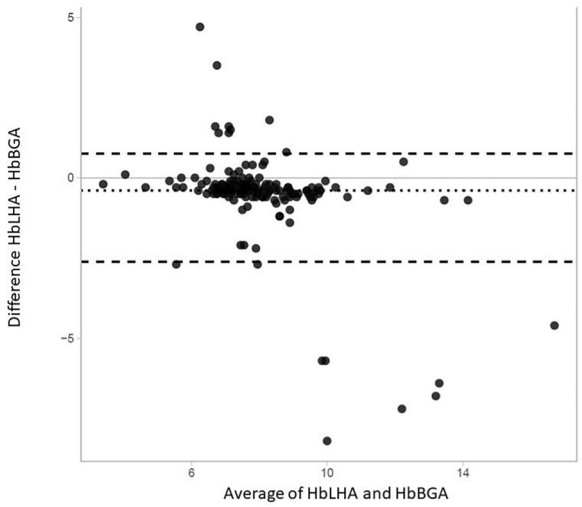
Topic: Infections and prevention

000209

Agreement between hemoglobin values measured by a laboratory hematology analyzer and a blood gas analyzer

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Intensive care Medicine Experimental 2025* 13(1):*000209.

Introduction: Blood gas analyzers (BGA) deliver hemoglobin (Hb) concentration results in a shorter time than laboratory hematology analyzers (LHA). Potential clinical benefit of faster results is conditioned by the agreement between these two techniques.
Objectives: To assess the concordance of Hb values as measured on a BGA and a LHA during management of gastrointestinal bleeding.
Methods: Prospective monocentric study.
Comparison of Hb values measured on a LHA (SYSMEX XN) and on a BGA (Radiometer ABL90 FLEX) on two simultaneous samples drawn in patients undergoing an esophagogastroduodenal endoscopy for suspected gastrointestinal bleeding.
Results: 164 paired samples obtained in 133 patients.
(SAPS II 46.8 ± 17.4; age 64.9 years ± 14.9).
The mean Hb concentration measured on laboratory hematology analyzer (HbLHA) was 7.75 ± 1.5 (g/dL).
The mean Hb concentration measured on BGA (HbBGA) was 8.3 ± 2.16 (g/dL).
Bias (average of differences) was—0.5 ± 1.5.
Correlation coefficient R2 = 0.54 HbBGA = 0.161 + 1.5 HbLHA.
Agreement between HbLHA and HbBGA is represented in figure.
Conclusions: Among patients with suspected gastrointestinal bleeding, concordance between Hb values measured on a HLA and a BGA is low. Results from these two techniques cannot be used indifferently for diagnosis and clinical management.



Agreement between HbLHA and HbBGA.

Topic: Transfusion and haemostasis disorders

000210

Signature of impaired efferocytosis early after coronary artery bypass grafting (CABG) marks patients with increased tissue damage and risk for acute kidney injury (AKI)

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Intensive care Medicine Experimental 2025* 13(1)*:000210.

Introduction

- AKI is a common complication in CABG and increases morbidity, risk for chronic kidney disease (CKD) and mortality [1, 2]. Impaired efferocytosis (clearance of dying cells/ debris) has been implicated in the pathogenesis of AKI while promotion of efferocytosis has been beneficial in preclinical models of AKI [3-5]. To date there is no study assessing biomarkers suggestive for impairment of efferocytosis and their relationship with AKI in adult CABG patients.

Objectives

- Assess the longitudinal trajectories of biomarkers of biomarkers for impaired efferocytosis in an exploratory cohort of CABG patients and investigate their relationship with markers of tissue injury, extracellular vesicles (EVs), coagulation and AKI.

Methods

- Plasma and urine from 10 patients with risk for AKI (CKD and type 2 diabetes) undergoing CABG were prospectively sampled (-24 h, + 2 h, + 6 h, + 24 h, + 48 h post-surgery). Markers for impaired efferocytosis (increased soluble Mer or AXL and reduced MFG-E8) were quantified and integrated into a novel arbitrary *Efferocytosis Impairment Score* EIS: sAXL x sMer)/sMFG-E8/1000. Cell/tissue damage (dsDNA, AST, ALT, LDH), D-Dimer and AKI markers (pCrea, uNGAL) and *AKIRISK™ Score* = (TIMP-2 * IGFBP-7)/1000, NephroCheck™) were assessed. EVs were assessed by flow cytometry for 39 surface markers, including phosphatidylserine (PS), CD11b and CD235ab.

Results: Biomarkers of impaired efferocytosis were extensively changed in 3 of 10 patients (30%) at 2 h post CABG surgery. These 3 patients had an EIS score of 19.8 ± 10.6 (EIShigh; n = 3) vs 0.7 ± 0.65 (EISlow; n = 7). Besides, EIS high patients showed significantly elevated levels of cell free dsDNA, PS + , CD11b + and CD235ab + EVs, and D-Dimer (> 8 µg/mL) compared to patients with EISlow at 2 h post-surgery implying higher rates of cell death, prothrombotic EV and higher fibrinolysis. These markers preceded LDH and AST which raised substantially in EIS high patients but only marginally in EIS low patients at later timepoint (> 6 h). In urine samples taken 6 h post-surgery, EIShigh patients showed increased uNGAL (234.8 ± 91.5 ng/mL EIShigh vs 7.2 ± 7.3 ng/mL EISlow) and an AKIRISK™ Score of 0.9 ± 0.2 EIShigh vs 0.06 ± 0.05 EISlow, both readouts marking for high risk to develop AKI. Indeed, in two of the EIS high patients pCrea increased > 100% from baseline 24 h post-surgery defining AKI stage 2 (KIDIGO). AKI markers including pCrea declined 48 h post-surgery suggesting a transient episode of AKI in these patients.
Conclusions: 30% of CAGB patients showed pronounced elevated biomarkers of impaired efferocytosis early post-CABG surgery. These preceded tissue injury and transient AKI suggesting involvement in the pathogenesis of AKI post-CABG. Confirmation prospective studies and applicability of early efferocytosis impairment for identifying AKI risk patients are required, also to support the development of efferocytosis-promoting therapies to protect and treat AKI.

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Topic: Acute Kidney Injury and haemofiltration

000212

SomaScan™ proteomic profiling in coronary artery bypass grafting (CABG) reveals a patient subgroup with impaired efferocytosis, increased tissue damage, and higher risk of acute kidney injury (AKI)

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Intensive care Medicine Experimental 2025* 13(1)*:000212.

Introduction: Acute kidney injury (AKI) is a common complication after CABG associated with increased morbidity and mortality [1, 2]. Early stratification of patients at risk for AKI post-CABG may help develop effective therapies. We hypothesized that early proteomic profiles after CABG could identify patients at risk for AKI and relate to insufficient clearance of dying cells (efferocytosis), which contributes to AKI pathogenesis [3].
Objectives: Assess proteomic trajectories and investigate relationship to markers of efferocytosis, tissue injury and AKI in a cohort of CABG patients.
Methods
Plasma and urine from 10 patients with risk for AKI (CKD and type 2 diabetes) undergoing CABG were prospectively sampled (-24 h, + 2 h,

+ 6 h, + 24 h, + 48 h post surgery). SomaScan™ proteomics dataset (7596 analytes) [4] was analysed using *limma-voom* in R. Patients with signature of impaired efferocytosis (increased soluble *Mer* or *AXL* and reduced *MFG-E8*) were identified using a novel Efferocytosis Impairment Score "*EIS*" (sAXL x sMer)/sMFG-E8/1000. AKI (risk) biomarkers *pCrea*, *uNGAL* and AKIRISK™ Score = [(*TIMP-2* * *IGFBP-7*)/1000, NephroCheck™] were assessed. AKI was defined by > 100% rise of pCrea over pre-surgery levels.

Results: Significant biomarker changes were observed a*t* 2 h (plasma) and 6 h (urine) post-surgery. Plasma biomarkers (such as *LPR1b, ANK2, Siglec11, CCPG1*) were notably elevated in 9/10 patients at 2 h post-surgery and preluded typical acute phase proteins (*SAA1, SAA2, CRP*) by several hours. 3/10 patients had an efferocytosis impairment score of > 5 (EIShigh). This group differed from EISlow (EIS < 5) by increased proteomic pathway signatures for acute phase responses/myocardial damage (plasma), and signatures of impaired efferocytosis and kidney damage (urine). Proteomics detected increased markers for cell damage (*actinine alpha2*), neutrophil activation (*MPO*) and vascular leakage (*FGFBP3*) in the EIShigh group at 2 h post-surgery. Novel urine markers of tissue damage such as *biliverdin reductase A*, *apolipoprotein B,* and *mRNA editing enzyme TOR signaling pathway regulator* were highly elevated in EIShigh patients 6 h post-surgery. Indeed, *uNGAL* and NephroCheck™ were markedly increased in urine of EIShigh group with 2/3 exhibiting a transient rise of pCrea to > 100% over baseline at 24 h (AKI stage 2).

Conclusions: SomaScan proteomics facilitated the clustering of patients into a subgroup with impaired efferocytosis pathways as early as 2 h post-CABG surgery. This subset (EIShigh) exhibited increased markers related to cell damage, immune system activation, and biomarkers for AKI. The novel biomarkers identified may assist in early identification of AKI risk patients post-CABG, but larger cohorts are needed for validation. Such studies are necessary to also support the development of new therapies targeting AKI, including those promoting efferocytosis.

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2. Studies were supported and conducted by Novartis Biomedical Research

Topic: Translational biology

000213

Interrater reliability and predictive modeling of nutritional assessment tools in critically Ill COVID-19 patients: a secondary data analysis of a cohort study

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Intensive care Medicine Experimental 2025* 13(1)*:000213.

Introduction: COVID-19's inflammatory responses increase the risk of malnutrition in patients admitted to intensive care patients. Reported malnutrition rates vary markedly—from 28.2% to 67.3%—depending on the assessment tool used, underscoring data gaps and variability. Recognizing that essential nutritional data are not always available for every patient, this study employs a secondary analysis to evaluate the interrater reliability among common nutritional scoring systems. In addition, we aimed to develop equations that establish quantitative relationships between these nutritional assessment tools, enhancing their comparability and practical application.

Methods: The present study was a secondary data analysis of prospective cohort. The study was obtained institutional review board approval from Tehran University of Medical sciences (IR.TUMS.IKHC.REC.1400.229). We performed a secondary analysis on data from 110 COVID-19 patients admitted to the intensive care unit (59.1% men; mean age 52 ± 15). Four assessment tools were evaluated: Nutritional Risk Screening 2002 (NRS2002), Mini Nutritional Assessment (MNA), modified Nutrition Risk in Critically Ill (mNUTRIC) score, and Prognostic Nutritional Index (PNI). Pearson correlation and Cohen's Kappa coefficients were calculated to assess interrater reliability. Additionally, curve estimation models were developed to explore the relationships among scores from different tools.

Results: Linear curve estimation was applicable for most pairs, except for the PNI–mNUTRIC pair, which was best modeled by a quadratic equation. Notably, the predictive model for NRS2002 based on the MNA score resulted in the highest R-squared value (R^2 = 0.636). The NRS2002 showed fair to moderate agreement with the MNA (κ = 0.289, p < 0.001) and with mNUTRIC (κ = 0.244, p = 0.001), but only slight and non-significant agreement with the PNI (κ = 0.114, p = 0.255). In contrast, the MNA demonstrated moderate to substantial agreement with mNUTRIC (κ = 0.348, p < 0.001) and a trend toward agreement with the PNI (κ = 0.135, p = 0.089).

Conclusions: Our findings support a linear association between several nutritional assessment tools in COVID-19 patients admitted to ICU. Promising results show an adequate predictive model for NRS2002 based on the MNA score. It is recommended to utilize the most comprehensive nutritional scoring system suitable for the clinical setting. Nonetheless, in scenarios where laboratory data or time are limited, these tools may be employed interchangeably, leveraging their predictive capabilities to ensure effective nutritional assessment.

Table 1 (abstract 000213) Curve estimates and equation modeling

	Test statistics	R^2	Equation model
mNUTRIC predicted by PNI	F =7.218, p=.001	.119	mNUTRIC= 8.92 - .207(PNI) + .002 $(PNI)^2$
PNI predicted by MNA	F= 5.672, p=.019	.050	PNI= 19.793+1.271 (MNA)
mNUTRIC predicted by MNA	F=23.476, p<.001	.179	mNUTRIC=10.991 - .604 (MNA)
PNI predicted by NRS	F=3.059, p=.083	.028	PNI= 38.231 - .937 (NRS)
mNUTRIC predicted by NRS	F=29.586, p=.083	.215	mNUTRIC=1.529 +.658 (NRS)
NRS predicted by MNA	F=188.716, p<.001	.636	NRS =13.002 - .804 (MNA)

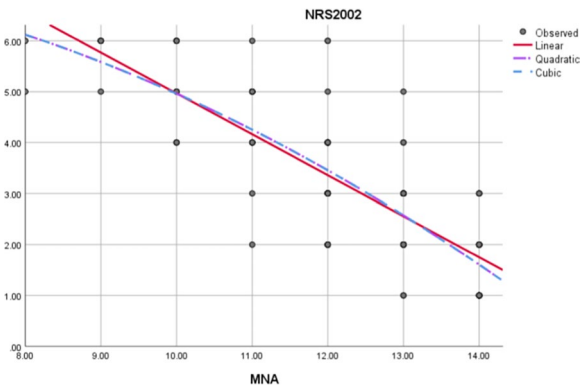


Fig. 1 (abstract 000213) Curve estimate of NRS2002 and MNA

Reference

1. https://doi.org/10.1155/2022/5016649

Topic: Metabolism, endocrinology, liver failure and nutrition

000215

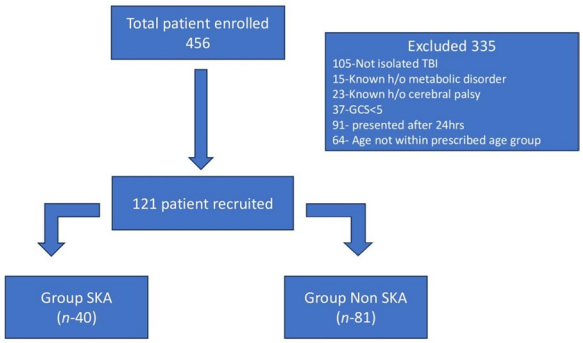
Starvation ketoacidosis in paediatric population with isolated traumatic head injury—its incidence and effect on the outcome

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Intensive care Medicine Experimental 2025* 13(1):*000215.

Introduction: Ketoacidosis is a metabolic state where ketone bodies increase with decreasing serum bicarbonate levels and pH. Starvation is one of its causes. Starvation ketoacidosis (SKA) may occur in children after traumatic brain injury (TBI) due to metabolic adaptation to fasting. This setting may potentiate cerebral microinfarctions leading to altered cerebral metabolism. This eventually leads to worsening coagulopathy and acidosis,(1) Literature is sparse in highlighting the effect of SKA in children with TBI.
Objectives: The primary objective is to find the incidence of SKA. Secondary objectives are the effect of SKA on outcome, its relation to the time from injury to admission, and evaluation of the Glasgow Outcome Score extended (GOS-E) at 3 months.
Methods: After ethics approval and trial registration, a prospective observational study was conducted after written and informed consent. Inclusion criteria: children aged 2 years to 12 years with moderate to severe isolated TBI. GCS < 5, hospital admission > 24 h of injury, known pre-existing metabolic disorders that may cause ketoacidosis, known neurodevelopment delay, and injury severity score (ISS) > 25 were excluded. All patients received standard of care as per formulated guidelines. At the time of assessment, arterial blood samples were collected for serum ketone levels and were measured by point-of-care testing using ketone strips. SKA was defined as serum ketone > 0.6 mmol/L along with pH < 7.30, HCO3-values < 18 meq/dl, normal lactate levels, and blood glucose level ≤ 80 mg/dl. Outcomes were assessed as death and/or ventilator-free days on or before 7 days post-admission and GOS-E at 3 months.
Results: 456 patients were screened out of whom 121 were analysed as per inclusion criteria (Fig. 1). Table 1 shows the baseline characteristics, ketone levels, ABG values, outcomes, and complications of the study.

Particulars	Total	SKA (40)	Non-SKA(81)	p-value
Gender Male Female	77 44	26 14	51 30	0.98α
Age	7.12 ± 4.4	7.78 ± 4.1	6.92 ± 4.6	0.09β
Time since injury	15.32 ± 19.9	18.83 ± 14.1	14.12 ± 17.6	0.00 β
No. of referrals	1(1–2)	2(1,2.5)	1(1,2)	0.00μ
Last meal	19.22 ± 1.22	22.41 ± 1.2	17.54 ± 1.1	0.00 β
GCS GCS motor n (1–4) (5–6)	8.5(6–13) 45 76	7(6,9) 16 23	10(7.5,12) 24 57	0.00 μ 0.31α
ISS	9.96 ± 4.14	10.73 ± 4.57	9.58 ± 3.89	0.15 β
Marshall Score	2(2,3)	2(2,2)	2(2,3)	0.25 μ
Base deficit	7.84 ± 3.9	11.41 ± 2.5	5.71 ± 3.18	0.00 β
HCO3	16.83 ± 4.0	13.03 ± 2.41	18.39 ± 3.36	0.00 β
RBS	87.98 ± 26.2	60.85 ± 12.66	102.5 ± 18.93	0.00 β
GCS at discharge	9(7,10)	9(7,10)	9(7,10)	0.97μ
GCS motor	5(4,6)	4(3,5)	6(4.5,6)	0.01 μ
Death %(n)	7.4 (9)	12.5 (5)	4.9(4)	0.27α
Ventilator-free days	3.41 ± 1.78	2.79 ± 1.81	3.66 ± 1.72	0.01β
GOS-E	5 (4,6)	5 (4,6)	6 (4,6.5)	0.31μ
Neuro worsening %(n) GCS motor	14(17)	30(12)	6(5)	0.00 α
Seizure %(n)	5(7)	15(6)	1(1)	0.01 α
Hemiparesis %(n)	2.5(3)	7.5(3)	0(0)	0.00 α
VAP %(n)	11.5(14)	25(10)	5(4)	0.01 α

Conclusions: In our study, incidence of SKA was 33% with more mortality, fewer ventilator-free days, and more complications than non-SKA. Time to injury, number of referrals, and consumption of last meal may be predisposing factors for developing SKA in children with TBI.



Shows the flow of patient.

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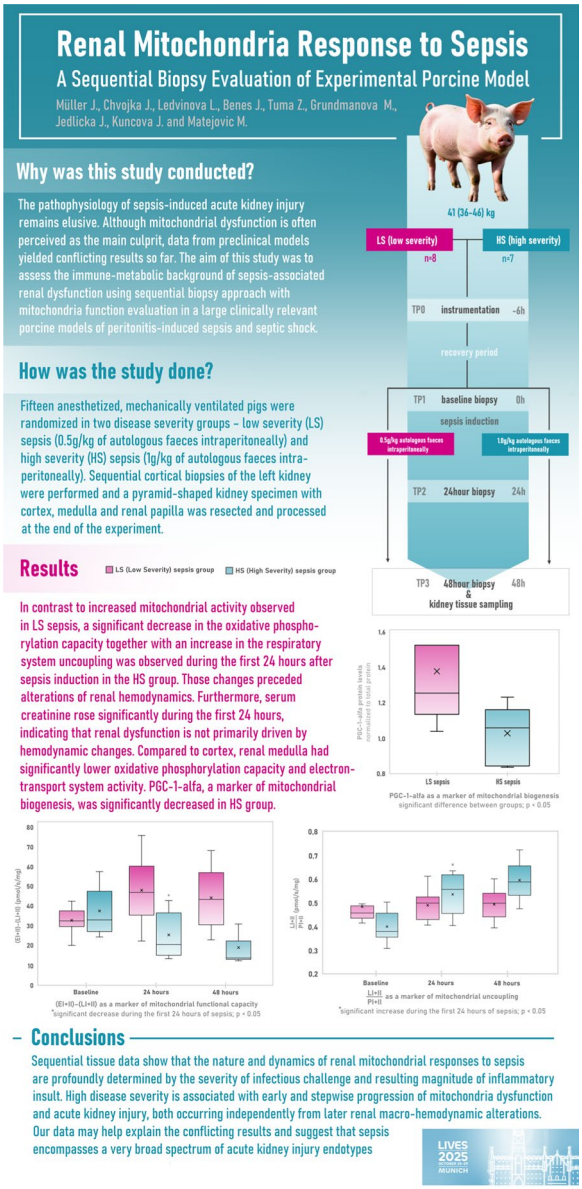
Topic: Trauma

000216

Renal mitochondria response to sepsis: a sequential biopsy evaluation of experimental porcine model

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Introduction: The pathophysiology of sepsis-induced acute kidney injury remains elusive. Although mitochondrial dysfunction is often perceived as the main culprit, data from preclinical models yielded conflicting results so far. The aim of this study was to assess the immune-metabolic background of sepsis-associated renal dysfunction using sequential biopsy approach with mitochondria function evaluation in a large clinically relevant porcine models mimicking two different paces and severity of sepsis and couple this approach with traditional parameters of renal physiology.
Methods: In this randomized, open-label study, 15 anaesthetized, mechanically ventilated and instrumented (renal artery flow probe and renal vein catheter) pigs were randomized in two disease severity groups—low severity (LS) sepsis (0.5 g/kg of autologous faeces intraperitoneally) and high severity (HS) sepsis (1 g/kg of autologous faeces intraperitoneally). Sequential cortical biopsies of the left kidney were performed and a pyramid-shaped kidney specimen with cortex, medulla and renal papilla was resected and processed at the end of the experiment. Oxygraphic data and western blot analysis of proteins involved in mitochondrial biogenesis and degradation were obtained.
Results: In contrast to increased mitochondrial activity observed in LS sepsis, a significant decrease in the oxidative phosphorylation capacity together with an increase in the respiratory system uncoupling was observed during the first 24 h after sepsis induction in the HS group. Those changes preceded alterations of renal haemodynamics. Furthermore, serum creatinine rose significantly during the first 24 h, indicating that renal dysfunction is not primarily driven by haemodynamic changes. Compared to cortex, renal medulla had significantly lower oxidative phosphorylation capacity and electron-transport system activity. PGC-1-alfa, a marker of mitochondrial biogenesis, was significantly decreased in HS group.
Conclusions: In this experimental model, unique sequential tissue data show that the nature and dynamics of renal mitochondrial responses to sepsis are profoundly determined by the severity of infectious challenge and resulting magnitude of inflammatory insult. High disease severity is associated with early and stepwise progression of mitochondria dysfunction and acute kidney injury, both occurring independently from later renal macro-haemodynamic alterations. Our data may help explain the conflicting results of preclinical studies and suggest that sepsis encompasses a very broad spectrum of sepsis-induced acute kidney injury endotypes.



Abstract for publication.

Topic: Sepsis

000217

The impact of time to ROSC on survival in ICU cardiac arrest: a retrospective cohort study

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***Intensive care Medicine Experimental 2025* 13(1):*000217*.**

Introduction: Cardiac arrest in ICU settings is associated with high mortality despite advances in resuscitation techniques [3,4]. While cardiopulmonary resuscitation (CPR) duration is a well-established predictor of survival [5,6], the independent impact of ROSC timing remains underexplored [7]. Achieving ROSC earlier may reduce ischemic injury and improve outcomes, but confounding with CPR duration often limits interpretation. This study investigates whether shorter time to ROSC independently predicts survival in ICU cardiac arrest patients after adjusting for illness severity and resuscitation duration [3,5,8].
Objectives: This study aimed to evaluate the association between time to return of spontaneous circulation (ROSC) and survival to hospital discharge in intensive care unit (ICU) patients with cardiac arrest.
Methods: A retrospective cohort study was conducted in the ICU of a secondary-care hospital in Saudi Arabia. Medical records of adult patients (≥ 18 years) who experienced cardiac arrest and received CPR between January 2023 and December 2024 were reviewed. Patients with documented ROSC times were included. Variables collected included age, sex, CPR duration, ROSC time, Simplified Acute Physiology Score II (SAPS II), and survival to discharge. Multivariate logistic regression was used to identify independent predictors of survival, adjusting for CPR duration and SAPS II.
Results: Among 111 patients, the overall survival-to-discharge rate was 32.43%. Survivors had significantly shorter ROSC times compared to nonsurvivors (mean: 9.8 ± 3.4 vs. 17.5 ± 6.1 min; $p < 0.001$). Time to ROSC was independently associated with survival (adjusted OR = 1.32 per minute reduction; 95% CI: 1.12–1.55; $p < 0.001$). Longer CPR duration was negatively associated with survival (adjusted OR = 0.85 per minute increase; 95% CI: 0.78–0.92; $p < 0.001$). Age, sex, and SAPS II were not significantly associated with survival.
Conclusions: A shorter time to ROSC is a strong and independent predictor of survival in ICU cardiac arrest. These findings support implementing structured resuscitation protocols focused on minimizing ROSC time through timely interventions and optimized CPR delivery. Further multicenter studies are needed to validate these results and assess long-term neurological outcomes [9,11].

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Topic: Cardiac arrest

000218

Discharge destination as a predictor of ED revisit: a study on survivors of the emergency ICU

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Intensive care Medicine Experimental 2025* 13(1)*:000218.

Introduction: While ICU survival has improved, survivors are at increased risk of frailty and higher healthcare utilization, including ED visits, due to post-intensive care syndrome (PICS). Individualized discharge planning is increasingly important, yet direct discharge to home is becoming more common due to patient preference, bed shortages, and transfer delays. This study aimed to analyze post-discharge trajectories and factors associated with 30-day ED revisits among survivors from an emergency ICU (EICU).
Methods: This retrospective single-center cohort study included 611 patients admitted via the ED and discharged alive from the EICU between June 1, 2021, and June 30, 2023, excluding those who died in the ICU or after transfer to general wards. Patients were grouped by discharge destination: direct home (DH), ward-to-home (WH), and transfer to another hospital (TF). The primary outcome was ED revisit within 30 days; the secondary outcome was revisit within 14 days. Multivariable logistic regression was performed to identify independent risk factors for early ED revisits.
Results: Among 611 patients, 80 (13.1%) were in the DH group, 294 (48.1%) in WH, and 237 (38.8%) in TF. The TF group was older ($p < 0.001$), and unmarried patients were more likely to be discharged directly home. Solid tumors ($p = 0.028$), diabetes ($p = 0.008$), dementia ($p < 0.001$), and cerebrovascular disease ($p = 0.008$) were more common in TF. Hematologic malignancies were more frequent in WH ($p = 0.011$). The TF group had higher rates of sepsis ($p < 0.001$), cardiac

arrest ($p = 0.036$), mechanical ventilation ($p = 0.003$), ICU delirium ($p = 0.006$), and POLST completion ($p < 0.001$), with longer hospital and ICU stays ($p < 0.001$ for both). Toxicologic admissions were more frequent in DH ($p < 0.001$).
At discharge, tracheostomies, home ventilators, nutritional tubes, urinary catheters, and drainage devices (e.g., PTBD, PCD) were significantly more common in TF.
There were no significant differences in 30-day ($p = 0.989$) or 14-day ($p = 0.267$) ED revisit rates among the groups. However, tracheostomy (OR 2.48) and drainage catheter (OR 4.85) were significantly associated with increased ED revisit risk.
Conclusions: Discharge destination was not associated with short-term ED revisit risk among EICU survivors. However, the presence of a tracheostomy or drainage catheter significantly increased revisit risk, indicating the need for tailored post-discharge planning. Further research is warranted to develop structured ICU discharge protocols.

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11. The Korean Society of Emergency Medicine

Topic: Health Services Research and Outcome

000219

A service evaluation of extubation failure in a major trauma critical care unit in the United Kingdom

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Intensive care Medicine Experimental 2025* 13(1)*:000219.

Introduction: Extubation failure is associated with poor health outcomes for patients and various studies have identified multiple risk factors and causes (Li et al.,2023; Torrini et al., 2021).
Objectives: The aim of this study was to evaluate local risks and causes of extubation failure via a retrospective service evaluation in a trauma critical care unit over a 6-month period.
Methods: Extubation failure, defined as re-intubation within 72 h, was assessed in patients aged ≥ 18 years who were mechanically ventilated (MV), electively extubated, and survived 72 h post-extubation. Patients who had a tracheostomy, or were extubated for palliative purposes were excluded. Independent t-tests were used to determine between-group differences in length of stay, days MV prior to extubation, age and APACHE II score. A risk ratio was used to determine the probability of a failed extubation based on whether the patient was extubated on a weekday or weekend, and during the daytime or overnight. The documented cause of extubation failure was also recorded.
Results: Of 208 patients electively extubated, 38 (18.4%) failed. Primary documented causes were poor cough with retained secretions (31.6%), agitation/delirium (23.7%), hypoxia (15.8%) and airway obstruction (10.5%). There were no significant differences in age (-1.48; 95% CI, -6.81, 3.84, p = 0.58) or APACHE II score (-0.95; 95% CI, -3.11, 1.23, p = 0.39) between successful and failed extubations. However, patients who experienced extubation failure had a significantly longer MV duration prior to extubation (10.1 ± 6.2 vs 3.7 ± 3.3 days; 95% CI 4.9, 7.8; p < 0.001) and a significantly longer critical care length of stay (mean difference 15.6 days; 95% CI, 12.9, 18.4; p < 0.001) compared to those successfully extubated. Following extubation, the risk ratio of a failed extubation occurring overnight vs daytime was 1.03 (95%CI 0.9 to 1.2), and the risk ratio of a failed extubation occurring on the weekend vs weekday was 1.0 (95%CI 0.9 to 1.2).
Conclusions: Extended duration of MV was associated with failure. Factors such as age, APACHE II score, time of day, and day of the week were not identified as being associated with extubation failure. Primary reasons for failure were poor cough or delirium. The results of this service evaluation provide a rationale for undertaking a quality improvement initiative, to implement a protocol and standardised assessment pathway for extubation. Future research should include a qualitative approach to explore clinicians' decision-making processes around extubation. This service evaluation has highlighted that clinicians should carefully consider all potential risk factors before trialling an extubation, particularly being cognizant of patients who have been MV for a prolonged period.

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Topic: Acute respiratory failure and mechanical ventilation

000220

Trajectories of mechanical ventilation power upon vvECMO initiation and contribution of ventilatory parameters

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Introduction: Following vvECMO initiation, the intensity of mechanical ventilation is typically reduced, but the optimal ventilation strategy during vvECMO remains a matter of debate [1].
Previous studies describing ventilator adjustments upon vvECMO initiation were limited to daily recordings of ventilatory parameters. However, rapid adjustments may have a particularly pronounced effect on survival [2,3], creating the need to analyze granular data. In this, mechanical power (MP), estimating the risk of ventilator-induced lung injury (VILI) by combining several parameters, can serve as an appealing tool to quantify the de-escalation of ventilatory intensity during vvECMO initiation. The contribution of individual ventilatory adjustments on MP reductions during vvECMO initiation has yet to be assessed.
Objectives: To assess immediate changes in MP upon vvECMO initiation and the contribution of individual ventilatory parameters.
Methods: Adult patients undergoing vvECMO from 2019 to 2025 at Charité—Universitätsmedizin Berlin, Berlin, Germany, with available ventilatory parameter data, were eligible for inclusion. Median ventilatory parameters (respiratory rate [RR], tidal volume [Vt], peak-inspiratory pressure [Ppeak], positive end-expiratory pressure [PEEP]) and arterial blood gases measured during the ± 4 h of vvECMO initiation were used to calculate changes. MP was calculated using the previously published simplified equation $MP = 0.098 \times RR \times Vt \times (Ppeak - 0.5 \times (Ppeak - PEEP))$ [3,4]. Changes upon vvECMO initiation were assessed using the Wilcoxon rank-sum or signed-rank test, as appropriate. This study was approved by Charité's Ethics Committee (*EA2/139/20*).
Results: 417 patients (27.3% female, median [interquartile range] age 57.8 [50.1,63.8]) were included. Hospital mortality was 44.6% (n = 186). The median SOFA Score before vvECMO was 14.0 (12.0,17.0), and the median P/F ratio was 111.7 mmHg (81.9,156.8).
Pre-vvECMO MP was lower (p < 0.001) in survivors (16.8 J/min [10.6,23.6]) vs. non-survivors (21.6 J/min [16.0,27.4]). Pre vvECMO, RR was 22 bpm (18.0,25.0) in survivors and 23 bpm (20.0,25.0) in non-survivors (p = 0.034), PEEP was 14.0 cmH2O (10.0,17.0) in survivors and 16.0 (14.0,18.0) in non-survivors (p < 0.001). No significant differences were observed for Vt (5.8 ml/kg predicted body weight [4.8,7.1], p = 0.10) and dynamic driving pressure (DP = Ppeak-PEEP; 17.0 cmH2O [14.0,19.5], p = 0.06) among both groups.
Upon vvECMO initiation, MP decreased by a median of -8.4 J/min (-13.5,-4.1) in survivors and -11.8 J/min (-17.4,-6.7) in non-survivors (p < 0.001, Fig. 1). This was mainly attributable to DP, RR, and Vt, while PEEP remained clinically unchanged (Fig. 1, Fig. 2).
In survivors, 96.7% (-100.0%,-86.5%) of MP decreases occurred within the first two hours, while in non-survivors 94.0% (-100.0%,-75.0%) of changes occurred during this period (p = 0.025).
Prior to vvECMO P/F ratio was higher among survivors than non-survivors (Fig. 3). After vvECMO initiation, P/F ratio increased, mainly driven by a decreased fraction of inspired oxygen (FiO2), with no significant post-vvECMO differences by survivor status (Fig. 3). Arterial partial pressure of carbon dioxide (PaCO2) decreased by -13.6 mmHg (-24.7,-6.6) with no significant differences between both groups (p = 0.23).
Conclusions: The initiation of vvECMO resulted in a significant overall reduction in MP by 61.5%. This decrease was primarily driven by reductions in DP, Vt, and RR, while PEEP remained clinically comparable. Changes predominantly occurred during the first two hours post-vvECMO and were more pronounced among non-survivors. At the same time, the PF ratio increased, primarily due to a reduction in FiO2. These findings highlight the importance of vvECMO in providing lung-protective ventilation while ensuring adequate gas exchange, even in patients with severely compromised lungs.

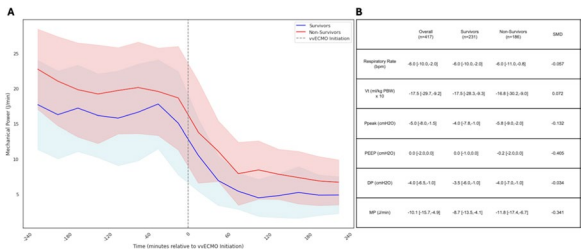


Fig. 1 (abstract 000220) Adjustment of ventilator parameters during vvECMO initiation. (A) MP trends in survivors vs. non-survivors from 4 h before to 4 h after the start of vvECMO. The X-axis represents time (in minutes), while the Y-axis indicates median MP (J/min) and IQR, which was calculated every 30 min. (B) Changes in ventilatory parameters during the last 4 h before and 4 h after start of vvECMO. Medians and interquartile range were calculated for the 4-h period before and the 4-h period after vvECMO initiation. *Abbreviations: bpm = breaths per minute, Vt = tidal volume, PBW = predicted body weight, Ppeak = peak inspiratory pressure, DP = dynamic driving pressure, MP = mechanical power, SMD = standardized mean difference.*

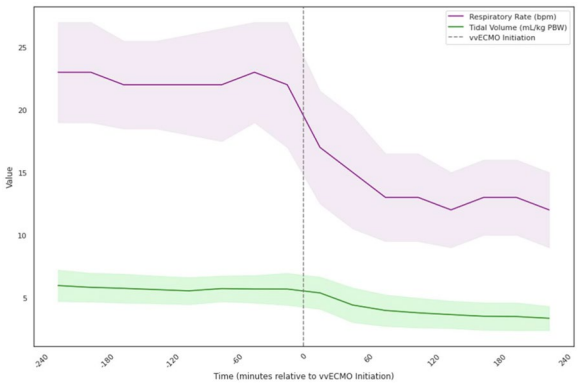


Fig. 2 (abstract 000220) Adjustment of tidal volume (Vt) and respiratory rate during vvECMO initiation. Overall trends in ventilatory parameters from 4 h before to 4 h after start of vvECMO. The X-axis represents time (in minutes), while the Y-axis indicates median values of ventilatory parameters (Vt in ml/kg PBW and respiratory rate) and IQR, which were calculated every 30 min. *Abbreviations: bpm = breaths per minute, PBW = predicted body weight.*

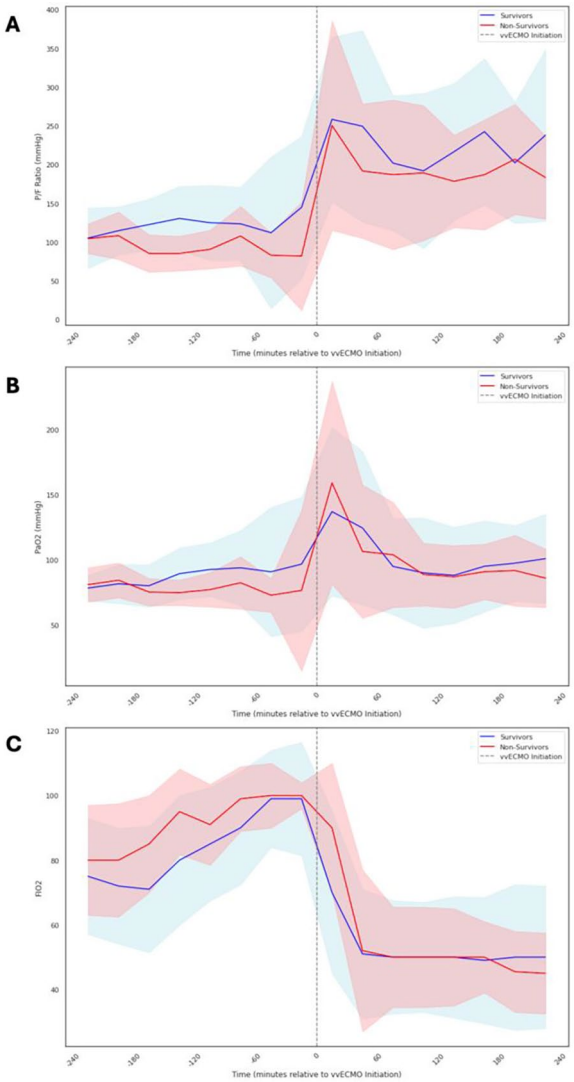


Fig. 3 (abstract 000220) Gas exchange during vvECMO initiation. (A) Line graph depicting P/F ratio trends in survivors vs. non-survivors from 4 h before to 4 h after the start of vvECMO. The median P/F-ratio pre vvECMO was 125.5 mmHg (91.8,180.4) in survivors and 95.6 mmHg (73.9,130.4) in non-survivors ($p < 0.001$). The median P/F ratio post vvECMO was 213 mmHg (142,302.6), with no significant differences between both groups ($p = 0.06$). (B) Line graph depicting arterial partial pressure of oxygen (PaO2) trends in survivors vs. non-survivors from 4 h before to 4 h after start of vvECMO. The median PaO2 pre-vvECMO was 87.8 mmHg (74.1,116.7) in survivors and 80.3 mmHg (68.8,92.3) in non-survivors ($p < 0.001$). The PaO2 post-vvECMO median was 99.6 mmHg (76.2,144.2) with no significant differences between both groups ($p = 0.22$). (C) Line graph depicting fraction of inspired oxygen (FiO2) trends in survivors vs. non-survivors from 4 h before to 4 h after start of vvECMO. The median FiO2 pre-vvECMO was 80% (55.5,99.2) in survivors and 88.5% (70.2,100.0) in non-survivors ($p < 0.001$). The median FiO2 post-vvECMO was 50.0% (40.0,70.0) with no significant differences between both groups ($p = 0.92$)
In all graphs, the X-axis represents time (in minutes), while the Y-axis indicates median values for (A) P/F ratio (mmHg), (B) PaO2 (mmHg), and (C) FiO2 (%), all with IQRs, which were calculated every 30 min.

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Topic: Acute respiratory failure and mechanical ventilation

000221

Monitoring fluid responsiveness using non-invasive hybrid diffuse optics on peripheral muscle during a passive leg raising maneuver

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Intensive care Medicine Experimental 2025* 13(1):*000221.

Introduction: Accurate assessment of fluid responsiveness is crucial for effective hemodynamic resuscitation. Current methods primarily rely on cardiac output (CO) monitoring, often requiring invasive techniques. The VASCOVID project, a collaborative European initiative, has recently validated a non-invasive device for continuous microvascular flow monitoring. This platform integrates Diffuse Correlation Spectroscopy (DCS) and Time-Resolved Near-Infrared Spectroscopy (TR-NIRS) to measure microvascular metabolic and flow-related parameters.
Objectives: To evaluate dynamic changes in microvascular flow and CO during a passive leg raising (PLR) maneuver.
Methods: This proof-of-concept observational study included both healthy subjects and ICU patients undergoing a PLR maneuver. Local microvasculature was assessed with the VASCOVID platform on the brachioradialis muscle, deriving the microvascular blood flow index (BFi) and tissue oxygen saturation (StO2). In healthy subjects, CO was estimated using the volume-clamp method (Finapres®, Finapres Med). In ICU patients, CO was assessed via an invasive hemodynamic monitor based on pulse waveform analysis with internal calibration (ProAQT®, Getinge), connected to the patient's arterial line. Subjects were classified as "responders" (CO-R) if their CO increased by at least 10% within 60 s of PLR. Continuous variables are reported as median (IQR), while categorical variables are expressed as absolute numbers (percentage). The predictive ability of microvascular variables for CO-R was assessed using Receiver Operating Characteristic (ROC) analysis.
Results: A total of 24 healthy subjects (32, 30–42 years) and 13 ICU patients (64, 61–72 years) were included. All ICU patients were receiving mechanical ventilation, and 10 (77%) required vasopressor support (Norepinephrine dose 0.25, 0.1–0.4 mcg/kg/min). Changes in CO during the PLR were effectively tracked by both BFi and StO2 (Figure). Thirteen (56%) healthy subjects, and 4 (31%) patients were CO-R. BFi changes showed an AUC of 0.74 (95% CI 0.6–0.9; $p < 0.01$), while StO_2 changes had an AUC of 0.80 (95% CI 0.64–0.96; $p < 0.001$) for predicting CO-R. The combination of both signals exhibited strong predictive performance for CO-R detection (AUROC 0.90, 95% CI 0.7–1; $p < 0.001$).
Conclusions: Non-invasive monitoring of peripheral microvascular flow using diffuse optics may serve as a valuable tool for assessing fluid responsiveness, potentially minimizing the need for invasive

Methods: Further research is needed to evaluate its effectiveness, particularly in complex ICU patients.

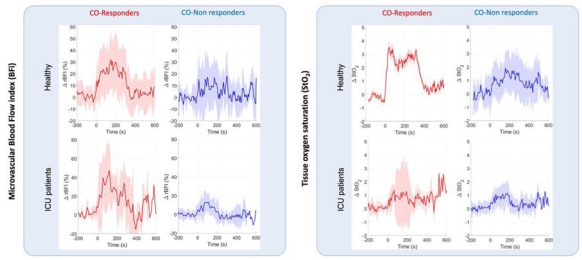


Figure. BFi and StO2 traces in responders and non-responders to the PLR maneuver in healthy volunteers and ICU patients. Solid lines represent average values, while shaded areas indicate the standard deviation. Time 0 represents the initiation of the PLR maneuver.

Reference

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Topic: Cardiovascular issues in ICU

000225

Norepinephrine + angiotensin II (NE + Ang II) in refractory septic shock. Effects on cardiac output (C.O.) and mean systemic filling pressure (Pmsf): data from hemodynamic monitoring by transpulmonary thermodilution (PiCCO)

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Intensive care Medicine Experimental 2025* 13(1):*000225.

Introduction: Refractory septic shock, defined as persistent low MAP despite fluid resuscitation and vasopressors infusion, is characterized by high morbidity and mortality. In the last years, some drugs with alternative pathways than catecholamines, have been proposed as additional therapy. Ang II in combination with NE have proven to be effective in achieve adequate MAP in refractory septic shock patients [1].

Objectives: In our study, we wanted to verify first hour Ang II adding effects on MAP, C.O., Pmsf, venous return resistances, RVr, and vasopressors requirement in refractory septic shock patients without any direct volume intervention.

Methods: We collected data from eight consecutive patients affected by refractory septic shock admitted to our general ICU, treated with association NE + Ang II and monitored by transpulmonary thermodilution with PiCCO instrument.

All patients received, before enrollment, fluid resuscitation of almost 30 ml/kg over two hours and showed inadequate MAP despite NE infusion at ≥ 0,3mcg/kg/min. We analyzed MAP, C.O. and vasopressors infusion rate during NE treatment and 1 h after Ang II adding. By continuous C.O. monitoring and performing two series of end-inspiratory hold maneuvers at 15, 25 and 35 cmH2O, we constructed two venous return curves for each of the six ventilator dependent patients and computed Pmsf and RVr during NE and NE + Ang II therapy without any fluid bolus infusion between measurements (Fig. 1) [2]. Data were analyzed using t paired rank test.

Results: After the first hour of Ang II treatment, all patients showed statistically significant MAP increase from 58 (± 9,8) to 92 (± 11,4) mmHg (p < 0,0001) and C.O. rise from 5,3 (± 1,6) to 5,8 (± 1,4) l/min (p = 0,06) (Fig. 1).

Pmsf increased from 14,8 (± 11,8) to 19,5 (± 6,8) mmHg (p = 0,07) without any CVP variation. Pmsf-CVP increased accordingly from 7,5 (± 9,1) to 11,8 (± 5) mmHg (p = 0,09).

RVr increased from 2,5 (± 1,4) to 4 (± 1,8) mmHg.min/l (p = 0,04).

Excluding data from a patient with profuse diuresis (> 500 ml) between measurements, C.O. increased from 5,2 (± 1,7) to 5,9 (± 1,5) l/min (p = 0,001), Pmsf from 10,4 (± 4,2) to 17 (± 3,3) mmHg (p = 0,002) and Pmsf-CVP from 3,5 (± 1,3) to 10,2 (± 2,9) mmHg (p = 0,007), (Fig. 2).

All patients showed NE dosage reduction after 1 h of Ang II treatment from 0,46 (± 0,15) to 0,3 (± 0,17) mcg/kg/min, (p = 0,0005). The average Ang II dose to reach MAP target was 31,6 ng/kg/min, higher dosages, till 80 ng/kg/min, was necessary in three patients chronically exposed to angiotensin receptor blockers [3].

Six patients were discharged alive from ICU, three needed RRT.

Conclusions: Although several results did not reach statistical significance due to the small sample size analyzed, in our series of refractory septic shock patients, Ang II infusion as second vasopressor proved to be effective in achieving of adequate MAP, in Pmsf and Pmsf-CVP increasing with consequent C.O. growth. After Ang II adding, NE dosage rapidly and significantly decreased.

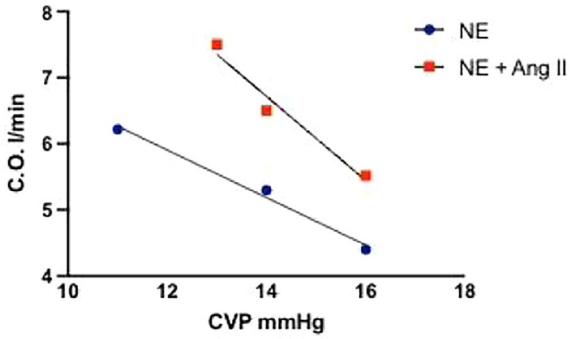


FIg. 1 (abstract 000225) Venous return curve. C.O. and CVP values at end-inspiratory hold maneuvers at 15, 25 and 35 cmH2O during NE (blue dots) and NE + Ang II treatment (red dots)

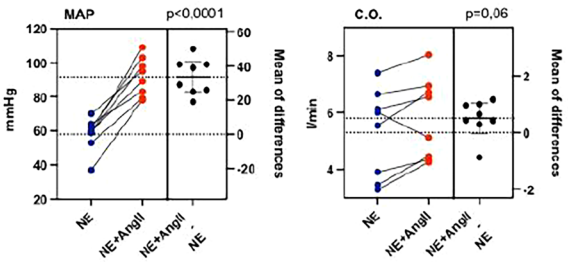


Fig. 2 (abstract 000225) MAP and C.O. during NE (blue dots) and NE + Ang II treatment (red dots)
Statistical significance for p < 0,05.

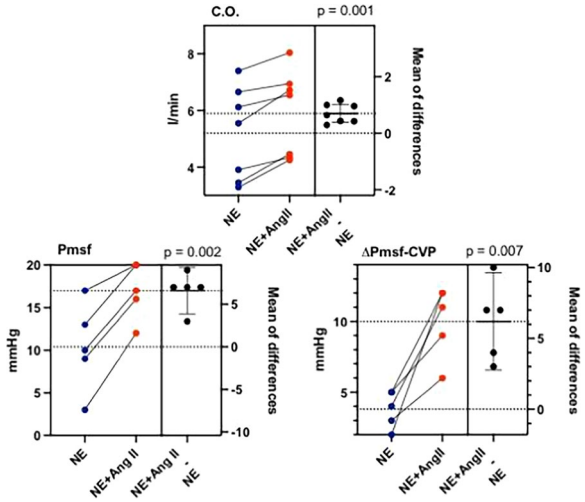


Fig. 3 (abstract 000225) C.O., Pmsf and ΔPmsf- CVP during NE (blue dots) and NE + Ang II treatment (red dots)
for patients without fluid loss. Statistical significance for p < 0,05.

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Topic: Sepsis

000227

Measurement of microcirculation by laser Doppler flowmetry is useful for the physiological monitoring of the chest compression rate during cardiopulmonary resuscitation: a pilot study

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Intensive care Medicine Experimental 2025 13(**Suppl 1**)***:000227***.

Introduction: High-quality cardiopulmonary resuscitation (CPR) performed by all rescuers, including bystanders, improves patient outcomes. Physiological monitoring of CPR, such as end-tidal carbon dioxide, is thought to be useful for improving CPR quality, but physiological monitoring cannot be performed rapidly or easily. Pocket LDF (JMS, Japan), a laser Doppler flowmetry (LDF) device, is currently used for non-invasive clinical assessment of the flow and tempo of the microcirculation. Microcirculatory monitoring might be useful for physiological monitoring during CPR, but this has not been investigated. We hypothesized that physiological monitoring of the microcirculation during CPR would reflect CPR quality.
Objectives: This pilot study investigated whether the microcirculation tempo is useful for physiological monitoring of the chest compression rate during CPR.
Methods: This observational study was conducted between September 2023 and February 2025. Patients with out-of-hospital cardiac arrest who arrived at the emergency department (ED) of Yamagata University Hospital, Japan, and whose microcirculation was measured using pocket LDF during CPR were included in this study. For monitoring, the LDF probe was placed on the patient's earlobe and used to measure the microcirculation tempo and flow every 1 s during CPR. The primary outcome was the percentage of 2 min average tempo values that were > 80/min, because high-quality CPR is considered to be achieved at a tempo of 100–120/min and chest compression fraction (CCF) of 60%–80%. The secondary outcome was the percentage of the tempo per second ≥ 100/min, as the CCF measured by LDF (CCFLDF), per case of cardiac arrest. Statistical analyses were performed using R version 4.4.0.
Results: Eighteen patients were included. The median age was 84.0 (interquartile range [IQR]: 67.8–87.8) years and 61.1% were male. The median (IQR) no-flow time was 9 (0–76) min, 50.0% had witnessed cardiac arrest, and the initial waveform was asystole in 55.6%, pulseless electrical activity in 33.3%, and ventricular fibrillation in 5.6%. Return of spontaneous circulation was achieved in the ED in 33.3% of patients. According to LDF, the median (IQR) mean tempo and flow were 97.7 (93.4–99.8)/min and 3.4 (2.2–9.7) mL/min, respectively. We obtained 91 records of the average tempo every 2 min, yielding a median of 98.3 (95.9–99.7)/min. The percentage of the average tempo > 80/min every 2 min was 95.6%. The median CCFLDF was 63.6% (52.9%–79.7%). The numbers of cases of CCFLDF > 80% or > 60% were 4 (20.0%) and 12 (60.0%), respectively.
Conclusions: The percentage of average tempo > 80/min every 2 min was 95.6%, indicative of high-quality CPR. On the other hand, few patients had CCFLDF > 60%. We consider that the tempo measured by LDF during CPR adequately reflects chest compression. Physiological monitoring of the microcirculation by LDF could guide the chest compression rate during CPR. However, the utility of CCFLDF remains unknown, and further studies are needed to determine the most appropriate analysis method and optimal cut-off values.

Reference

1. None

Topic: Cardiac arrest

000230

Correlation of pulse oximeter saturation measurements and smart wearable devices: a prospective observational study

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Introduction: Peripheral venous blood oxygen saturation (SpO2) and clinical status play crucial roles in the early detection of patients at risk of respiratory failure. Smart Wearable Devices can be designed to include SpO2 measurement capabilities (1). With sufficient sensitivity, these devices could help identify deterioration in a patient's condition and signal the need for escalation of care, such as hospitalisation, activating early warning systems (EWS), or admitting patients to the intensive care unit (ICU).
Objectives: To evaluate the accuracy of SpO2 measurements from smart wearable devices by comparing them to readings from a calibrated pulse oximeter in a paediatric ICU setting.
Methods: In a mixed paediatric ICU, the SpO2 levels of 30 paediatric patients were measured using a reference-calibrated pulse oximeter, the Masimo Rad-8 (MR8). Additionally, measurements were obtained with several smart wearable devices, specifically the Samsung Galaxy S7 (SGS7), Samsung Galaxy S8 (SGS8), and Honor Band 7 (HB7). Each device was used to conduct six measurements (three on each hand).
Results: Pearson's test revealed a strong positive correlation in all cases, ranging from 0.413 to 0.783 ($p < 0.001$ to $p < 0.023$) (see Fig. 1). A paired t-test showed mean differences of -0.2 to -1.4 ($p < 0.002$ to $p < 0.511$) (see Fig. 2). The Bland–Altman plots indicated the following mean differences (± standard deviation): MR8-**SGS7**: 1.08% ± 1.91; MR8-SGS8: 0.03% ± 1.19; MR8-HB7: 0.85% ± 2.25 (see Fig. 3).
Some comparisons indicate statistically significant differences in average measurements, with the highest difference of 1.4% exceeding the SpO2 measurement error of ± 1%. The latest SGS8 device met the targeted criteria, but due to the limited number of devices tested, it is unclear if this represents a coincidence or greater accuracy in newer

devices. Typically, smart wearables record lower values than calibrated devices, making them suitable for activating EWS.
Conclusions: The newest smart wearable device we tested provides accurate measurements aligned with calibrated equipment. However, it is noteworthy that all devices tend to report lower values. This heightened sensitivity can be leveraged in EWSs and aid in making timely decisions to escalate critical care.

	Pearson correlation coefficient	p-value
Left SGS7	0,620	**< 0,001**
Right SGS7	0,427	**0,019**
Left SGS8	0,766	**< 0,001**
Right SGS8	0,783	**< 0,001**
Left HB7	0,521	**0,003**
Right HB7	0,413	**0,023**

Samsung Galaxy S7 (SGS7), Samsung Galaxy S8 (SGS8), Honor Band 7 (HB7)

Fig. 1 (abstract 000230) Pearson correlation coefficient test

	MR8	Tested device	Difference	p-value
		SGS7		
Left	96,6 (1,9)	95,8 (2,1)	0,8 (1,8)	**0,020**
Right	96,8 (1,6)	95,4 (2,2)	1,4 (2,1)	**0,002**
		SGS8		
Left	96,6 (1,9)	96,8 (1,8)	-0,2 (1,3)	0,511
Right	96,8 (1,6)	96,5 (1,8)	0,2 (1,1)	0,290
		HB7		
Left	96,6 (1,9)	96,0 (2,1)	0,6 (1,9)	0,084
Right	96,8 (1,6)	95,7 (2,9)	1,1 (2,6)	**0,036**

Average (standard deviation), p-values < 0,05 are bold;
Samsung Galaxy S7 (SGS7), Samsung Galaxy S8 (SGS8), Honor Band 7 (HB7), Masimo Rad-8 (MR8)

Fig. 2 (abstract 000230) Paired t-test of measured differences

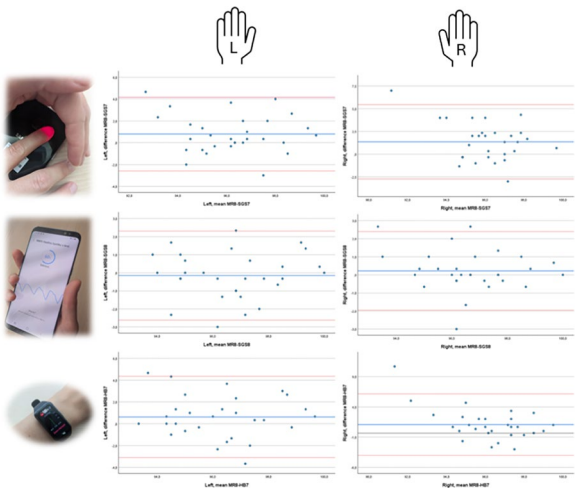


Fig. 3 (abstract 000230) Bland–Altman plots of measurements

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Topic: Acute respiratory failure and mechanical ventilation

000231

Influence of ventricular-arterial coupling on mortality measured by transpulmonary thermodilution

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***Intensive care Medicine Experimental 2025* 13(1):*000231*.**

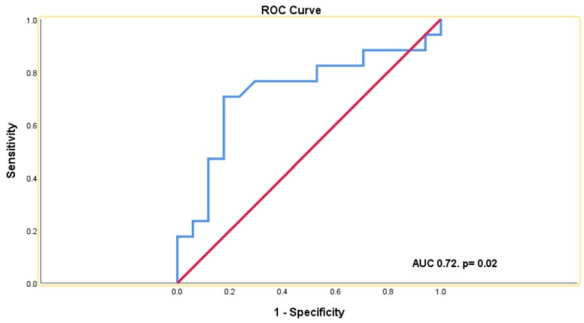
Introduction: Ventricular–arterial coupling (VAC) represents the interaction between ventricular contractility and the arterial load, serving as reflects cardiovascular performance and ventricular efficiency index. VAC uncoupling, a mismatch between contractility and afterload, has been previously described in septic shock patients.
Objectives: The aim of our work was to evaluate whether there is an the association between VAC and mortality in critically ill patients with sepsis, and to identify a VAC threshold measured by transpulmonary thermodilution (TPTD) that predicts increased mortality.
Methods: We conducted a prospective study was conducted in a 24- bed mixed intensive care unit ICU in Argentina. Adults patients with sepsis and cardiovascular dysfunction were included. VAC was calculated from the first TPTD measurement using the formulas: arterial elastance (Ea) = (MAP × 0.9) / SV and end-systolic elastance (Ees) = MAP /[(GEDVI/4) − SV]. Statistical analysis included Student's t-test or Mann–Whitney U test, as appropriate. Binary logistic regression identified independent predictors of mortality. Receiver operating characteristic (ROC) curve analysis was performed to determine the VAC threshold associated with increased mortality.
Results: We included 34 patients, 11 of whom were female. Mean age was 57 [40 – 68] (p = 0.53) Apache II and SOFA scores were 19 [13 – 27] and 8 [5 – 9]; (p = 0.02) (p = 0.53), respectively. Hemodynamic variables are shown in Table 1. ROC curve is shown in Table 2 AUC was 0.75. The cutt off VAC value that predicted higher mortality in this cohort was 1.27 (p = 0.02) with a sensitivity of 70% and specificity of 83%. It is important to note that these are preliminary Results:
Conclusions: In this cohort of septic patients VAC was independently associated with mortality. The cutt-off VAC value that predicted higher mortality in this cohort was 1.27 (p = 0.02) with a sensitivity of 70% and specificity of 83%

Table 1 (abstract 000231) Hemodynamic variables

	All (34)	Survivors(17)	Non survivors (17)	P
CO (L/min)	6.7 [3.8 - 9.4]	5.7 [4.8 - 8.05]	6.5 [3.85 – 7.05]	0.88
CI (L/min/m2)	3.1 [2.3 - 3.9]	3.0 [2.6 - 4.1]	3.1 [2.05 - 3.80]	0.39
SV (mL/lat)	57 [45 -75]	65 [48 - 100]	55 [40 - 65]	0.09
SBP (mmHg)	109 [89 - 123]	101 [88 - 125]	101 [88 - 125]	0.65
DBP (mmHg)	58 [51 -65]	56 [34 - 64]	59 [46 - 69]	0.41
MAP (mmHg)	70 [61 - 80]	75 [64 - 85]	70 [62 - 78]	0.30
HR (bpm)	108 [93-128]	97 [81 - 115]	97 [81- 115]	0.03
GEDVI(mL/m²)	571 [429 -661]	556 [415 - 649]	546 [414 - 669]	0.55
GEF (%)	21 [17 -26]	23 [20 -28]	23 [20 - 28]	0.70
ELWI (mL/m²)	10 [8 -12]	9.3[6.65 -10.4]	9.3 [6.6 - 10]	0.06
IPVP	2.3 [1.30 - 2.80]	2.3 [1.9 - 2.6]	2.6 [2.0 - 3.4]	0.03
IRVSI (dines-s-m²/cm²)	1604 [1267- 2494]	1668 [1348 - 2320]	1222 [883 - 1447]	0.98
Ea (mmHg mL−1)	1.58 [1.24 - 2.16]	1.48 [1.23 - 1.95]	1.72 [1.24- 2.69]	0.58
Ees (mmHg mL−1)	1.34 [1.08 - 1.66]	1.58 [1.24 - 1.75]	1.23 [0.79 - 1.52]	0.04
VAC	1.16 [0.88 - 2.04]	1.33 [1.03 - 1.80]	1.72 [1.06 - 2.51]	0.02
CVP(mmHg)	12 [8 - 15]	11 [7.5 - 15]	14 [8 - 17]	0.35
VVS	11[6 - 14]	7 [4 - 14]	12 [7 - 14]	0.03
Fluid Balance (mL)	2590 [00 - 5625]	800 [0 - 4900]	3550 [1150 - 6650]	0.06
Norepinephrine(mcg/kg/min)	0.44 [0.22 - 0.66]	0.31 [0.17 - 0.53]	0.60 [0.31 - 0.69]	0.03
Vasopressin (U/min)	00 [00 - 0.05]	00 [00 - 0.04]	00 [0.02 - 0.05]	0.41

Table 2 (abstract 000231) Multivariate analysis with mortality as outcome

	HR	IC	P
VAC	3.09	1.01 - 9-51.	0.04
Apache II	1.12	1.02 - 1.26	0.03



ROC curve showing the ability of VAC to predict mortality.

Topic: Cardiovascular issues in ICU

000232

Introduction of a decision aid algorithm to rationalise blood gas analysis

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Introduction: Blood gas analysis, particularly arterial blood, is one of the most used tests in critical care.(1) However, it is often lacks a clear indication and over 30% are performed unnecessarily.(2) The over-use of blood gas sampling is financially and environmentally costly, contributing to intensive care beds being responsible for three times the greenhouse gas emissions of a standard inpatient bed.(3) It is also a time-consuming burden on staff.
Objectives: A decision-aid algorithm was introduced across three intensive care units in a UK centre, with the aim of reducing the number of blood gas samples taken by 10–20%.
Methods: The blood gas analysis decision aid tool (from North Shore Hospital, Australia) (2) was introduced with an education campaign.
Data were collected on the number of patient samples analysed on point-of-care testing machines over the preceding year and savings predicted. An interim analysis was carried out 8 weeks after the intervention, then re-audited a further 6 months later.
Staff time savings were based on the average of time from decision to take a blood gas sample to test resulted.
Environmental savings were calculated using input–output emissions based on UK government databases (4,5).
Intermittent spot audits with mini educational interventions collected qualitative data and increased awareness.
Results: The total number of blood gas analyses reduced from average of 2274 to 1933 per week (14.98%) at interim analysis, then further to 1836 per week (19.25%) over 6 months. Figure 1 shows this and per each intensive care unit, with the greatest reduction (31.1%) in General ICU and High-dependency.
In total, this is estimated to be savings of £46,563.00 and environmentally 52.587 tonnes CO_2e per year.
It equates to 2190 min (36.5 h) of nursing time per week saved. Spot audits collected staff experience data and showed 100% of nurses surveyed were aware of the decision aid. It was on display at 81% of bed spaces.
However, spot audits also showed 18.6% of blood gas analyses had no clear indication as per the algorithm and 4.7% were performed on "wardable" patients.
Conclusions: The introduction of a decision aid tool has successfully rationalised blood gas sampling, leading to a reduction in samples taken, financial and environmental savings. It has also freed up staff time, to divert to other activities of patient care. The target of 20% reduction has been safely achieved.
This success has been limited in specialist units, especially Neuro-ICU, likely due to the need for tight electrolyte monitoring.
Data limitations include the seasonal variance in bed occupancy and acuity, and the samples run on our point-of-care analysers from neighbouring non-critical care wards.
The qualitative data highlight the challenges of changing mind-set and identified areas to target.
In summary, the introduction of a decision aid tool has rationalised blood gas analysis, leading to a reduction of unnecessary sampling, financial and environmental savings, without compromising patient safety.

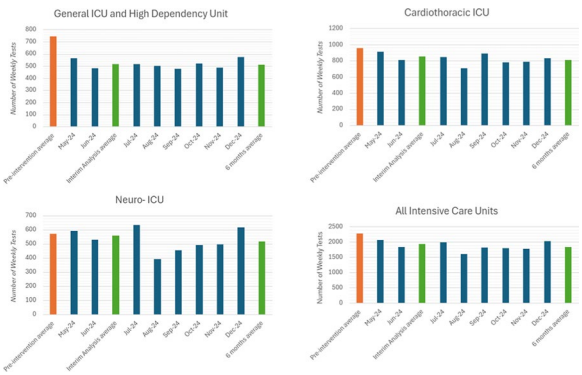


Fig. 1 (abstract 000232) Bar charts showing the average number of weekly point-of-care blood gas analyses before, 8 weeks after and a further 6 months after the introduction of the decision aid tool; separately in each unit and as a total across all intensive care units

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Topic: Health Services Research and Outcome

000237

Effect of high protein diet on weaning from mechanical ventilation in critically ill patients

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Introduction: An imbalance among intake and needs, the effects of catabolic hormones, and physical immobilization are the main causes of malnutrition and muscle atrophy throughout intensive care unit stays. (1).
The body's greatest protein pool is found in muscle. Significant proteolysis and muscle loss (up to 1 kg a day) are linked to critical illness and are linked to acquired weakness in the intensive care unit (3). Muscle wasting is more severe in individuals with multiple organ failure than in those with single organ failure, and it happens early and quickly in the 1st week of critical illness (3). Although there is little evidence to support these recommendations, current guidelines suggest that critically sick studied cases should consume more protein (1.2–2.0 g/kg/d) than the healthy, who should consume 0.80 g/kg/d. It is suggested that protein intake must be greater than 2.0 g/kg/d when 24-h nitrogen balances are utilized as an objective (4). Protein is the most crucial macronutrient for critically ill studied cases because it enhances immunological response, aids in the maintenance of lean body mass, and promotes recovery. There is mounting evidence that consuming enough protein may be more crucial for the body than consuming enough calories (5).
Several studies recommend using a method to evaluate malnutrition in the intensive care unit. Due to the rapid withering of lean tissues and fluid administration, it is challenging to assess weight changes in the intensive care unit. Sarcopenia and muscle loss must be identified in the intensive care unit. Unfortunately, sarcopenia and malnutrition cannot be accurately reflected by body mass index or real body weight (2).
Throughout an ICU stay, significant amounts of fat and lean body mass may be lost in a comparatively short period of time. Although there is no recognized method, lean body mass can be assessed using stable isotopes, bioelectric impedance, ultrasound, or computerized tomography scans (2). In critical care settings, ultrasonography provides a noninvasive, portable, affordable, and bedside tool for assessing muscle mass (6,7). When compared to previous tests used to evaluate muscular features, it has a number of advantages and enables a rapid screening of broad muscle sections at the patient's bedside (6).
Diaphragmatic dysfunction can be accurately and usefully diagnosed by diaphragmatic ultrasound. Additionally, a thickening proportion of thirty-to-thirty six percent enables both morphologic and functional examination of the muscle (1).
Objectives: To illustrate how a diet rich in protein affects: diaphragmatic thickness and diaphragmatic excursion by using ultrasound and its reflection on weaning from mechanical ventilation and mortality.
Methods: 60 patients in critical condition were involved in this single-center, randomized controlled research. Group I consisted of studied cases who were given a high-protein diet (2.0 g/kg/d) for seven days, whereas Group II consisted of studied cases who were given a standard-protein diet (1.2 g/kg/d) using enteral formula. Patients were recruited and assessed for eligibility from the intensive care units in Alexandria Main University Hospital.
Results: There had been a statistically significant increase in diaphragmatic thickness with inspiration, diaphragmatic thickening Fraction and diaphragmatic excursion between studied cases in group I compared with group II at day 3 and day 7. Meanwhile, there had been no significant difference between the studied groups at day0. There had been a statistically significant reduction in the number of studied cases weaned from mechanical ventilation among patients in group II compared with group I, and group II exposed higher mortality rate within 28 days.

Conclusions:
Patients with standard protein diet showed low diaphragmatic thickness with inspiration and low diaphragmatic thickening fraction and low diaphragmatic excursion compared to patients received high protein diet especially after 7 days. So, weaning from mechanical ventilation was higher among studied cases received high protein diet, but mortality rate throughout ICU stay was higher among patients with standard protein diet.



Fig. 1 (abstract 000237) view of the right subcostal region in B mode and M mode to measure diaphragmatic excursion

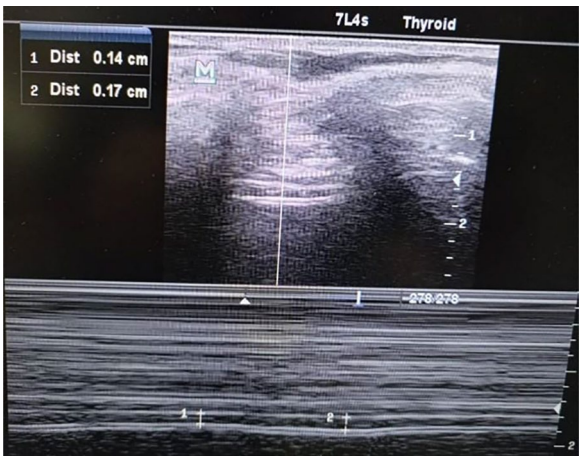


Fig. 2 (abstract 000237) Diaphragmatic thickness is measured by diaphragmatic ultrasound in B-mode and M-mode at the zone of apposition. End-expiration thickness is 1, while end-inspiration thickness is 2.

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8. I would like to extend my deepest gratitude to all those who have supported and guided me throughout the completion of this university project. I am profoundly grateful to professor doctor(Tayseer mahmoud zaytoun)]/professor doctor(dina zidan)/doctor(mohamed elsalamony), my project advisors, for his/her invaluable guidance, insightful feedback, and unwavering support.

Topic: Metabolism, endocrinology, liver failure and nutrition

000238

Determinants of ICU memory formation and the impact on long-term post-traumatic stress: a multicenter longitudinal cohort study

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Intensive care Medicine Experimental 2025* 13(1)*:000238.

Introduction: Patients admitted to an intensive care unit (ICU) can experience a wide array of recollections during recovery, ranging from complete amnesia to vivid delusional memories, with the latter being linked to poor short-term psychological outcomes [1, 2]. However, it is unclear which demographic and clinical determinants shape ICU memory formation and how different memory types contribute to long-term psychological distress.
Objectives: To identify determinants of ICU memory formation and the relationship between memory types and long-term symptoms of post-traumatic stress disorder (PTSD).
Methods: Adult patients from two Dutch University ICUs underwent a structured telephone interview using the ICU-Memory Tool (ICU-MT) three months after ICU discharge. Memories were categorized in three types: complete ICU amnesia, factual memories without delusions, and delusional memories. Symptoms of PTSD were assessed using the Impact of Event Scale (IES-6) at 3 and 12 months post-ICU. Determinants of ICU memory formation were identified in a multinomial logistic regression model. The impact of different memories on long-term PTSD symptoms was assessed in a linear mixed-effects model, using mean IES score as the outcome, adjusted for relevant covariates.
Results: Of the 428 included patients, 13.8% (n = 59) had complete amnesia for the ICU stay. Factual memories without delusions were reported by 47.4% (n = 203), while 38.8% (n = 166) experienced delusional memories, of whom 93.3% (n = 155) also had factual memories. ICU delirium was present in 41% of patients with delusional memories. Days with deep sedation and female sex were associated with amnesia for the ICU stay (adjusted odds ratio (aOR), 1.34, 95%CI 1.09 – 1.65 and aOR 2.01, 95%CI 1.05 – 3.83, respectively, Fig. 1), whereas presence of delirium and length of ICU stay were associated with delusional memories (aOR 1.94, 95%CI 1.04 – 3.61 and aOR 1.11, 95%CI 1.02 – 1.21, respectively, Fig. 1). Prevalence of PTSD symptoms increased significantly from 3 months to 1 year post-ICU in those with delusional memories (6.7% to 17.8%, p < 0.01, Fig. 2), while remaining stable in the other memory groups. Adjusted analyses revealed delusional memories as well as female sex as risk factors for long-term symptoms of PTSD (adjusted relative increase 13%, 95%CI 4.2% – 22%, and 8.9%, 95%CI 1.8% – 17%, respectively, Fig. 3).
Conclusions: Delusional memories occurred in over one third of ICU survivors, also in the absence of delirium. Delirium and more days in the ICU increased the likelihood of delusional memories, whereas deep sedation and female sex were associated with ICU amnesia. Both delusional memories and female sex contributed to the development and persistence of PTSD symptoms in the long term. These findings underscore the need for targeted interventions to mitigate memory disturbances and their psychological consequences, both during and after ICU admission.

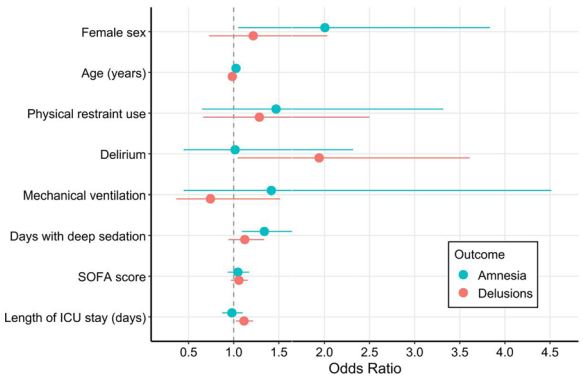


Fig. 1 (abstract 000238) Multinomial logistic model to identify determinants of ICU memory types. *The reference group is factual memories. Horizontal coloured lines represent 95% confidence intervals.*

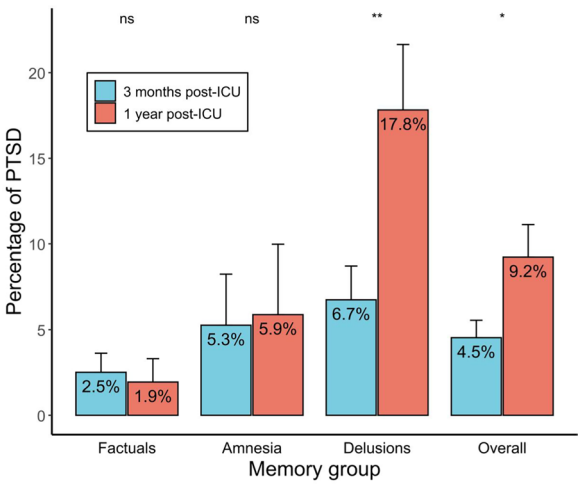


Fig. 2 (abstract 000238) Prevalence of PTSD symptoms per time-point and memory group. ** p < 0.05; ** p < 0.01. A mean IES-6 score of > = 1.75 was used as a cut-off to determine presence of PTSD symptoms [3].*

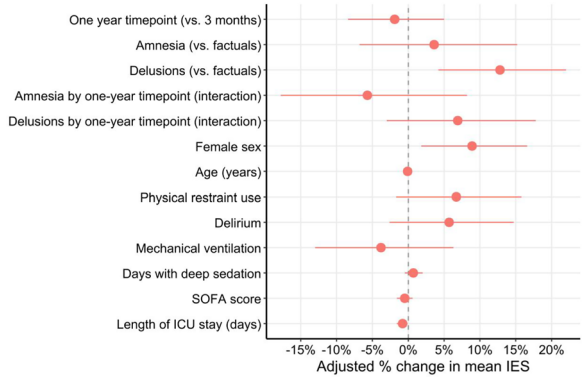


Fig. 3 (abstract 000238) The impact of different ICU memories on long-term PTSD symptoms (linear mixed-effects model). *The outcome variable mean IES-6 score was log-transformed to normalize the residuals. To enhance interpretability, estimates were exponentiated, allowing for the coefficients to be interpreted as % change per one-unit increase in the independent variable. Horizontal coloured lines represent 95% confidence intervals.*

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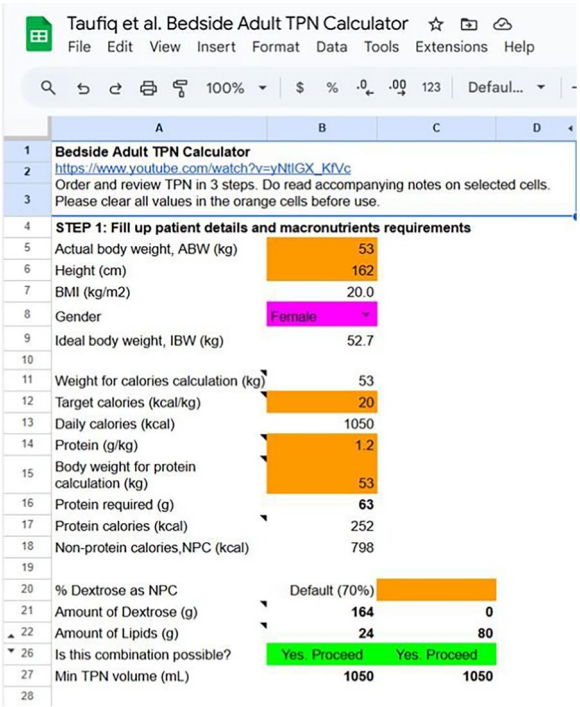
Topic: Sedation, analgesia and delirium

000239

User perceptions and time savings with a TPN calculator: a pilot survey among ICU clinicians

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Intensive care Medicine Experimental 2025* 13(1):*000239.

Introduction: Prescribing total parenteral nutrition (TPN) is a detailed task that involves clinicians calculating patient-specific factors, nutritional elements, and dosage limits to meet individual needs while ensuring the stability of the TPN mixture. To support clinicians in this process, a web-based TPN calculator was created to improve the accuracy and efficiency of TPN order prescriptions. This study aims to outline the features of the TPN calculator and evaluate the usability, and impact of the calculator on productivity, collaboration, and decision-making in a professional context.
Methods: A TPN calculator was created using Google Sheets and shared with clinicians in the surgical intensive care unit at Tan Tock Seng Hospital. This tool utilized numerical formulas to perform multi-step calculations, determining the necessary macro- and micronutrient values for TPN prescriptions based on patient-specific inputs. A YouTube instructional video link was included to assist prescribers in navigating the calculator. To evaluate its effectiveness, a pilot survey was conducted, featuring 10 Likert-scale questions from the System Usability Scale (SUS) alongside qualitative feedback prompts, focusing on usability and the tool's influence on productivity, collaboration, and decision-making. Typically, an average SUS score of 70 or higher reflects a strong level of usability.
Results: Six clinicians who used the TPN calculator—comprising three medical doctors and three pharmacists—participated in a survey. These users had a median age of 31 years and professional experience ranging from 4 to 9 years. The pilot survey revealed a strong usability rating, with a median SUS score of 77.5 (70–90). Feedback highlighted the calculator's efficiency and ease of use, noting that it boosted confidence in the accuracy of TPN prescriptions. Additionally, it enhanced focus on tasks, improved team collaboration, minimized repetitive clarifications in the clinical decision-making process, and proved reliable. Users also reported a median time savings of 10 min per TPN prescription.
Conclusions: The TPN calculator exhibited strong usability and serves as a valuable tool for clinicians, enhancing accuracy, efficiency, and productivity in crafting TPN prescriptions within the ICU.



Screenshot of calculator showing Step 1. Users to fill up orange shaded fields.

29	**STEP 2: Final Order Form** (select values from above)			
30	Amino Acids (g)	65	Na (mmol)	50
31	Dextrose (g)	165	K (mmol)	50
32	Lipids (g)	25	Ca (mmol)	5
33			Mg (mmol)	5
34	Total Volume (mL)	1100	Phosphate (mmol)	10
35	Total Calories (kcal)	1071	Cl/Acetate ratio	
36	Non-Protein Calories (kcal)	811	Chloride	1
37	Infusion Rate (mL/hr)	45.8	Acetate	1
38				
39	**STEP 3: Check if ordered values are within limits**			
40	kcal/kg (ABW, IBW if obese)	20.4		
41	Dextrose by % NPC	69%		
42	Stability of TPN	Min	Ordered	Max
43	Amino Acids (g)	27.5	65	66
44	Dextrose (g)	77	165	330
45	Lipids (g)	22	25	66
46	Amount of divalent cations (mmol)		10	11
47	Amount of monovalent cations (mmol)		100	220
48	Calcium phosphate solubility product		41.32231405	70
49	Min Phosphate rqd (mmol/day)	1.88	10	
50	Lipid (g)		25	131.25
51	Glucose oxidation rate (mg/kg/min)		2.18	5
52	Estimated final osmolarity (mOsm/l	1497.08	Must be given via central line	
53				
54	End of calculations. Please click here to complete a survey.			
55	This calculator does not and cannot replace clinical judgement of the healthcare			
56	professionals in your institution.			

Screenshot of calculator showing Steps 2 and 3. Stability checks done and osmolarity value is calculated to determine if TPN must be administered via central line.

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Topic: Information systems and Data Science

000240

Effect of lung volume preservation during weaning from mechanical ventilation on successful extubation: a multicenter randomized clinical trial

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***Intensive care Medicine Experimental 2025* 13(1):*000240*.**

Introduction:
A spontaneous breathing trial (SBT) using pressure support ventilation (PSV) appears to be the strategy associated with the best clinical outcomes. However, the role of positive end-expiratory pressure (PEEP) during SBT remains unclear. Strategies such as reconnecting the patient to the ventilator after SBT or extubation with positive pressure may help prevent lung collapse during SBT and extubation. We hypothesized that a weaning strategy designed to prevent lung collapse during both SBT and extubation could result in higher successful extubation rates.

Objectives: Primary objective: To evaluate whether a lung volume preservation strategy during weaning increases the rate of successful extubation at 72 h compared to a standard weaning strategy.
Secondary objectives: To compare the extubation rates immediately after the SBT between both strategies. To assess the respiratory failure and reintubation rates within 72 h post-extubation. To evaluate the impact of each strategy on ICU mortality and hospital mortality.
Methods: Multicenter randomized clinical trial conducted in 30 Spanish ICUs. Patients meeting weaning criteria were randomized to either: 1. Lung volume preservation weaning strategy: SBT for 30 min with PSV 8 cmH_2O, PEEP 5 cmH_2O, and extubation maintaining PEEP; or 2. Standard weaning strategy: SBT for 30 min with PSV 8 cmH_2O, ZEEP, and extubation with continuous suction.
Results: A total of 1,692 patients were included, with a median age of 65 years (IQR 55–73) and a median duration of mechanical ventilation of 6 days (IQR 3–9); 639 (38%) were women.
A total of 840 patients were randomized to the standard strategy and 852 to the lung volume preservation strategy. After the SBT, 777 patients (92%) in the standard group and 809 patients (95%) in the lung volume preservation group were extubated ($p = 0.03$). Reintubation within 72 h was required in 101 patients (13%) from the standard group versus 129 patients (16%) from the lung volume preservation group ($p = 0.09$). Consequently, successful extubation at 72 h was achieved in 676 patients (81%) in the standard group and 680 patients (80%) in the lung volume preservation group ($p = 0.73$). ICU mortality occurred in 67 patients (8%) in the standard group and 45 patients (5%) in the lung volume preservation group ($p = 0.02$), while hospital mortality was 98 patients (12%) in the standard group and 90 patients (10%) in the lung volume preservation group ($p = 0.14$).
Conclusions: A lung volume preservation strategy for weaning from mechanical ventilation did not result in higher rates of successful extubation at 72 h compared to a standard weaning strategy. A higher percentage of patients were extubated following an SBT with PEEP compared to an SBT without PEEP. Reintubation rates were slightly higher with the lung volume preservation strategy, though the difference was not statistically significant. ICU mortality was higher in patients undergoing the standard strategy, but there were no differences in hospital mortality.

Table 1 (abstract 000240) Primary and secondary outcomes

	Total (n= 1692)	Standard group (n= 840)	Lung volume preservation group (n = 852)	p-value
Primary outcome:				
- Successful extubation at 72 h; n (%)	1356 (80)	676 (81)	680 (80)	0.73
Secondary outcomes:				
- Extubated after SBT; n (%)	1586 (94)	777 (92)	809 (95)	0.03
- Respiratory failure at 72h; n (%)	326 (21)	148 (19)	178 (22)	0.14
- Reintubation rate at 72 h; n(%)	230 (15)	101 (13)	129 (16)	0.09
ICU Mortality; n (%)	112 (7)	67 (8)	45 (5)	0.02
Hospital mortality; n (%)	188 (11)	98 (12)	90 (10)	0.14

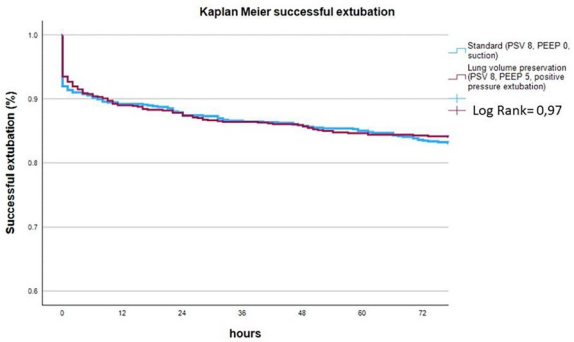


Fig. 1 (abstract 000240) Kaplan–Meier curve for successful extubation

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Topic: Acute respiratory failure and mechanical ventilation

000241

Reducing mortality in cardiopathic ICU patients through an adapted early sepsis recognition protocol

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Intensive care Medicine Experimental 2025* 13(1)*:000241.

Introduction: Sepsis remains one of the leading causes of hospital mortality, particularly among patients with severe comorbidities. In cardiology hospitals, delayed recognition of sepsis in cardiopathic patients contributes significantly to adverse outcomes, due to the clinical complexity of this population. The absence of specific protocols for these patients frequently hampers timely diagnosis.
Objectives: To evaluate the impact of implementing a sepsis protocol adapted for early recognition in critically ill cardiopathic patients in a cardiology hospital, focusing on its effect on mortality reduction.
Methods: This was an observational study, both retrospective and prospective, conducted at a specialised cardiology hospital between January 2023 and December 2024. An adapted sepsis protocol was introduced, incorporating clinical and laboratory criteria tailored to the cardiology setting. A multidisciplinary team received structured training aimed at enhancing early recognition. Clinical indicators and outcomes were compared before and after implementation. The primary outcome was in-hospital mortality. Inclusion criteria encompassed patients aged 18 or older with a confirmed diagnosis of severe heart disease and sepsis.
Results: A total of 312 patients were assessed prior to protocol implementation and 329 afterwards. Early recognition of sepsis within the first six hours improved significantly (from 41 to 76%, $p < 0.001$). Prompt initiation of appropriate antibiotic therapy increased from 47 to 82% ($p < 0.001$). Hospital mortality showed a significant decrease from 38 to 24% ($p = 0.004$). The mean length of stay in the intensive care unit was reduced from 9.2 to 6.7 days ($p = 0.02$).
Conclusions: The implementation of an adapted sepsis protocol for critically ill cardiopathic patients led to earlier recognition, improved therapeutic response, and a statistically significant reduction in hospital mortality. These findings underscore the importance of developing patient-specific strategies in complex clinical settings and reinforce the value of tailoring institutional sepsis protocols.

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Topic: Sepsis

000243

Descriptive analysis of advanced neuromonitoring in patients admitted for aneurysmal subarachnoid hemorrhage (aSAH)

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Intensive care Medicine Experimental 2025* 13(1)*:000243.

Introduction: Aneurysmal subarachnoid hemorrhage (aSAH) is associated with high morbidity and mortality rates. Functional prognosis depends not only on the primary injury, but also on the secondary brain damage. Multimodal neuromonitoring can help prevent the secondary damage. In this study, we aim to analyze if there are differences in outcomes within our sample based on the type of advanced neuromonitoring used.
Objectives: To describe the characteristics and outcomes of patients admitted to critical care units with aSAH who require advanced neuromonitoring with an intracranial pressure (ICP) sensor or with an ICP and a brain tissue oxygen pressure (PbtO2) sensor. To analyze outcomes in terms of complications, mortality and hospital length of stay among patients with different types of advanced monitoring.
Methods: A retrospective observational study was conducted on patients admitted for aSAH to the critical care units of a tertiary hospital from March 2018 to December 2024. Demographic, clinical and mortality variables, as well as neuromonitoring data, were collected. In this sample, **vasospasm** was diagnosed by angiography and **delayed**

cerebral ischemia (DCI) was defined as the appearance of new focal deficits or a decrease of two points on the Glasgow Coma Scale for more than 1 h. **Cerebral infarction** was identified as the ischemic lesion detected by computed tomography or magnetic resonance imaging. Patients were classified according to neuromonitoring type: **group 1** (monitored with ICP) and **group 2** (monitored with both ICP and PbtO2). Results are expressed as numbers and percentages or as median and interquartile range (IQR), as appropriate.

Results: A total of 128 patients diagnosed with aSAH were included, with a median age of 61.7 years, 71.1% (n = 91) women. Of these, 44 patients did not undergo neuromonitoring with ICP or PbtO2, either due to the possibility of clinical evaluation (n = 31) or poor short-term vital prognosis (n = 13). The remaining 84 patients required neuromonitoring and were classified into Group 1 (n = 68) and Group 2 (n = 16). Both groups were homogeneous in terms of median age, gender distribution, and prognostic neurological scales. Although the incidence of rebleeding and intracranial hypertension was similar between the two groups, Group 2 had a higher incidence of vasospasm, DCI and cerebral infarction. The length of stay in both the critical care unit and the hospital was longer in Group 2. The results are detailed in Table 1.

Conclusions: In our sample, most patients with aSAH required advanced neuromonitoring. Patients monitored with both ICP and PbtO2 had a significantly higher incidence of cerebral infarction and a longer stay in critical care units, as well as a higher percentage of vasospasm and DCI, although the latter were not statistically significant. A larger sample size for Group 2 is needed to assess these differences.

Table 1 (abstract 000243) Results of Group 1 and Group 2

	Group 1. ICP (n 68)	Group 2. ICP+PbtO$_2$ (n 16)	p
Median age [IQR]	60,1 [50,7-70,2]	59,4 [50,9-67,8]	p 0,90
Women, n (%)	50 (73,5)	12 (75)	p 0,90
WFNS, n (%)			p 0,34
• 1	3 (4,4)	1 (6,2)	
• 2	3 (4,5)	2 (12,5)	
• 3	6 (8,8)	1 (6,2)	
• 4	27 (39,7)	7 (43,8)	
• 5	29 (42,6)	5 (31,3)	
Fisher scale, n (%)			p 0,10
• I	0 (0)	0 (0)	
• II	0 (0)	1 (6,2)	
• III	2 (2,9)	1 (6,3)	
• IV	66 (97,1)	14 (87,5)	
Neurological complications, n (%)			
• Rebleeding	10 (14,7)	2 (12,5)	p 0,82
• Vasospasm	40 (58,8)	12 (75)	p 0,23
• DCI	23 (33,8)	8 (50)	p 0,23
• Cerebral infarction	27 (39,7)	12 (75)	p 0,01
• Hydrocephalus	56 (82,4)	11 (68,8)	p 0,22
• Intracranial hypertension	57 (83,8)	13 (81,3)	p 0,80
mRs at discharge, median [IQR]	4 [3-6]	4 [3,25-5,75]	p 0,99
• 0	1	1	
• 1	6	0	
• 2	9	0	
• 3	3	3	
• 4	20	6	
• 5	8	2	
• 6	21	4	
Mortality, n (%)	22 (32,4)	5 (31,3)	p 0,93
Critical care units stay (days), median [IQR]	13,5 [6,3-20,8]	21,7 [15,0-27,8]	p <0,01
Hospital stay (days), median [IQR]	25,0 [13,5-39,5]	34,7 [15,9-47,8]	p 0,25

IQR: Interquartile Range; WFNS: World Federation of Neurosurgical Societies; DCI: Delayed Cerebral Ischemia; mRS: Modified Rankin Score.

Reference

1. To our unit and Mr. Gich, statistician.

Topic: Neurointensive care

000245

Predicting intensive care unit readmissions, death or code blue events after discharge from intensive care

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Intensive care Medicine Experimental 2025* 13(1):*000245.

Introduction: Unplanned intensive care unit (ICU) readmissions, deaths, and medical emergencies following ICU discharge are significant adverse events that impact patient outcomes and healthcare resources. The decision to discharge patients from ICU is a complex clinical judgement that could benefit from additional decision support tools. Early recognition of at-risk patients using data-driven approaches could support clinicians' discharge decisions.

Objectives: This study aimed to develop a clinical decision support tool to predict ICU readmission, death, or code blue events as a multiclass outcome post-ICU discharge (within 48 h, after 48 h, or neither). We sought to: (1) leverage deep learning based on transformer architectures to process temporal clinical data; (2) compare deep learning against traditional machine learning approaches; and (3) identify key predictors of adverse events.

Methods: We conducted a retrospective analysis of adult patients transferred out from ICUs in Tan Tock Seng Hospital and National Centre for Infectious Diseases between August 2022 and July 2024. Patients were excluded if they: (1) died during their ICU stay, (2) were transferred to another hospital, (3) were under Palliative Medicine care, or (4) had Do Not Resuscitate or Comfort Care Only orders. For the remaining 3,210 ICU episodes, we extracted demographics, clinical attributes, and temporal physiological data.

For the machine learning approach, data were split into development (80%) and test (20%) sets, with nested tenfold cross-validation for hyperparameter tuning and model selection. SHapley Additive exPlanations (SHAP) analysis was conducted for feature importance.

For the deep learning approach using the Self-Supervised Transformer for Sparse and Irregularly Sampled Multivariate Clinical Time-Series (STraTS) model [1], data were split into training (60%), development (10%), validation (10%), and test (20%) sets. The test set was common across both approaches to evaluate model performance using macro-averaged F1 score.

Results: Of the 3,210 ICU episodes analysed, 5.6% experienced adverse events within 48 h, 11.6% after 48 h, and 82.8% had no events post-ICU discharge. Among traditional machine learning approaches, Random Forest achieved the best performance with a macro-averaged F1 score of 0.44 on the test set. The STraTS model demonstrated superior performance with a F1 score of 0.55. SHAP analysis identified current and cumulative ICU length of stay, oxygen device at ICU discharge, and latest laboratory values (urea, creatinine, haemoglobin) as the strongest predictors of post-ICU adverse events.

Conclusions: The transformer-based STraTS model outperformed traditional machine learning approaches in predicting post-ICU adverse events by effectively capturing complex temporal patterns in physiological data. This tool could provide objective decision support for ICU discharge planning and guide appropriate monitoring strategies for high-risk patients.

Topic: Information systems and Data Science

000246

MIRACLE2 versus other cardiac arrest scores, and traditional severity scores to predict neurological consequence and hospital mortality: ten-year analysis in patients with out-of-hospital cardiac arrest

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***Intensive care Medicine Experimental 2025* 13(1):*000246*.**

Introduction: The MIRACLE2 is a practical score with seven parameters accurately predicting neurological outcomes in out-of-hospital cardiac arrest (OHCA). Its effectiveness is comparable to cardiac arrest scores like the Cardiac Arrest Hospital Prognosis (CAHP) and Target Temperature Management (TTM) scores. Nonetheless, data on the performance of these specific scores in OHCA is limited compared to traditional severity scores such as Acute Physiology and Chronic Health Evaluation (APACHE) and Simplified Acute Physiology Score (SAPS), which require multiple variables.
Objectives: This study aims to comprehensively assess the efficacy of MIRACLE2, CAHP, and TTM with APACHE II, SAPS II, and SAPS-3 scores to predict neurological outcomes and hospital mortality in patients with OHCA from cardiac cause with return of spontaneous circulation (ROSC).
Methods: A retrospective study was conducted in a tertiary care hospital from 2015 to 2024. The primary outcome was the poor neurological outcome, defined by Cerebral Performance Category (CPC) 3–5 at hospital discharge. The secondary outcome was hospital mortality.
Results: A total of 158 cases were included. Hospital mortality was 53.2%. The unfavorable neurological outcome was 73.4%. The patients' good and poor neurological outcomes did not differ significantly according to gender, witness arrest, and bystander CPR. Acute myocardial infarction was the most common cause of cardiac arrest, and revascularization was not different between groups (69% and 73.3%). The patients in this study received veno-arterial extracorporeal membrane oxygenation (VA-ECMO) 6.3% and targeted temperature management (TTM) 50%. VA-ECMO and TTM were not performed differently in each group. Whereas, the parameters included the specific cardiac arrest score, such as age, initial shockable rhythm, cardiac arrest at home, no-flow time, low flow time, adrenaline dose before ROSC, reactive pupil at ROSC, GCS M1 at ROSC, and admission pH less than 7.2, which were significantly different between groups. The poor outcome substantially increased in patients with higher scores. The MIRACLE2, CAHP, TTM, APACHE II, SAPS II, and SAPS-3 scores presented an area under the receiver operating characteristic curve (AUROC) of more than 0.8 to predict poor neurological outcomes (Fig. 1). These results were in line with mortality prediction (Fig. 2). The TTM score revealed the highest AUROC of 0.899 and 0.854 to predict unfavorable neurological consequences and mortality, respectively. There was no significant difference in the ability of each cardiac arrest score to indicate a poor neurological outcome. However, the TTM score significantly outperforms APACHE II, SAPS II, and SAPS-3 in predicting unfavorable neurological outcomes, with p-value < 0.001. The AUROC and optimum cut-off point for each score to predict poor neurological outcomes were presented in Table 1.

Table 1 (abstract 000246) The performance of each score to predict poor neurological outcome

Score	AUROC (95%CI)	Cut-off point	Sensitivity (%)	Specificity (%)
MIRACLE2	0.832 (0.769–0.895)	5	69.0	90.5
CAHP	0.869 (0.808–0.930)	188	74.1	85.7
TTM	0.899 (0.852–0.946)	15	81.0	88.1
APACHE II	0.823 (0.750–0.896)	30	80.2	69.0
SAPS II	0.865 (0.799–0.931)	54	83.6	78.6
SAPS-3	0.837 (0.772–0.902)	66	75.0	83.3

Conclusions: The MIRACLE2, CAHP, and TTM scores can be used as part of patient assessment in the post-arrest state to identify unfavorable neurological consequences and mortality in OHCA. The TTM score could be considered because it is the most effective and is significantly superior to traditional severity scores.

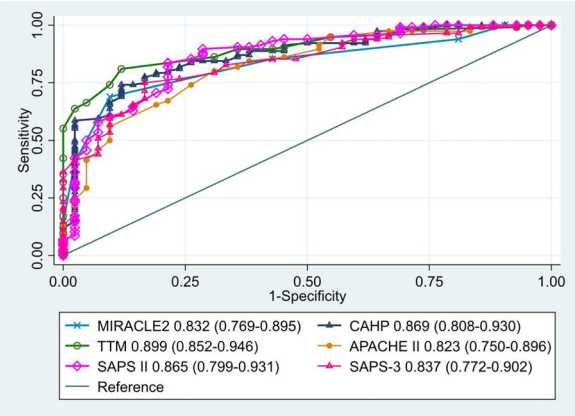


Fig. 1 (abstract 000246) Each score to predict neurological outcome in patients with OHCA from cardiac cause

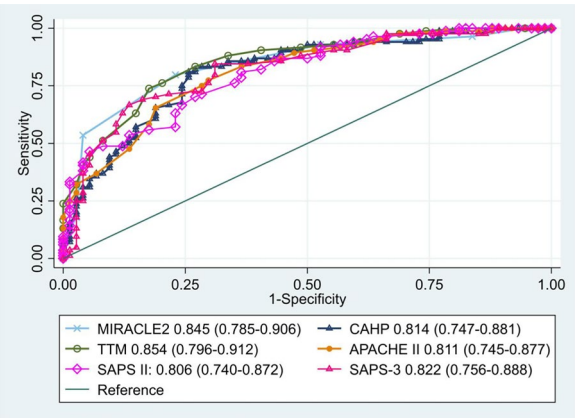


Fig. 2 (abstract 000246) Each score to predict hospital mortality in patients with OHCA from cardiac cause

Topic: Cardiac arrest

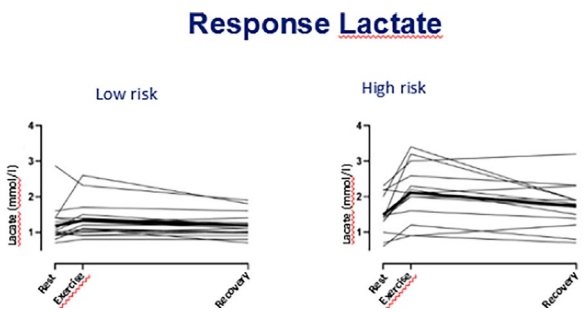
000247

Novel approach to assess metabolic load during ICU rehabilitation: evaluation of lactate response

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***Intensive care Medicine Experimental 2025* 13(1):*000247*.**

Introduction: Early rehabilitation is advocated for ICU patients but clinical guidelines to guide exercise intensity are lacking. 1,2 Due

to low muscle strength and exercise capacity related to ICU-AW and mitochondria dysfunction, overexertion is a serious risk for this vulnerable population.1–5 To avoid overexertion, information on the metabolic load of rehabilitation interventions is warranted.2,6,7
Recent work in COVID-19 patients demonstrated high blood lactate levels at low exercise intensities, indicating a high metabolic load and mitochondrial dysfunction.8 Blood lactate levels may be a promising marker for assessing metabolic load during ICU rehabilitation.
Objectives: To investigate changes in blood lactate levels during active rehabilitation interventions in ICU patients.
Methods: This single-center observational cohort study was conducted in the ICU of Amsterdam University Medical Center. Mechanically ventilated ICU patients (> 48 h) who met the safety criteria for active exercise therapy were included.1 The primary outcome, blood lactate level was measured at three time points: before, at peak exertion, and 30 min after a rehabilitation intervention (defined as sitting on the edge of the bed).
For analysis, patients were stratified into two groups: those at potential higher risk of mitochondrial dysfunction (patients with sepsis, COVID-19, or acute respiratory distress syndrome (ARDS)) and those at potential lower risk of mitochondrial damage (patients after cardiac surgery, trauma, or cancer). Descriptive statistics were used to characterize the study population and lactate levels across time points as primary outcome.
Results: A total of 30 ICU patients were included (median age: 65 years [IQR 51–75]; 67% male). The median duration of mechanical ventilation was 12.5 days [IQR 7.8–24.3], and the median ICU stay was 15.5 days [IQR 9.8–29.5]. Thirteen patients were categorized into the potential higher risk of mitochondrial dysfunction group, while 17 were in the group at potential lower risk mitochondrial damage. Individual responses to exercise varied. The group with potential higher risk of mitochondrial dysfunction shows higher baseline lactate levels, an upward trend during exercise, and delayed recovery compared to the group at potential lower risk of mitochondrial damage (median lactate levels: before 1.4 vs 1.0; at peak exertion 2.1 vs 1.2; and 30 min after 1.8 vs.1.1, respectively) (figure).
Conclusions: This pilot study suggests that ICU patients who are at high risk for mitochondrial dysfunction exhibit an increased lactate response to exercise with delayed recovery, potentially indicating metabolic stress. Blood lactate may serve as a marker of metabolic response in this ICU subgroup. However, further research in a larger cohort is needed to determine the association between physical capacity and metabolic stress.



Response lactate to active exercise therapy.

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9. Amsterdam Movement Sciences, Rehabilitation and Development, Amsterdam, the Netherlands

Topic: Nursing care and physiotherapy

000250

Unlocking the predictive power of hematological indices of 30-day mortality in diabetic and non-diabetic stroke patients

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Intensive care Medicine Experimental 2025* 13(1):*000250.

Introduction: Stroke is a leading cause of disability and death worldwide with diabetes being a well-recognized risk factor associated with poor outcomes. Diabetes fosters a chronic low-grade inflammation that worsens stroke prognosis. Recently, hematological indices including neutrophil-to-lymphocyte ratio, and monocyte-to-lymphocyte ratio have emerged as prognostic inflammatory biomarkers for stroke outcomes. However, the impact of diabetes on the predictive power of these indices remains unclear.
Objectives: This study aimed to evaluate neutrophil-to-lymphocyte ratio and monocyte-to-lymphocyte ratio as potential predictors of 30-day mortality in diabetic and non-diabetic stroke patients, contributing to personalized risk assessment and therapeutic strategies.
Methods: We conducted a retrospective cohort study on 359 stroke patients admitted to the intensive care unit and assigned them to diabetic and nondiabetic groups. Neutrophil-to-lymphocyte ratio and monocyte-to-lymphocyte ratio were calculated from complete blood count upon admission. The association between the biomarkers and 30-day mortality was assessed using Spearman's correlation. The predictive ability of neutrophil-to-lymphocyte ratio and monocyte-to-lymphocyte ratio on short-term mortality was evaluated using univariate and multivariate regression, and the predictive performance was determined using receiver operating curve analysis.
Results: In the non-diabetic stroke group, neutrophil-to-lymphocyte ratio was significantly associated with 30-day mortality in both univariate (OR = 1.14, 95% CI: 1.075–1.206, $p < 0.001$) and multivariate analyses (OR = 1.12, 95% CI: 1.04–1.22, $p = 0.004$), with an optimal cutoff of 6.2 (sensitivity = 72%, specificity = 77%). Monocyte-to-lymphocyte ratio showed significance in univariate analysis (OR = 6.13, 95% CI: 2.40–15.6, $p < 0.001$) but not in multivariate analysis.
Conclusions: In the diabetic stroke group, neither neutrophil-to-lymphocyte ratio nor monocyte-to-lymphocyte ratio independently

predicted mortality. In conclusion, neutrophil-to-lymphocyte ratio only emerged as a reliable predictor for 30-day mortality in non-diabetic stroke patients. However, in diabetic stroke patients, its predictive ability is blunted.

Reference

1. Jordan University of Science and Technology

Topic: Transfusion and haemostasis disorders

000252

Co-occurrence of hypomagnesemia and hypokalemia and their effect on 28-day mortality in critically ill patients, a retrospective cohort study

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Intensive care Medicine Experimental 2025* 13(1):*000252.

Introduction: Among the various complications faced by critically ill patients, electrolyte disorders remain a significant complication associated with poor outcomes. Hypomagnesemia and hypokalemia are frequently encountered in critical care patients. Despite their clinical significance, data on their combined effect on mortality and ICU length of stay (LOS) is limited, especially in Middle Eastern populations.
Objectives: To assess the impact of hypomagnesemia and hypokalemia, individually and in combination, on 28-day mortality, overall mortality, and ICU length of stay among critically ill patients.
Methods: A retrospective cohort study in a tertiary hospital was conducted, and data were obtained from the medical records of all patients admitted to the ICU during the period of July 2012 to July 2022. The patients were divided into four major groups based on their magnesium and potassium levels. The 28-day mortality, mortality rate, and length of stay were measured as outcomes. SPSS software version 22 was used for data analysis.
Results: The prevalence of hypomagnesemia, hypokalemia, and their co-occurrence were 16%, 11.9%, and 4.2%, respectively. Hypomagnesemia was associated with a longer LOS (13.84 vs. 11.34 days, $p \leq 0.05$) but not with a significant increase in 28-day mortality (36%). Hypokalemia significantly increased 28-day mortality (42% vs. 36%, $p \leq 0.05$) and LOS (14.87 vs. 11.44 days, $p \leq 0.05$). Combined hypomagnesemia and hypokalemia significantly increased 28-day mortality (42.6% vs. 36.5%, $p \leq 0.05$) and LOS (17.44 vs. 11.6 days, $p \leq 0.05$).
Conclusions: Both hypomagnesemia and hypokalemia negatively impact ICU outcomes, with the combined disturbances showing the most significant effect on mortality and LOS. Early detection and correction are critical for improving patient outcomes.

Reference

1. Jordan University of Science and Technology

Topic: Metabolism, endocrinology, liver failure and nutrition

000253

Predictors of acute kidney injury in patients with diabetic ketoacidosis: a retrospective observational study

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Intensive care Medicine Experimental 2025* 13(1):*000253.

Introduction: Acute kidney injury (AKI) is a serious complication in patients with diabetic ketoacidosis (DKA), contributing to prolonged hospital stays, increased morbidity, and higher mortality rates. Identifying key predictors of acute kidney injury in diabetic ketoacidosis patients is essential for early risk stratification and intervention and improving patient outcomes.
Objectives: The study aimed to identify predictors of acute kidney injury in patients with diabetic ketoacidosis admitted to the Intensive Care Unit (ICU).
Methods: This retrospective observational study analyzed a cohort of all diabetic ketoacidosis patients admitted to the intensive care unit (ICU) from July 2012 to July 2022. Data were extracted from electronic health records, including demographic factors, prior acute kidney injury history, comorbidities, and clinical outcomes.
Results: A total of 152 patients with diabetic ketoacidosis admitted to the ICU were included in the analysis. Acute kidney injury was observed in 24 (15.5%) of patients. Significant predictors of acute kidney injury included hypertension ($p = 0.018$), prior acute kidney injury history ($p = 0.021$), human albumin administration ($p < 0.000$), and blood product transfusions ($p = 0.001$).
Conclusions: Hypertension, prior acute kidney injury, human albumin administration, and blood product transfusions were identified as significant predictors of acute kidney injury in diabetic ketoacidosis patients reflecting overall disease severity. Larger studies are needed to confirm these findings and explore the complex interplay between fluid management, hemodynamic stability, and acute kidney injury risk in critically ill diabetic ketoacidosis patients. Clinicians should remain cautious when managing fluid resuscitation and transfusion strategies in this population.

Reference

1. Jordan University of Science and Technology

Topic: Acute Kidney Injury and haemofiltration

000255

Effects or remote ischaemic preconditioning on contrast-associated nephropathy in diabetic patients and its relantionships to oxidative stress and inflammatory status

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Intensive care Medicine Experimental 2025* 13(1):*000255.

Introduction: Remote ischaemic preconditioning (RIP) is a non-pharmacological strategies proposed to reduce the incidence of contrast-associated nephropathy (CN). Previous research describes protective effects in patients with risk factors, as in diabetic patients. This protective effect might be related to the activation of haemoxygenase-1 (HO-1) enzyme. HO-1 is a protein rapidly induced by various stimuli (such as RIP), which triggers vasodilator, anti-inflammatory and anti-apoptotic effects at the renal level.
However, some studies suggests that this mechanism may be altered in diabetic patients, in whom the protective effects by RIP may be attenuated.
Objectives: Evaluate if the manoeuvre of remote ischaemic preconditioning (RIP) exerts beneficial preventive effects on contrast-associated nephropathy (CN) through activation of antioxidant defence system haemoxygenase-1 (HO-1) dependent antioxidant and anti-inflammatory mechanisms, in diabetic patients undergoing preferential coronary intervention (CI).
Methods: A prospective randomized, single centre pilot trial was conducted at University Hospital Sta. Lucia, Spain. We analyzed 71 diabetic adult patients with acute coronary syndrome admitted to a medical intensive care unit, with a diagnosis of diabetes before admission, undergoing standard coronary intervention (CI).
We established two groups (random assignment): one of them received the RIP manoeuvre (RIPC group) trough intermittent upper-arm ischemia before CI, and the other one did not received it (control group). We recorded demographical, clinical, and analytical data of the patients, before and after 72 h of procedure. We analyzed the changes in the levels of HO-1, before and after RIP, and their relationship with the development of CN.

The effect of RIP on the temporal evolution of the inflammatory state was also studied by determining changes in the white series, C-reactive protein (CRP) and plasma ferritin levels, and their relationship with the development of CN.

Results: The incidence of CN in our sample was 32.4%.

Receiving the RIP manoeuvre was not associated with significant differences in this respect between groups and did not affect the time course of the antioxidant status.

There was no association between antioxidant status and the occurrence of CN.

Similarly, receiving the preconditioning manoeuvre did not affect the time course of the inflammatory markers analysed. There was also no association between inflammatory status and the occurrence of CN.

Conclusions: Based on our results we can describe the lack of efficacy of the RIP manoeuvre, in our diabetic patients, in terms of protecting them from developing CN, and the independence, of such a manoeuvre, of inflammatory and antioxidant behaviour.

Table 1 (abstract 000255) ATime course of plasma HO-1 levels in the study groups with and without RIP

	p-value	Odd-Ratio (95% CI)
VAP	< .001	0.437 (0.287; 0.666)
COPD	0.011	2.613 (1.251; 5.456)
Chronic renal failure	< .001	0.376 (0.240; 0.589)
Acinetobacter infections	< .001	0.086 (0.033; 0.220)
ESBL infections	0.005	0.528 (0.339; 0.822)

SDD: Selective Digestive Decontamination; VAP: ventilator associated pneumonia; COPD: chronic obstructive pulmonary disease; ESBL: extended spectrum belalactamase

Table 2 (abstract 000255) ATime course of plasma levels of HO-1 and CN

		SDD			Relative Risk
		No	Yes	*p*-value	(95% CI)
VAP / MV	VAP/1000 days of MV	10.31	3,91	< 0.001	0.353 (0.247 – 0.504)
Urinary infections	N1000 days of catheter	3.79	2.88	0.218	0.755 (0.483 – 1.181)
Bacteremia related to catheter	Bacteremia/1000 days of CVC	3.59	3.73	0.892	1.03 (0.674 – 1.573)
Secondary bacteremia	Bacteremia./1000 ICU days	4.69	2.08	< 0.001	0.438 (0.269 – 0.712)
Multidrug-resistant bacteria infections	Multidrug-resistant bacteria infections/1000 ICU days	9.59	2.81	< 0.001	0.287 (0.201 – 0.412)

SDD: Selective Digestive Decontamination; VAP: ventilator associated pneumonia; MV: mechanical ventilation; CVC: central venous caheter.

Table 3 (abstract 000255) Means (SD) and statistical contrasts of the inflammatory variables in the study groups with and without RIP

	Patients with multi-drug resistant NIs		
	No N = 687	Yes N = 356	P
Age, years	60.6 ± 14.5	61.7 ± 13.5	0.212
APACHE II score	444 (66.4)	240 (69.0)	0.402
Sex male	20.0 ± 7.7	21.2 ± 7.4	0.013
SDD	638 (92.9)	295 (82.9)	< 0.001
Trauma patients	84 (12.2)	29 (8.2)	0.046
Coronary artery disease patients	157 (22.9)	59 (16.6)	0.017
Emergency surgery	168 (24.5)	86 (24.2)	0.925
Immunodepression	74 (10.8)	51 (14.4)	0.091
Neutropenia	21 (3.1)	20 (5.6)	0.043
PN	128 (18.6)	81 (22.8)	0.11
RRT	61 (8.9)	29 (8.2)	0.689
Malnutrition	255 (37.2)	155 (43.5)	0.046
Diabetes mellitus	62 (9.0)	50 (14.0)	0.013
IChronic renal failure	198 (28.8)	119 (33.4)	0.125
Cirrhosis	101 (14.7)	55 (15.4)	0.748
Neoplasm	123 (17.9)	83 (23.3)	0.037
VAP	222 (32.3)	148 (41.6)	0.003
CRB	251 (36.7)	132 (37.1)	0.903
Secondary bacteremia	142 (20.7)	115 (32.4)	< 0.001
Urinary infection	199 (29.0)	114 (32.1)	0.301
ATB 48 hours before admission	177 (26.7)	108 (30.5)	0.202
Death	216 (31.5)	146 (41.2)	0.002
Acinetobacter baumannii	0	29 (5.6)	< 0.001
MRSA	0	18 (4. 6)	< 0.001
ESBL	0	239 (63.2)	< 0.001
MR-*Pseudomonas*	0	91 (24.3)	< 0.001
Other MR-GNB	0	.54 (13, 9)	< 0.001
Admission			0.075
Medical	484 (72.0)	281 (79.2)	
Scheduled surgery	84 (12.2)	35 (9.9)	
Emergency surgery	109 (15.9)	39 (11.0)	
Inflammatory response:			< .001
Non sepsis	31 (4.5)	8 (2.2)	
Sepsis	132 (19.2)	47 (13.2)	
Septic shock	524 (76.1)	391 (84.5)	
ICU days	29 (17; 45)	44 (29; 66)	< 0.001
Days in hospital prior to ICU	1 (0; 4)	1 (0; 8)	0.068
GCS	15 (10; 15)	15 (10; 15)	0.063

Data are means ± SD, frequencies (%) and medians (RIQ). NI: nosocomial infections; SDD: Selective Digestive Decontamination; PN: parenteral nutrition; RRT: renal replacement technique; CRB: central venous catheter bacteraemia; MRSA: methicillin-resistant Sthaphylococcus aureus; ESLB: extended-spectrum beta-lactamase; GCS: Glasgow Coma Score; MR BGN: ; multidrug-resistant Gram-negative bacteria

Table 4 (abstract 000255) Means (SD) and statistical contrasts of inflammatory variables in the study groups that did or did not develop CN

	P	Odd-Ratio (IC-95%)
SDD	< .001	0.373 (0.249,0.558)
Secundary Bacteremia	< .001	1.674 (1.273,2.200)

SDD: Selective Digestive Decontamination

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Topic: Acute Kidney Injury and haemofiltration

000258

Impact on nosocomial multidrug-resistant infections, antibiotic consumption, and colistin and tobramycin colonization in an ICU after thirteen years of selective digestive decontamination

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Intensive care Medicine Experimental 2025* 13(1)*:000258.

Introduction: The impact of SDD in areas where multidrug-resistant bacteria (MDRB) are endemic is of great interest. Selective digestive decontamination (SDD) has been associated with a reduction in mortality and rates of nosocomial infections (NI).

Objectives: To analyze the impact on MDRB NI, antibiotic consumption and colistin and tobramycin colonization in an ICU after 13 years of SDD.

Methods: This study was conducted in a 30-bed medical-surgical ICU. All consecutive patients admitted to the ICU between October 1, 2011, and September 30, 2024, who were expected to require tracheal intubation > 48 h were administered SDD (SDD study group) with a 4-day course of intravenous cefotaxime plus enteral colistin, tobramycin, nystatin in an oropharyngeal paste and digestive solution. Oropharyngeal and rectal swabs were obtained on admission and once a week. We used ENVIN NI criteria. All patients admitted to ICU with NI in ICU between October 1, 2010, and September 30, 2011 (non-SDD group) were compared with the SDD study group. A univariate and a multivariate logistic regression analysis were performed. For each of the NIs, incidences per 1000 days of exposure in each cohort and the corresponding relative risks were obtained using Poisson regression. Statistical significance was $p \leq 0.05$. Colistin- and tobramycin-resistant colonization and antibiotic consumption as defined daily doses of antibiotics (DDD) were also analyzed.

Results: A total of 14.695 patients were admitted to ICU. We analyzed patients who developed NI, and 933 patients of them received SDD. There were no statistically significant differences between the two groups in terms of admission type or demographics. SDD patients had significantly fewer extended spectrum beta-lactamase (ESBL) infections $p = 0.007$, other Gram negative multidrug resistant bacteria (GNB-MR) $p = 0.004$ (Table 1) and *Acinetobacter spp*. infections $p < 0.001$ (Table 2). There was also a significant reduction in the rates of ventilator-associated pneumonia (VAP), urinary tract infections, other secondary bacteremia and MDRB NI in the SDD group versus the non-SDD group (Table 3). There was 2 *Clostridioides difficile* infection. Colistin-resistant colonization was 14.7% and tobramycin-resistant colonization was 21.% of samples. There was a decrease in DDD/100 ICU stays after SDD.

Conclusions: After 13 years of SDD application, there was a significant reduction in ESBL, other GNB-MR and *Acinetobacter* infections, as well as rates of VAP, secondary bacteremia, urinary tract infections and MDRB NI. There was a decrease in antibiotic consumption after SDD. Low rates of colonization by colistin- and tobramycin-resistant bacteria were also observed.

Table 1 (abstract 000258) Univariate analysis SDD 13 years

Patients with NI	*Selective Digestive Decontamination* No N = 110	Yes N = 933	P
Age, years	59.6 ± 15.8	61.1 ± 13.9	0.274
APACHE II score	21.2 ± 7.6	20.3 ± 7.6	0.248
Sex male	75 (68.2)	609 (67.1)	0.827
Trauma patients	17 (15.4)	96 (10.3)	0.1
Coronary artery disease patients	19 (17.3)	197 (21.1)	0.344
Emergency surgery	33 (30.0)	221 (23.7)	0.148
Neutropenia	3 (2.7)	38 (4.1)	0.794
Immunodepression	26 (23.6)	183 (19.6)	0.322
Parenteral nutrition	34 (30.9)	376 (40.3)	0.055
Chronic renal failure	40 (36.4)	166 (17.8)	< 0.001
RRT	12 (11.0)	100 (10.7)	0.926
Malnutrition	34 (30.9)	283 (30.3)	0.901
Diabetes mellitus	9 (8.2)	147 (15.8)	0.035
COPD	40 (36.4)	168 (17.8)	< 0.001
VAP	58 (52.7)	312 (33.4)	< 0.001
CRB	27 (24.6)	356 (38.3)	0.005
Secondary bacteremia	31 (28.2)	226 (24.3)	0.372
Urinary infection	29 (26.4)	284 (30.5)	0.37
ATB 48 hours before admission	28 (25.4)	257 (28.4)	0.521
Death	35 (31.8)	327 (35.2)	0.482
Acinetobacter baumannii	13 (11.8)	9 (1.0)	< 0.001
MRSA	4 (3.6)	14 (1.5)	0.112
ESBL	39 (35.5)	221 (23.7)	0.007
MR-*Pseudomonas*	10 (9.1)	81 (8.7)	0.886
Other MR-GNB	12 (10.9)	42 (4.5)	0.004
Admission			0.231
Medical	79 (71.8)	679 (72.9)	
Scheduled surgery	10 (9.1)	109 (11.7)	
Emergency surgery	21 (19.1)	127 (13.6)	
Inflammatory response:			0.354
Non sepsis	2 (1.8)	37 (4.0)	
Sepsis	23 (20.9)	156 (16.7)	
Septic shock	85 (75,3)	640 (79,4)	
ICU days	28 (16; 46)	34 (21; 53)	0.007

Data are means SD and frequencies (%) RRT: Renal replacement therapy; VAP: ventilator associated pneumonia;CRB: Catheter related bacteremia; ATB: antibiotic; COPD: chronic obstructive pulmonary disease; MRSA: methicillin resistant *Sthaphylococcus aureus*; ESBL: extended spectrum belalactamase; MR: multiresistant; GNB: gram negative bacteria.

Table 2 (abstract 000258) Multivariate analysis SDD 13 years

	Period, *average (DT)*					
	pre-catheterism	24 h	48 h	72 h	Time *p-value*	Maniobra RIP*Time *p-value*
HO-1 (ng/ml)						
RIP No	0,8 (1,5)[bA]	1,4 (2,2)[bA]	1,6 (2,2)[bA]	1,3 (1,4)[bA]		
RIP yes	0,7 (1,5)[bA]	1,2 (1,5)[bA]	1,4 (1,5)[bA]	1,3 (1,5)[bA]		
Total	0,7 (1,5)	1,3 (1,9)	1,5 (1,8)	1,3 (1,4)	**< 0,001**	0,8

Table 3 (abstract 000258) Infection rates SD 13 years

	Period, *average (DT)*					
	Pre-catheterism	24 h	48 h	72 h	Time *p-value*	CN*Time *p-value*
HO-1 (ngr/ml)						
CN No	0,9 (1,8)[bA]	1,5 (2,3)[bA]	1,7 (2,2)[bA]	1,4 (1,6)[bA]		
CN yes	0,3 (0,5)[bA]	0,9 (0,6)[bA]	1,1 (0,7)[bA]	0,9 (0,8)[bA]		
Total	0,7 (1,5)	1,3 (1,9)	1,5 (1,8)	1,2 (1,4)	**< 0,001**	0,9

Reference

1. Thanks to Dr. Sergio Ruiz-Santana for initiating and maintaining SDD in our ICU 13 years ago, in spite of the opinions against it, managing to control infections and multi-resistance in our ICU.

Topic: Infections and prevention

000260

Analysis of factors associated with the development of nosocomial infections by multi-resistant gram negative bacteria in an ICU after 13 years of selective digestive decontamination

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Intensive care Medicine Experimental 2025* 13(1)*:000258.

Introduction: Selective digestive decontamination (SDD) has been associated with a reduction in nosocomial infections (NI). The fact that critically ill patients have the highest susceptibility, coupled with the frequent disruption of their defense barriers by invasive devices, has long justified the rates. Identifying factors associated with the development of NI by multidrug-resistant Gram negative bacteria (MRGNB) in ICU patients may help us to reduce them.

Objectives: To identify factors associated with the development of NIs by MRGNB in an ICU after 13 years of selective digestive decontamination (SDD).

Methods: Prospective study including patients who developed NI from 1 October 2010 to 30 September 2024 in a polivalent ICU. SDD was applied to all admitted patients requiring mechanical ventilation for more than 48 h. Intravenous cefotaxime plus enteral solution and a paste with colistin, tobramycin, and nystatin were administered every 8 h until discharge for the first 4 days. Rectal and pharyngeal swabs were requested on admission and weekly. The risk factors associated with the development of NI by MRGNB described in the literature were analysed. The diagnostic criteria for NIs were those of the ENVIN-Helics program. Univariate analysis and multidimensional logistic analysis of MRGNB were performed. It was considered statistically significant if $p \leq 0.05$.

Results: A total of 14.695 patients were admitted to the ICU during this period and 356 (34.13%) developed NI due to MRGNB out of a total of 1043 patients with NI. In univariate analysis (Table 1), patients with MRGNB had longer length of stay ($p < 0.001$) and higher ICU mortality ($p = 0.002$). Among the MRGNB responsible for infections, extended-spectrum beta-lactamase (ESBL) (63.2%) and MR *Pseudomonas* (24.3%) were the most common. The most frequent MRGNB NI was ventilator-associated pneumonia. The independent factors for the development of MRGNB NIs in the multivariate analysis were secondary bacteremia: OR: 1.674 (1.273,2.200) with $p < 0.001$ and SDD itself: OR: 0.373 (0.249,0.558) with $p < 0.001$ (Table 2).

Conclusions: Selective digestive decontamination was a statistically significant independent protective factor for the development of MRGNB NIs in our ICU. Secondary bacteremia was also an independent factor. Patients with these NIs had higher ICU length of stay and mortality. ESBL and MR *Pseudomonas* MRGNB NIs were the most common.

Table 1 (abstract 000258) Univariate analysis 13 years SDD and MRGNB nosocomial infections

		Period, average *(ST)*				
		Precatheterism	24 h	48 h	Time *p-value*	manoeuvre RIP*Time *p-value*
CRP (mgr/dl)					0,7	0,2
RIP No		4,9 (6,1)	4,6 (4,6)	3,9 (3,7)		
RIP Yes		4,3 (4,3)	5,4 (4,5)	5,3 (4,2)		
	Total	4,6 (5,3)	4,9 (4,6)	4,6 (4,0)		
Ferritin (ngr/ml)					**< 0,001**	0,5
RIP No		115,4 (98,2)[aB]	130,4 (85,3)[bB]	145,3 (92,3)[bB]		
RIP Yes		175,5 (176,5)[aA]	192,1 (156,8)[bA]	217,9 (160,7)[bA]		
	Total	144,6 (143,8)	160,3 (128,1)	180,5 (134,2)		
Total leukocytes ($x10^3$/l)					0,1	0,8
RIP No		9,2 (2,2)	8,9 (2,4)	8,8 (2,4)		
RIP Yes		9,7 (2,5)	9,1 (2,2)	9,0 (2,0)		
	Total	9,5 (2,3)	8,9 (2,3)	8,9 (2,2)		
Neutrophils ($x10^3$/l)					0,2	0,9
PIR No		6,8 (2,5)	6,5 (2,3)	6,2 (2,3)		
PIR Yes		6,8 (2,0)	6,5 (1,9)	6,4 (1,8)		
	Total	6,8 (2,2)	6,5 (2,1)	6,3 (2,1)		
Lymphocytes ($x10^3$/l)					0,1	0,3
RIP No		1,6 (0,9)	1,4 (0,7)	1,6 (0,7)		
RIP Yes		1,9 (1,1)	1,6 (0,8)	1,6 (0,8)		
	Total	1,7 (1,0)	1,5 (0,8)	1,6 (0,8)		
Neutroph/Limphocytes ratio					0,1	0,3
RIP No		6,3 (6,4)	6,2 (4,5)	5,1 (4,8)		
RIP Yes		5,2 (4,6)	5,2 (3,5)	5,2 (3,4)		
	Total	5,8 (5,5)	5,2 (4,5)	5,3 (4,3)		

Table 2 (abstract 000258) Multivariate analysis 13 years SDD and MR GNB nosocomial infections.JPG

	Period, average *(ST)*			Time	CN*Time
	Precatheterism	24 h	48 h	*p*-value	*p*-value
CRP (mgr/dl)				0,7	0,6
CN No	4,5 (5,4)	5,3 (4,7)	4,9 (4,0)		
CN Yes	4,8 (5,1)	4,4 (4,2)	3,9 (3,9)		
Total	4,6 (5,3)	4,9 (4,6)	4,6 (4,0)		
Ferritin (ngr/ml)				< 0,001	0,4
CN No	141,2 (163,1) [aA]	151,2 (135,7) [aA]	174,6 (144,3) [bA]		
CN Yes	151,2 (98,7) [aA]	178,1 (112,6) [aA]	192,1 (113,9) [bA]		
Total	144,6 (143,8)	160,3 (128,1)	180,5 (134,2)		
Leukocytes (x10^9/l)				0,1	0,5
CN No	9,4 (2,3)	9,1 (2,4)	9,0 (2,3)		
CN Yes	9,6 (2,4)	8,7 (2,1)	8,7 (1,8)		
Total	9,5 (2,3)	8,9 (2,3)	8,9 (2,2)		
Neutrophils (x10^9/l)				0,2	0,5
CN No	6,8 (2,4)	6,7 (2,2)	6,4 (2,2)		
CN Yes	6,8 (1,7)	6,1 (1,7)	6,1 (1,8)		
Total	6,8 (2,2)	6,5 (2,1)	6,3 (2,1)		
Limphocytes (x10^9/l)				0,1	0,2
CN No	1,8 (1,1)	1,5 (0,7)	1,6 (0,8)		
CN Yes	1,7 (0,9)	1,6 (0,8)	1,5 (0,7)		
Total	1,7 (1,0)	1,5 (0,8)	1,6 (0,8)		
Neutrophils/Limphocyt ratio				0,1	0,6
NC No	5,8 (5,4)	6,2 (4,1)	5,2 (4,1)		
NC Sí	6,6 (6,3)	5,2 (4,1)	5,6 (4,7)		
Total	5,8 (5,5)	5,8 (4,5)	5,3 (4,3)		

Topic: Infections and prevention

000264

The role and mechanism of Lp-PLA2 in regulating macrophage inflammatory response via the iNOS/NLRP3 pathway in sepsis-induced cardiomyopathy

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Intensive care Medicine Experimental 2025* 13(1):*000264.

Introduction: Sepsis-induced cardiomyopathy (SICM) is myocardial injury induced by sepsis, with a high mortality rate, directly impacting the prognosis of sepsis[1–4]. Due to its complex pathogenesis, there is a lack of effective treatment strategies and early warning biomarkers. Lipoprotein associated phospholipase A2 (Lp-PLA2) is considered to be associated with the regulation of inflammatory responses and is an independent risk factor for many inflammation-related diseases[5–10]. The activity and expression of Lp-PLA2 are associated with poor prognosis in septic shock patients and are mainly secreted by macrophages, which are key cells in maintaining the inflammatory homeostasis of the heart. However, the role of Lp-PLA2 and macrophages in SICM is not yet clear.
Objectives: This study aims to explore the role and specific mechanisms of Lp-PLA2 in regulating macrophages in SICM and to identify potential specific targets for the treatment of SICM.
Methods: This study utilized cecal ligation and puncture surgery or intraperitoneal injection of LPS to establish a mouse model of SICM, and used LPS stimulation of macrophages to establish a cell model of SICM. Through both animal and cell levels, lentiviral overexpression/knockdown of Lp-PLA2 and the specific drug darapladib were used, combined with experimental techniques such as RT-PCR, Western blot, co-culture of cells, immunofluorescence staining, cardiac ultrasound, and ELISA, to validate the important role of Lp-PLA2 in driving macrophage inflammation in the occurrence and development of SICM. Subsequently, techniques such as COIP-MS, RNA-Seq, Western blot, and immunofluorescence staining were used to validate that Lp-PLA2 drives macrophage inflammation through the iNOS/NLRP3 signaling pathway.

Result

1. In the cardiac tissues of LPS/CLP-induced SICM mice, Lp-PLA2 expression is upregulated and primarily localized in macrophages.
2. Darapladib downregulates the expression of inflammatory factors *iNOS*, *Il-1β*, *Tnf-α*, *Il-6*, and *Il-10* in the cardiac tissues of SICM mice by inhibiting Lp-PLA2 expression and activity, and the intervention effect of 50 mg/kg darapladib is significant.
3. A dose of 50 mg/kg darapladib significantly reduces the mortality and the expression of cardiac injury markers ANP, BNP, CK-MB, and cTnI in SICM mice, and maintains normal EF and FS values at various time points.
4. Inhibiting Lp-PLA2 can downregulate the expression of macrophage activation markers CD68 and inflammatory factors *Tnf-α*, *Il-6* in LPS-treated macrophages, and alleviate the damage of the supernatant from LPS-treated macrophages to the viability of H9C2 myocardial cells.
5. iNOS is a downstream transcription factor of Lp-PLA2, and knocking down Lp-PLA2 in macrophages can inhibit the LPS-induced increase of iNOS.
6. Transcriptomic testing suggests that NLRP3 is a key molecule in Lp-PLA2-regulated macrophage inflammatory response. In SICM mouse heart tissue, NLRP3 is significantly positively correlated with Lp-PLA2, and darapladib can inhibit the expression of NLRP3.
7. MCC950 can significantly inhibit the expression of NLRP3. When used alone, both MCC950 and darapladib can inhibit the expression of NLRP3, iNOS, and IL-1β, and can significantly downregulate the transcription of the inflammatory factors *Tnf-α* and *Il-6*. The combined use does not have an additive effect.

Conclusions: Lp-PLA2 regulates macrophage inflammatory response through iNOS/NLRP3, contributing to the occurrence and development of SICM. Inhibiting Lp-PLA2 may improve the prognosis of SICM, and darapladib could potentially become a therapeutic drug for SICM patients.

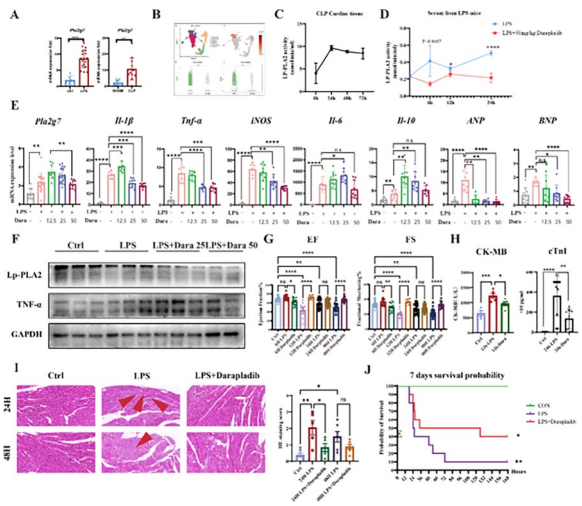


Fig. 1 (abstract 000264) Inhibition of Lp-PLA2 activity and expression improves the prognosis of SICM. A: *Pla2g7* mRNA levels in SICM mice; B: single-cell sequencing of the left ventricle in CLP-induced SICM mice; C-D: detection of Lp-PLA2 activity in SICM mice; E: treatment of SICM mice with different doses of darapladib, detection of *Pla2g7*, *iNOS*, *Nlrp3*, *Il-1β*, *ANP*, *BNP*, *Tnf-α*, *Il-6*, *Il-10* in SICM mouse heart tissues; F: levels of Lp-PLA2 and Tnf-α proteins in SICM mouse heart tissues; G-H: functional parameters of the heart in SICM mice; I: HE staining observation of the pathological structure of SICM mouse heart tissues; J:7-day survival rate of mice. ****P < 0.0001,***P < 0.001,**P < 0.01,*P < 0.05

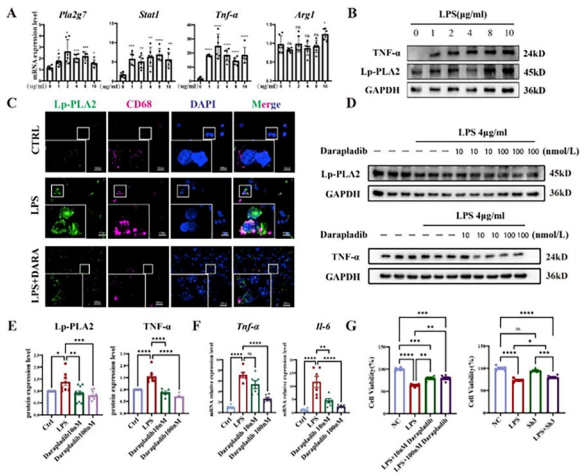


Fig. 2 (abstract 000264) Lp-PLA2 regulates macrophage inflammatory response. A-B: LPS stimulation of Raw264.7 cells; C-E: pre-treatment of Raw264.7 cells with darapladib; F: co-culture of Raw264.7 cells with H9C2 cells under different treatment conditions, detection of H9C2 cell viability. ****P < 0.0001,***P < 0.001,**P < 0.01,*P < 0.05

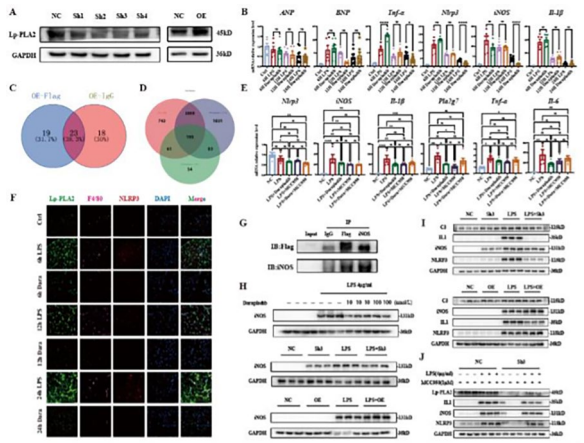


Fig. 3 (abstract 000264) Lp-PLA2 regulates macrophage inflammatory response through iNOS/NLRP3. A: Stable transformation strain construction; B: expression of *iNOS, Nlrp3*, *Il-1β*, *ANP, BNP*, *Tnf-α* in SICM mouse heart tissues at various time points; C: COIP-MS; D: RNA-Seq of NC/LPS/LPS + darapladib treated cells; E: pre-treatment of Raw264.7 cells with MCC950; F: immunofluorescence staining of SICM mouse heart tissues at various time points; G: COIP; H: detection of iNOS expression in Raw264.7 cells after knockdown/overexpression of Lp-PLA2; I: detection of iNOS, Nlrp3, Il-1β, C3 expression in Raw264.7 cells after knockdown/overexpression of Lp-PLA2; J: detection of Lp-PLA2, iNOS, Nlrp3, Il-1β expression in Raw264.7 cells after pre-treatment with MCC950. ****P < 0.0001,***P < 0.001,**P < 0.01,*P < 0.05

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11. The work was supported by the Natural Science Foundation of Hunan Province in China (No. 2024JJ6659), the Natural Science Foundation of Changsha in China (No. kq2403030).

Topic: Sepsis

000265

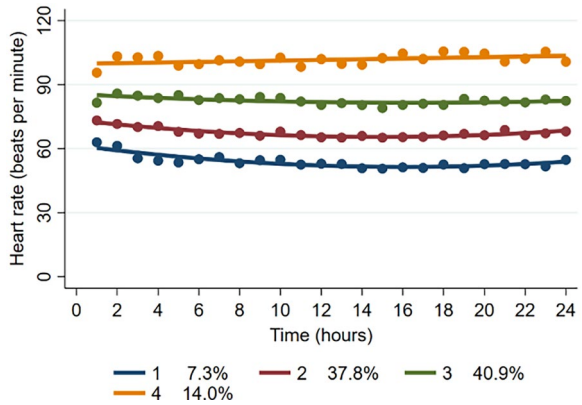
Trajectories of 24-h heart rate and hemorrhagic transformation in acute ischemic stroke patient receiving intravenous thrombolysis

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Intensive care Medicine Experimental 2025* 13(1):*000265.

Introduction: Hemorrhagic transformation (HT) is a serious complication in patients with acute ischemic stroke (AIS) receiving intravenous thrombolysis (IVT) with recombinant tissue plasminogen activator (rtPA). Previous studies have shown that admission heart rate (HR) is associated with poor outcomes in AIS. Heart rate trajectory (HRT), which reflects autonomic nervous system regulation over time, may provide more comprehensive insights than single-point HR measurements. However, data on the association between HRT and HT in AIS patients receiving IVT remain limited.
Objectives: The primary objective was to evaluate the association between 24-h HRT patterns and hemorrhagic transformation in AIS patients treated with IVT. Secondary objectives included assessing the relationships between HRT patterns and in-hospital mortality, as well as functional outcomes at discharge, measured by the modified Rankin Scale (mRS).
Methods: This retrospective cohort study included AIS patients who received IV rtPA alone at Songklanagarind Hospital between January 2015 and February 2025. Patients aged over 18 years with confirmed AIS, complete 24-h HR data, and follow-up neuroimaging were included. Hourly HR values during the first 24 h were analyzed using latent mixture modeling to classify HRT patterns.

Results: A total of 164 AIS patients were included. Of these, 38 (23.2%) developed hemorrhagic transformation. Four distinct HRT groups were identified: low HR trajectory (T1; 7.3%), moderate-low HR trajectory (T2; 37.8%), moderate-high HR trajectory (T3; 40.9%), and high HR trajectory (T4; 14.0%). Compared with the low HR group, the high HR group was significantly associated with an increased risk of HT, with an adjusted odds ratio of 11.12 (95% confidence interval [CI]: 1.01–122.59; $P = 0.049$). While in-hospital mortality did not differ significantly across groups, discharge mRS scores varied significantly by trajectory ($P = 0.010$), suggesting a relationship between HRT pattern and functional outcome.
Conclusions: In AIS patients treated with IV rtPA, distinct 24-h heart rate trajectory patterns were significantly associated with the risk of hemorrhagic transformation and functional outcomes at discharge. Notably, a persistently high HR trajectory was correlated with a markedly increased risk of HT. Trajectory-based assessment may be a valuable tool for early risk stratification, and heart rate control could represent a future therapeutic target in AIS management during thrombolysis.



Trajectory groups of heart rate measured repeatedly during the first 24 h after rt-PA administration. Group 1 (7.3%), group 2 (37.8%), group 3 (40.9%) and group 4 (14%) were categorized as the low HR, moderate–low HR, moderate–high HR, and high HR groups, respectively.

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2. This study was supported by the Faculty of Medicine, Prince of Songkla University. No external funding was received.

Topic: Neurointensive care

000267

The association between exposure to hypertonic albumin and mortality after traumatic brain injury

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Intensive care Medicine Experimental 2025* 13(1):*000267.

Introduction: Traumatic brain injury (TBI) is a leading cause of morbidity and mortality in critically ill patients and often requires fluid administration.[1] Previous studies have suggested a potential association between albumin administration and increased mortality after TBI; however, few data are available for hypertonic (25%) albumin administration.[2,3].
Objectives: This study aims to investigate the relationship between hypertonic albumin use and hospital mortality in TBI patients.
Methods: We conducted a retrospective analysis using the MIMIC-IV database via BigQuery. We identified Intensive Care Unit (ICU) admissions for TBI based on ICD-9 and ICD-10 diagnosis codes. Unique hospital admissions were used as the unit of analysis to account for patients with multiple encounters. Administration of albumin during the ICU stay was determined, and only administrations occurring between ICU admission and discharge were included. Patients were stratified based on whether they received hypertonic albumin. Clinical presentation was assessed using the first available Glasgow Coma Scale (GCS) score within six hours of ICU admission and SOFA score of the first 24 h. Demographic data, ICU length of stay, and hospital mortality were extracted and compared between groups. A multivariable logistic regression was conducted on the propensity score-matched cohort to assess the association between hypertonic albumin administration and hospital mortality.
Results: We identified 3.074 patients (62.5% male; median age 66 [IQR 48–82] years; median LOS 48 [IQR 25–105] hours) diagnosed with TBI who were admitted to the ICU. Among them, 28 (0.9%) received at least one administration of hypertonic albumin during their ICU stay. Of the 3.047 patients who did not receive albumin, 370 (12.1%) died, compared to 12 deaths (42.9%) in the hypertonic albumin group ($p < 0.001$). However, patients receiving hypertonic albumin had higher SOFA score during the first 24 h (7 [IQR 4–9] vs. 3 [IQR 2–4], p 0.04) and longer ICU stays (190 [IQR 59–347] vs. 48 [IQR 25–103] hours, $p < 0.001$), without differences in age and gender. After a multivariable logistic regression including first-day SOFA, conducted on the propensity score-matched cohort, the administration of hypertonic albumin was not independently associated with hospital mortality (OR 1.17; 95% CI: 0.37–3.72; $p = 0.79$).
Conclusions: In this cohort of ICU patients with TBI, administration of hypertonic albumin was not significantly associated with higher probability of in-hospital mortality.

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Topic: Neurointensive care

000268

Temporal stability of inflammatory subphenotypes of acute respiratory distress syndrome: outcomes and implications for early corticosteroids

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Intensive care Medicine Experimental 2025* 13(1):*000268.

Introduction: Inflammatory subphenotypes of acute respiratory distress syndrome (ARDS) identify patients with distinct outcomes and may lead to possible individualized treatment (1). However, temporal evolution of the initial subphenotype is unclear (2,3), and may impact targeted treatment strategies (4).
Objectives: This study assessed the temporal stability of inflammatory subphenotypes of ARDS and potential clinical implications using the example of early corticosteroids.
Methods: Data and biomarkers from six multicenter randomized controlled trials (RCTs, n = 3,958: ARMA, ALVEOLI, FACTT, SAILS, ROSE, EPVent-2) were analyzed to develop and validate an open-source AI Clinical Classifier for classification of inflammatory subphenotypes of ARDS using routinely available data. Then, it was used to classify a retrospective cohort including 5,578 adult ARDS patients from the seven intensive care units at Beth Israel Deaconess Medical Center (Boston) between 2008 and 2024. A Bayesian Markov model was used to evaluate temporal stability at 3-day intervals until day 30 (5). Multivariable logistic regression models assessed the effect of early corticosteroids on 30-day mortality across subphenotypes.
Results: An open-source AI Clinical Classifier (https://bostonmontpellier.shinyapps.io/AIClarity) was developed and externally validated across six RCTs before longitudinal validation using biomarkers until day 7 (Fig. 1). In the retrospective cohort, 2,169 (39%) hyperinflammatory and 3,409 (61%) hypoinflammatory patients were identified. The 30-day mortality was 49% (1,053/2,169) and 24% (826/3,409, $p < 0.001$), respectively. Over 30 days, 1,072 (49%) hyperinflammatory patients at baseline transitioned to hypoinflammatory, compared to 229 (7%) hypoinflammatory patients at baseline transitioning to hyperinflammatory ($p < 0.001$). Every 3 days, patients initially classified as hyperinflammatory had a 51% probability of staying hyperinflammatory, and a 24% probability of transitioning to hypoinflammatory (Fig. 2). Every 3 days, patients initially classified as hypoinflammatory had a 62% probability of staying hypoinflammatory, and a 7% probability of transitioning to hyperinflammatory. Early corticosteroids were associated with a lower 30-day mortality (adjusted odds ratio, aOR = 0.76 [95% confidence interval (95%CI):0.59–0.99], $p = 0.040$) in hyperinflammatory patients at baseline, and a higher 30-day mortality (aOR = 1.46 [95%CI:1.17–1.82], $p < 0.001$) in hypoinflammatory patients (p-for-interaction < 0.001, Fig. 3). Only patients who stayed hyperinflammatory at day 3 exhibited a persistent response to corticosteroids (aOR = 0.51, 95%CI:0.32–0.80, $p = 0.004$).
Conclusions: While the hypoinflammatory subphenotype of ARDS remains stable over time, the hyperinflammatory subphenotype displays a more unpredictable trajectory. Early corticosteroids may benefit hyperinflammatory ARDS patients until transition to hypoinflammatory, supporting re-classification to ensure treatment success.

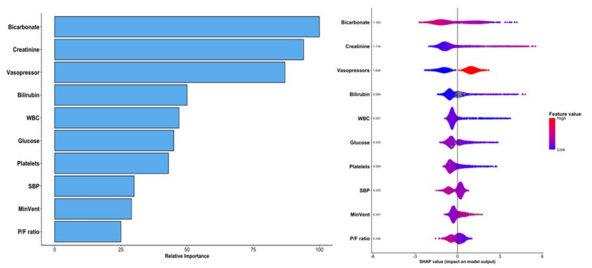


Fig. 1 (abstract 000268) Most important variables in the AI Clinical Classifier
Left panel: the variables used by the AI Clinical Classifier to make a prediction are organized by relative importance from top to bottom.
Right panel: each patient is represented by a dot. The color represents the value of the variable. Its position on the horizontal axis represents its SHAP value (its impact on the prediction). The farther to the right the dot is, the higher the probability of hyperinflammation.
WBC: white blood cell count, SBP: systolic blood pressure, MinVent: minute ventilation, P/F: PaO2/FiO2.

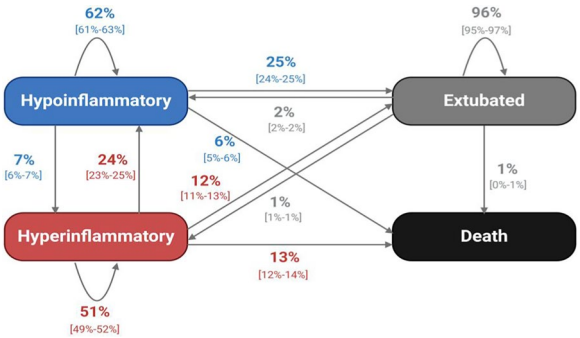


Fig. 2 (abstract 000268) Temporal transition probabilities per 3-day intervals and 95% credible intervals in the Bayesian Markov model
The numbers represent the probability of transitioning from one state to another every three days. Red numbers represent the probabilities for hyperinflammatory patients, blue numbers for hypoinflammatory patients, and grey number for extubated patients.

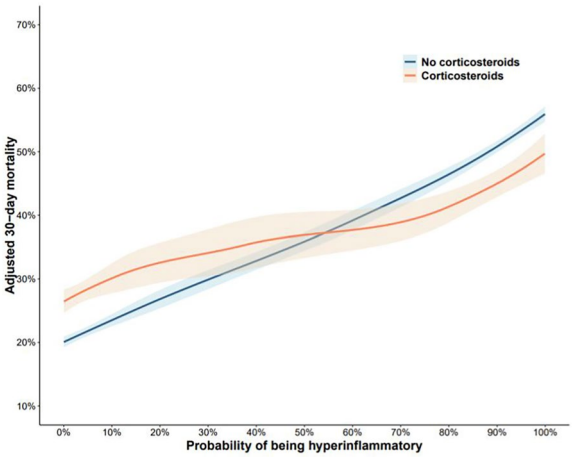


Fig. 3 (abstract 000268) Corticosteroids effect on 30-day mortality according to the probability of being hyperinflammatory at baseline
The probability of being hyperinflammatory at baseline is derived from the AI Clinical Classifier. Adjusted on age, sex, ethnicity, body mass index, hematologic malignancy, COVID-19, chronic obstructive pulmonary disease, PaO2/FiO2 ratio, Sequential Organ Failure Assessment score, neuromuscular blockade administration, and sedation depth.

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Topic: Acute respiratory failure and mechanical ventilation

000269

Impact of the NHS Lothian Critical Care Recovery Service on post-ICU hospital stay and costs: a retrospective cohort analysis

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Intensive care Medicine Experimental 2025* 13(1)*:000269.

Introduction: Survivors of critical illness frequently experience prolonged hospital stays and substantial healthcare costs due to complex rehabilitation needs. To address this, NHS Lothian implemented the Critical Care Recovery Service (CCRS) in 2021, providing a structured multidisciplinary pathway for post-ICU rehabilitation. This study evaluates the impact of CCRS on post-ICU hospital length of stay (LOS) and associated costs.
Methods: A retrospective cohort analysis was conducted at the Royal Infirmary of Edinburgh, comparing ICU survivors pre-CCRS implementation in 2019 with those managed by CCRS in 2024. Patients in the 2019 cohort were retrospectively triaged to ensure they met CCRS inclusion criteria. Exclusions included patients eligible for alternative rehabilitation pathways (e.g., major trauma, stroke, neurosurgery) and those who died during their hospitalisation. Cost estimates were derived from Public Health Scotland's Scottish Costs Book, calculating total post-ICU hospitalisation expenses.
Results: There were 99 patients in pre-CCRS implementation cohort (2019) and 95 patients in the post CCRS implementation cohort (2024). Implementation of CCRS was associated with a reduction in median post-ICU hospital LOS from 16 days (IQR 12–34) to 11.5 days (IQR 7–25.5), despite unchanged median ICU LOS (12 days) in both cohorts. The proportion of patients requiring prolonged hospitalisation (> 30 days post-ICU) significantly declined from 31 to 24% ($p < 0.05$). Cost analysis revealed a median per-patient reduction in post-ICU hospitalisation expenses from £21,000 to £12,650, leading to a total cost saving of £660,951 (£3,103,268 pre-CCRS vs. £2,442,317 post-CCRS).
Conclusions: The implementation of CCRS has contributed to significant reductions in hospital LOS and healthcare costs for post-ICU patients. These findings support the continued investment and expansion of CCRS services to optimise healthcare resources and improve patient outcomes. Future studies should assess patient centred measures of long-term recovery, hospital readmission rates and healthcare resource utilisation post CCRS implementation.

Topic: Health Services Research and Outcome

000270

Pupil diameter in patients with a brain death clinic

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Intensive care Medicine Experimental 2025 **13(1)**:00270.

Introduction: When deciding on the possibility of ascertaining brain death, it is mandatory to comply with existing national recommendations/orders. Russian recommendations, along with such mandatory criteria that make it possible to suspect brain death in a patient, such as complete and stable lack of consciousness (coma); atony of all muscles; lack of reaction to severe pain stimuli in the area of trigeminal points and any other reflexes closing above the cervical spinal cord; immobility of the eyeballs, lack of reaction of the maximally dilated pupils—for adults, the diameter of the pupils is more than 5 mm, to direct bright light; absence of corneal reflexes; absence of oculocephalic reflexes; absence of oculovestibular reflexes; absence of pharyngeal and tracheal reflexes. If all of the above criteria are met, an apnoeic oxygenation test is performed to determine the absence of spontaneous breathing. After passing this test, a clinical diagnosis of brain death is made and dynamic observation begins from 6 to 72 h, depending on the cause of the development of this condition. We noted that in a number of patients, in the presence of all the criteria that make it possible to establish the diagnosis of brain death, the diameter of the pupils does not reach 5 mm or more.
Objectives: To assess the effect of pupil diameter in patients with the absence of other clinical signs on the ascertainment of brain death in patients with primary brain injury.
Methods: The study included 95 patients with primary brain injuries (strokes, traumatic brain injuries) over 18 years of age, admitted to the Regional Clinical Hospital from September 4, 2023 to March 22, 2024 (201 days). Patients received standardised therapy, including mechanical ventilation. In the development of atonic coma and the absence of reaction to painful stimuli, the absence of pupils' reaction to light, the absence of corneal, oculocephalic, oculovestibular, pharyngeal and tracheal reflexes, as well as the absence of the pattern of own breathing (assessed by the absence of own breaths in the Adaptive Support Ventilation mode of the Hamilton-C2 device with a trigger sensitivity of 1 l/min), the pupil diameter was measured.
Results: 31 (33%) patients out of 95 developed atonic coma with no stem reflexes and no self-breathing pattern. When assessing the pupil diameter in 13 (37%) patients out of 31 patients, the pupil diameter was less than 5 mm, which did not allow for the ascertainment of brain death. Pupil diameter less than 5 mm remained in all patients until circulatory arrest, with no surviving patients in this group. The death of patients occurred within 48 h from the moment of the development of atonic coma with the absence of their own breathing.
The absence of an increase in pupillary diameter of 5 mm or more in patients with other signs of brain death is a common phenomenon in clinical practice. In reviewing the available literature, we found that in a retrospective study by Pavlina Lenga et al. (2024) in a group of 17 patients with established brain death, the mean diameter for the right pupil was 4.9 mm (± 1.3) and 5.2 mm (± 1.2) for the left pupil, i.e. half of the patients had pupil diameter less than 5 mm. In a study by Shlugman D. et al. (2001), 148 patients were diagnosed with brain death, several of whom had pupil diameters less than 4 mm. Khandelwal et al. (2019) described several cases where the pupil diameter of

the patients was less than 3 mm, which led to the question of the possibility of declaring brain death in these patients, but after a thorough assessment of the stem reflexes and confirmation of their absence, the pronouncement of death in these patients was carried out.
Conclusions: The presence of the phenomenon of absence of pupil diameter increase of 5 mm or more is a significant factor influencing the frequency of brain death determinations, with its mandatory presence in national clinical guidelines.

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Topic: Brain death, organ donation and transplantation

000271

An audit assessing the ergonomics and function of current transport bags across three intensive care units in London

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Intensive care Medicine Experimental 2025* 13(1):*000271.

Introduction: Intensive Care Unit (ICU) transport bags are vital for patient transfers and emergencies. They were designed nearly ten years ago with multiple carrying methods, which include: as a backpack, clipped onto the side of the bed or under the headrest (Van Zwanenberg, Dransfield and Juneja, 2016). Despite their robustness, concerns about their ergonomics promote an evaluation of their design.
Objectives: This study aimed to assess staff knowledge, utilisation, and satisfaction regarding these bags, focusing on potential safety impacts.
Methods: A cross-sectional study with one hundred staff, across three intensive care units, completed an online survey on frequency, awareness of recommended usage, actual practices, and overall satisfaction. This involved an image of intended use. We collected feedback on main concerns. Staff included nurses, doctors, porters, etc.
Results: Results revealed that while staff used the bags regularly, 79% were unaware of recommended transport Methods: Only 34% were satisfied with current bag deployment, with concerns about weight and strap design. Lack of education and musculoskeletal injury were commonly identified themes.
Conclusions: Poor awareness of recommended transport, coupled with low satisfaction rates, highlight a gap between intended use and actual practice. Failure of intended use demonstrates the need for staff education. Concerns raised were related to the strap design, weight and a high risk of associated potential injury and days lost to sickness. The intersection of human factors and ergonomics suggests that addressing these issues could improve staff safety. Future research should focus on exploring innovative designs for ICU transfer bags to improve staff experience and safety.

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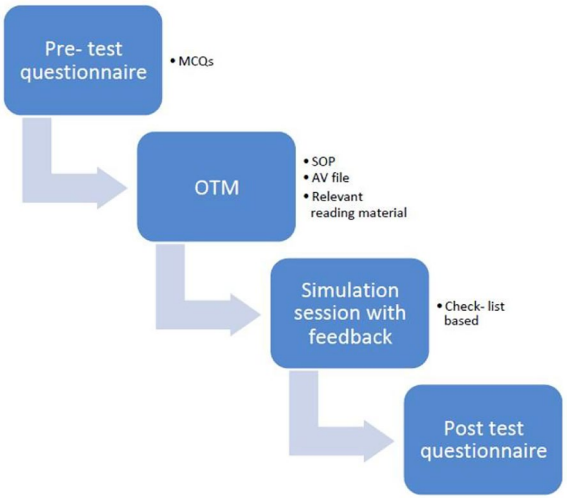
Topic: Information systems and Data Science

000279

Impact of simulation-based teaching on knowledge of performer, actual conduct of aerosol-generating procedures, and self-confidence while handling patients with COVID-19

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Intensive care Medicine Experimental* 2*025* 13(1):*000279.

Introduction: The COVID-19 pandemic had become a global emergency, with nearly 200 countries facing the crisis. Healthcare workers (HCWs) are at high risk, especially during aerosol-generating procedures. Proper training helps HCWs follow safety precautions, protecting themselves and their teams. Simulation-based training has proven effective in improving protocol adherence and helping HCWs perform procedures while wearing personal protective equipment (PPE). This method has also been successful in past epidemics, providing essential skills and overcoming technical challenges faced in high-risk environments.
Objectives: • Education of health care workers (HCW) to protect themselves and the team from acquiring infections while doing procedures on patients with COVID-19, that have the potential to generate aerosol.
• Training of HCWs to perform procedures with simulated personal protective equipment (PPE), to understand the technical difficulties that might be encountered and improve self-confidence.
Methods: The study, conducted by the Department of Anaesthesiology, Pain Medicine, and Critical Care, involves simulated training for COVID-19 management using mannequins. Participation in the study is voluntary, with full training provided regardless of participation. The intervention study follows a single-group pre–post design. Residents from various departments handling COVID-19 patients are eligible. A sample size of 200–250 residents is expected, with analysis after 50 trainings. The online teaching module (OTM) includes a standard operating procedure, audiovisual demonstration, and reading material. Simulation sessions will involve PPE simulation, mannequin practice, and procedure demonstrations. Participants will complete pre- and post-test questionnaires. Feedback will be provided by assessors, and materials will be discarded after each session.
Results: The study involved 51 Anaesthesia Residents over six months, including Junior Residents and those with 1–3 years of experience. A pre-test on bronchoscopy showed a mean score of 7.72 ± 1.0, improving to 8.66 ± 1.06 in the Post-Test ($P < 0.0001$). Similarly, pre-test intubation scores were 6.92 ± 1.39, rising to 9.45 ± 1.10 post-test ($P < 0.0001$). Post-simulation checklists revealed that 55% of participants scored ≥ 11 correct answers in bronchoscopy, and 57% did so in intubation. Feedback indicated 41% were very happy with the program, 80% understood it well, and 57% rated the content highly. Overall, the study demonstrated significant knowledge improvement and positive participant feedback.
Conclusions: Simulation-based training significantly improved healthcare workers' skills and knowledge in performing high-risk procedures like bronchoscopy and intubation while using PPE during the COVID-19 pandemic. The positive results and participant feedback demonstrate that this approach effectively enhances technical abilities and confidence, making it a valuable tool for training in high-risk environments. This method can be a key component of residency programs to ensure better preparedness and safety in future healthcare crises.



Methodology of the study.

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2. Intramural Grant from AIIMS, New Delhi

Topic: Infections and prevention

000280

Impact of awake prone positioning on lung aeration during high-flow nasal oxygen and continuous positive airway pressure: a prospective physiologic study

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Intensive care Medicine Experimental 2025* 13(1):*000280.

Introduction: Awake prone positioning (APP) has been reported to improve oxygenation for non-intubated patients with acute hypoxemic respiratory failure (AHRF) (1–3), particularly for patients with COVID-19 induced AHRF, APP has been shown to decrease the need of intubation(4, 5). However, a recent meta-analysis has revealed that the benefits of APP are more pronounced in patients who receive advanced respiratory support, including high-flow nasal cannula (HFNC) oxygen therapy, continuous positive airway pressure (CPAP), and noninvasive ventilation (NIV)(6), while no significant differences in intubation risk were observed between APP and supine position for those on conventional oxygen therapy. Furthermore, a subgroup analysis from a multi-center randomized controlled trial comparing APP with standard care has highlighted an increased risk of endotracheal intubation in patients receiving NIV or CPAP, while those undergoing HFNC therapy showed a decreased risk (7).
On the other hand, the consistent positive end-expiratory pressure (PEEP) delivery inherent in CPAP and NIV distinguishes them from the variable PEEP levels generated by HFNC. CPAP and NIV have been shown superior over HFNC in terms of oxygenation improvement(8, 9). Additionally, helmet NIV effectively reduced inspiratory effort and mitigated pendelluft effects, setting it apart from HFNC(9). Correspondingly, in a multi-center randomized controlled trial involving COVID-19 patients, Perkins and colleagues highlighted CPAP's superiority over HFNC and conventional oxygen therapy in reducing intubation rates(10).
However, the synergistic effects of APP combined with CPAP, as well as the potential for more effective alveolar recruitment and improved ventilation homogeneity, remain unclear when compared to the combination of APP and HFNC. Thus, we aimed to explore the impact on ventilation homogeneity and alveolar recruitment of different respiratory support—conventional oxygen therapy, HFNC, and CPAP—in both supine and prone positions among COVID-19 patients with AHRF.
Objectives: Awake prone positioning (APP) has shown potential in improving oxygenation and reducing intubation rates in patients with acute hypoxemic respiratory failure (AHRF). This study aimed to evaluate the effects of APP on ventilation distribution during high-flow nasal cannula (HFNC) and continuous positive airway pressure (CPAP).
Methods: Thirty-four AHRF patients underwent 30-min phases of HFNC, high-flow oxygen mask (HFOM), and CPAP in both supine and prone positions in a random order. Ventilation was assessed using electrical impedance tomography (EIT).
Results: The pulse oximetry of saturation/fraction of inspired oxygen (SpO2/FiO2) and ROX index (defined as [SpO2/FIO2]/respiratory rate) were greater with CPAP compared to HFOM and HFNC in both supine and prone positions (all $P < 0.05$). APP significantly improved the SpO2/FiO2 and ROX index across all devices (all $P < 0.05$). In the supine position, center of ventilation (CoV) with CPAP was higher compared to both HFOM ($P = 0.015$) and HFNC ($P = 0.030$). However, during APP, CoV with CPAP decreased significantly compared to supine position ($P = 0.001$). Regardless of the type of respiratory support, APP did not significantly affect ΔZ but significantly reduced global inhomogeneity (GI) and pendelluft. In contrast, CPAP, regardless of the position (supine or prone), significantly increased ΔZ and global inhomogeneity (GI) but had no effect on pendelluft, when compared to other respiratory support Methods: Regarding comfort, both APP and CPAP resulted in lower comfort levels compared to the baseline.
Conclusions: Compared to HFOM and HFNC, CPAP significantly improved oxygenation but may cause global ventilation inhomogeneity. APP reduced GI and pendelluft; whereas, using APP during CPAP facilitated homogeneous ventilation distribution, further improving oxygenation.

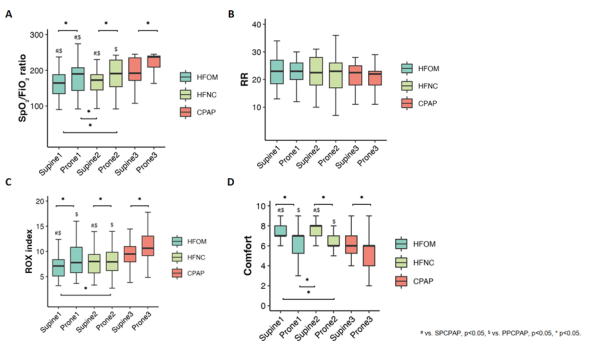


Fig. 1 (abstract 000280) Evolution of SpO2/FiO2 (A), RR(B), ROX index (C) and comfort (D) with HFOM, HFNC and CPAP in supine and prone position. # vs. SPCPAP, p < 0.05, $ vs. PPCPAP, p < 0.05, * p < 0.05. Supine 1: SPOM, supine position with high flow oxygen mask. Supine 2: SPHFNC, supine position with high-flow nasal cannula. Supine 3: SPCPAP: supine position with continuous positive airway pressure. Prone 1: PPOM, prone position with high flow oxygen mask. Prone 2: PPHFNC, prone position with high-flow nasal cannula. Prone 3: PPCPAP, prone position with continuous positive airway pressure

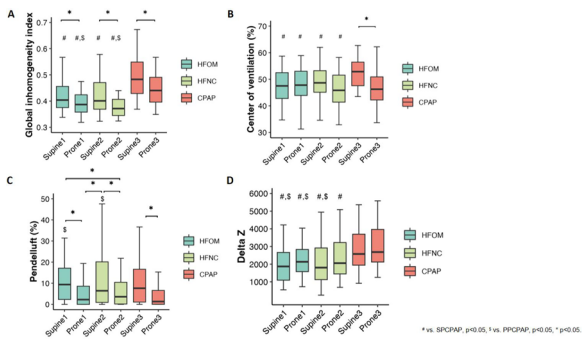


Fig. 2 (abstract 000280) Evolution of global inhomogeneity index (A), center of ventilation (B), pendelluft (C) and delta Z (D) with HFOM, HFNC and CPAP in supine and prone position. # vs. SPCPAP, $p < 0.05$, $ vs. PPCPAP, $p < 0.05$, * $p < 0.05$. Supine 1: SPOM, supine position with high flow oxygen mask. Supine 2: SPHFNC, supine position with high-flow nasal cannula. Supine 3: SPCPAP: supine position with continuous positive airway pressure. Prone 1: PPOM, prone position with high flow oxygen mask. Prone 2: PPHFNC, prone position with high-flow nasal cannula. Prone 3: PPCPAP, prone position with continuous positive airway pressure

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11. This work was supported by the Shanghai Municipal Health Commission Fund(GWVI-11.1–14), the Open Project of State Key Laboratory of Respiratory Disease (SKLRD-OP-202321), the Shanghai Key Laboratory of Lung Inflammation and Injury, the Shanghai Health Commission Clinical Research Project (202,240,334), and the Youth Fund of Zhongshan Hospital, Fudan University (No.2024ZSQN48).

Topic: Imaging in intensive care

000282

The difference of outcomes in cardiac arrest patients post targeted temperature management between patients with and without diabetes mellitus: the nationwide multicenter TIMECARD study

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Intensive care Medicine Experimental 2025* 13(1):*000282.

Introduction: Targeted temperature management (TTM) reduces mortality rates and improves neurological function in patients who experience cardiac arrest. However, the differences in responses to TTM between patients with and without diabetes mellitus (DM) require further investigation.
Objectives: We therefore aimed to examine the outcomes of TTM therapy for patients with and without DM who were treated for cardiac arrest.
Methods: This multicenter observational study included patients who experienced cardiac arrest and received TTM therapy between January 2013 and September 2019. Comparisons were made between DM and non-DM patient groups.
Results: A total of 580 patients were enrolled. The DM group had a worse survival rate (45.3% vs. 32.0%, $p = 0.0016$) and worse neurological outcomes (GCS score > 8: 67.5% vs. 53.2%, $p = 0.0318$) at hospital discharge. In the multivariate logistic regression analysis, it revealed that DM was a negative predictor for survival in patients who underwent cardiac arrest and were treated by TTM (OR = 1.51, 95% CI: 1.03–2.21, $p = 0.0366$). In the DM group, coronary intervention (OR = 0.262, 95% CI: 0.11–0.64, $p = 0.0034$) was a positive predictor for survival. In the non-DM group, prehospital return of spontaneous circulation (OR = 0.444, 95% CI: 0.24–0.83, $p = 0.0108$) was a positive predictor for survival, whereas old age > 65 years (OR = 2.15, 95% CI: 1.30–3.56,

$p = 0.003$) and mean arterial pressure < 65 mmHg (OR = 2.957, 95% CI: 1.49–5.86, $p = 0.019$) were negative predictors.
Conclusions: This study showed that DM is significantly associated with worse survival and neurological outcomes in patients who experience cardiac arrest and are treated by TTM. Additionally, patients with DM who had cardiogenic etiologies and initial shockable rhythms had a higher mortality rate. Some positive factors for survival, such as witness collapse and prehospital return of spontaneous circulation, were reduced in patients with DM.

Topic: Cardiac arrest

000283
Impact of recurrent enteral feeding intolerance on 30-day mortality in critically ill patients: a retrospective cohort study
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Intensive care Medicine Experimental 2025* 13(1)*:000283.

Introduction: Feeding intolerance (FI) is a prevalent and significant challenge in critically ill patients, often contributing to adverse clinical outcomes. While previous studies have established an association between a single episode of enteral feeding intolerance (EFI) and poor prognosis, the impact of multiple EFI episodes on patient outcomes remains inadequately explored. Given the potential prognostic significance of recurrent EFI in intensive care unit (ICU) patients, this study aims to evaluate its relationship with patient survival.
Objectives: We conducted a retrospective study of ICU patients requiring mechanical ventilation from July 2021 to September 2022.
Methods: Inclusion criteria comprised patients aged ≥ 20 years, requiring mechanical ventilation, and with an ICU stay exceeding three days. Patients with contraindications to enteral nutrition were excluded. EFI was defined as an interruption of enteral feeding with difficulty achieving the target intake due to any of the following: high gastric residual volumes, increased abdominal girth, distension, subjective discomfort, emesis, or diarrhea. A single episode of EFI was defined as meeting EFI criteria for one day, whereas multiple episodes of EFI indicated recurrent occurrences.
Results: Among 447 patients (mean age 69 years; mean APACHE II score 25), 15% experienced a single episode of EFI, while 29% experienced multiple episodes. The average daily enteral nutrition intake during the first 7 days was 692 kcal/day in patients with EFI, compared to 889 kcal/day in those without EFI. In multivariable Cox regression analysis, multiple EFI episodes were independently associated with increased 30-day mortality (hazard ratio [HR]: 1.66; 95% confidence interval [CI]: 1.10–2.49), as were higher APACHE II scores (HR: 1.08; 95% CI: 1.04–1.12). A single EFI episode was not significantly associated with mortality.
Conclusions: Multiple EFI episodes are linked to increased 30-day mortality in critically ill patients, highlighting the need for proactive management to prevent recurrent EFI.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000288
Impact of pharmacist interventions on antimicrobial use in ICU
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Intensive care Medicine Experimental 2025* 13(1)*:000288.

Introduction: Optimizing antimicrobial therapy in critically ill patients is essential to improving clinical outcomes and minimizing the emergence of antimicrobial resistance. Pharmacists play a crucial role in antimicrobial stewardship. This study aims to evaluate the relevance of pharmacist-led interventions on antimicrobial prescriptions in Intensive Care Units (ICU) with limited pharmacist support.
Objectives: Evaluate pharmacist interventions and how often they were accepted by doctors, regarding antimicrobial prescriptions in critically ill patients, in a setting where there is only one supporting pharmacist who is not exclusively dedicated to the ICU.
Methods: Pharmacist interventions regarding antimicrobial drugs were collected retrospectively in both ICUs of a tertiary hospital, using electronic prescribing system CPC-Glintt, between 2024 January 1st and 2024 December 31st. The interventions occurred in person or by written message in the prescription. They were classified according type of recommendation and acceptance by medical team. Patient data were collected anonymously. Antibiotics prescribed for gastroparesis were excluded.
Results: During the study period, there were 759 inpatients with antimicrobials prescribed. There were 186 registered interventions about antimicrobials, mainly regarding antibiotics (79%), followed by antifungals (12%), antivirals (6%), and antituberculous agents (2%). The types of interventions were as follows: dosing or frequency (69), duration (36), stopping (20), de-escalating (20), pharmacokinetic monitoring (13), interactions (3), IV to per os transition (1), and other (24). Approximately 10% of the interventions did not require acceptance to take place. Of the remaining interventions, 64% were accepted by the medical team in less than 24 h, and 5% after that.
Conclusions: Pharmacist interventions contributed to more appropriate use of antimicrobials in critically ill patients. The high rate of timely acceptance by the medical team reinforces the importance of integrating pharmacists into antimicrobial stewardship efforts, even when they are not exclusively dedicated to the ICU.

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Topic: Infections and prevention

000289
Myeloid phenotypic switching mediates sepsis-Alzheimer's amyloid-β cascade: single-cell multiomics and cross-species validation
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Intensive care Medicine Experimental 2025* 13(1)*:000289.

Introduction: Sepsis-associated cognitive impairment (SACI) lacks targeted therapies, with unresolved debates on the peripheral origins of cerebral amyloid-β (Aβ) pathology. We hypothesized that sepsis reprograms myeloid progenitors to drive Aβ dysregulation through "trained immunity". Integrated scRNA-seq analysis of sepsis, AD, and healthy cohorts identified dynamic expression of MAFG, FOXO3, NFIL3, and RGS10 in sepsis-derived CMPs, later enriched in AD DCs/platelets.

Objectives: Emerging evidence suggests that peripheral inflammation impacts the central nervous system (CNS) and may contribute to the pathophysiology of neurodegenerative diseases such as Alzheimer's disease (AD). Our objectives were to: (1) identify dynamically expressed myeloid-derived conserved genes shared between sepsis and AD; (2) validate their potential as biomarkers for sepsis-associated cognitive impairment (SACI) prognosis and Aβ pathology; (3) define their roles in cognitive deficits using murine sepsis models; (4) explore clinical relevance through survival analysis and functional enrichment.

Methods: Data integration: scRNA-seq analysis of sepsis, AD, and healthy controls (public datasets) to identify sepsis-enriched CMPs and AD-enriched DCs/platelets.

Biomarker validation: ROC analysis of gene expression in sepsis blood (GSE65682, n = 802) and brain tissue (GSE135838, CERAD-stratified, n = 24).

Murine models: cognitive assessment (Y-maze, novel object recognition) and RT-qPCR in CLP sepsis and APP/PS1 AD mice.

Functional annotation: GSEA (MSigDB pathways) and survival analysis (Kaplan–Meier).

Statistical analysis: ANOVA, Spearman correlation, ROC (AUC > 0.7) via R stats.

Results: Integrated analysis of single-cell transcriptomes from sepsis, AD, and healthy controls identified 13 core genes co-upregulated in sepsis-derived common myeloid progenitors (CMPs) and AD dendritic cells (DCs)/platelets (Fig. 1A-B), including myeloid regulators (MAFG, FOXO3, NFIL3) and neuroinflammatory mediators (RGS10). Literature mining expanded the signature to 28 AD-associated peripheral biomarkers (Fig. 1C), with pathway overlap observed for known AD risk genes (e.g., TREM2, APOE).

Validation in in-house sepsis and brain tissue cohorts demonstrated specific overexpression of MAFG, FOXO3, NFIL3, and RGS10 in SAE patients, showing robust diagnostic power (AUC > 0.7) for SAE subtyping, CERAD scores, and Braak staging (Fig. 2C, E). Single-cell resolution revealed dynamic cellular tropism: these genes localized to CMPs during sepsis but shifted to DCs/platelets in AD, suggesting myeloid phenotypic switching facilitates Aβ "periphery-to-CNS" transmission (Fig. 3C-E).

CLP-induced septic mice exhibited significant cognitive deficits at day 7: decrease in new object recognition index and time spent exploring the novelty arm of the Y maze, mirroring human SAE phenotypes (Fig. 4B-I). Survival analysis linked high FOXO3 and MAFG expression to increased 28-day mortality, while NFIL3/RGS10 showed no prognostic significance (Fig. 5A). Functional annotation revealed: (1) peripheral blood: FOXO3 enriched in keratinization/neurotransmission, MAFG in platelet activation, NFIL3 in IL-6/chemokine signaling, RGS10 in GPCR pathways (Fig. 5B); (2) brain tissue: MAFG/FOXO3 dominated synaptic plasticity, NFIL3 in neuroinflammation, RGS10 in microglial TYROBP networks (Fig. 5C).

Dynamic expression profiling showed acute-phase upregulation of MAFG/FOXO3/NFIL3/RGS10 in peripheral leukocytes, which normalized by day 21 but remained elevated in APP/PS1 mice, suggesting their role as "immune memory" markers driving post-sepsis Aβ pathology (Fig. 5D-G).

Conclusions: This study reveals that sepsis reprograms myeloid cells via MAFG, FOXO3, NFIL3, and RGS10—genes dynamically activated in sepsis progenitors (CMPs) and enriched in AD dendritic cells/platelets—to drive amyloid-β (Aβ) pathology through myeloid phenotypic switching and periphery-to-CNS transmission. These genes demonstrate diagnostic utility for sepsis-associated encephalopathy and predict mortality. Targeting the "myeloid-neurovascular unit" offers therapeutic promise for sepsis-related cognitive decline.

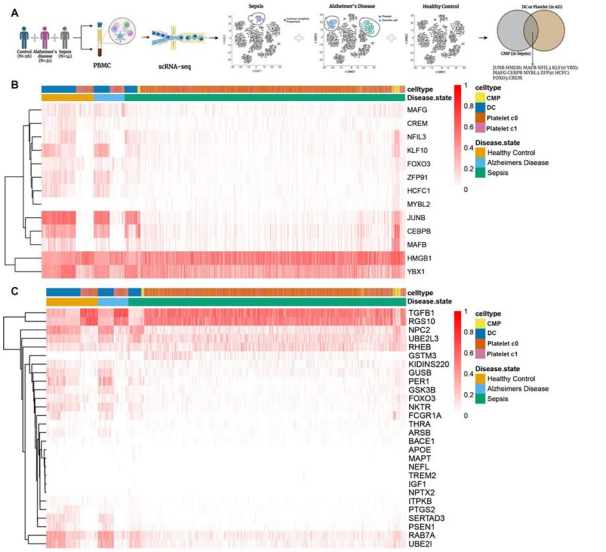


Fig. 1 (abstract 000289) Transcriptomic profiling of myeloid cells in sepsis and AD. (A) Integrated analysis workflow: screening of differentially expressed genes from scRNA-seq data of sepsis, AD and healthy controls; (B) heatmap of co-expressed genes in sepsis CMPs and AD DCs/platelets (13 key genes including MAFG, CREM); (C) heatmap of 28 literature-reported AD peripheral biomarkers (e.g., TGFB1, APOE)

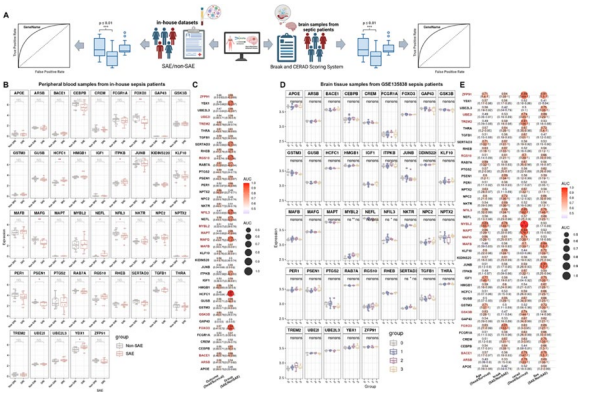


Fig. 2 (abstract 000289) Clinical validation and diagnostic performance of candidate biomarkers. (A) Validation strategy: gene expression analysis in in-house sepsis cohort and public brain transcriptome dataset (GSE135838); (B) differential gene expression between SAE and non-SAE groups stratified by GCS scores; (C) ROC analysis of gene–clinical outcome correlations (bubble size indicates AUC values); (D) association between gene expression and CERAD scores in GSE135838; (E) ROC analysis for AD pathological features (e.g., Braak staging). *P < 0.05; **P < 0.01; ***P < 0.001. Error bars: SEM

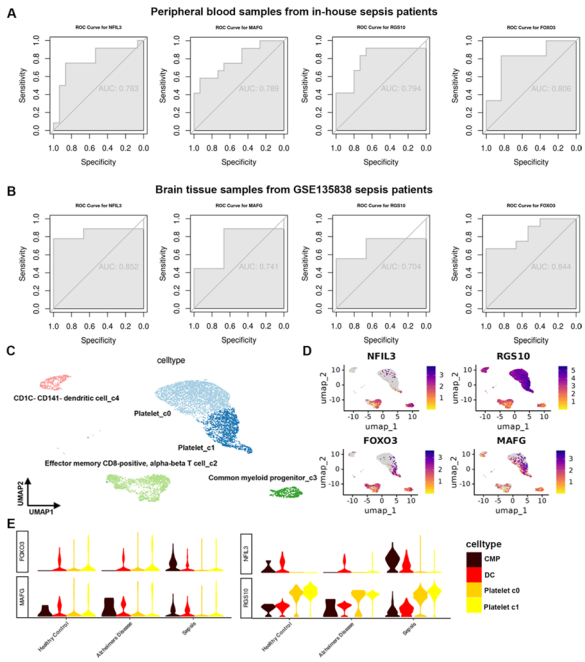


Fig. 3 (abstract 000289) Cross-species validation and cellular localization of key genes. (A) ROC curves of 4 candidate genes (MAFG, FOXO3, NFIL3, RGS10) in sepsis cohort (AUC > 0.7); (B) ROC analysis in brain tissue dataset; (C) UMAP visualization of APP-high cell subsets; (D) violin plots showing gene expression across cell subtypes; (E) Heatmap of gene expression in CMPs, DCs and platelets from healthy, AD and sepsis groups

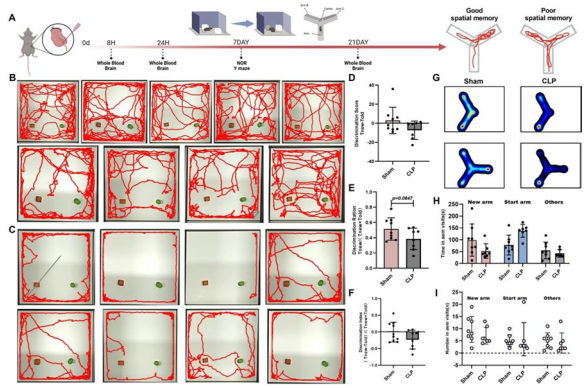


Fig. 4 (abstract 000289) Cognitive impairment phenotypes in septic mice. (A) Experimental design for cognitive assessment in CLP model; (B-C) representative trajectories in novel object recognition test: (B) sham, (C) CLP; (D-F) behavioral parameters (rearing events, mean velocity, center duration); (G-I) Y-maze results: (G) schematic, (H) time in arms, (I) arm entries. *P < 0.05; **P < 0.01; ***P < 0.001. Error bars: SEM

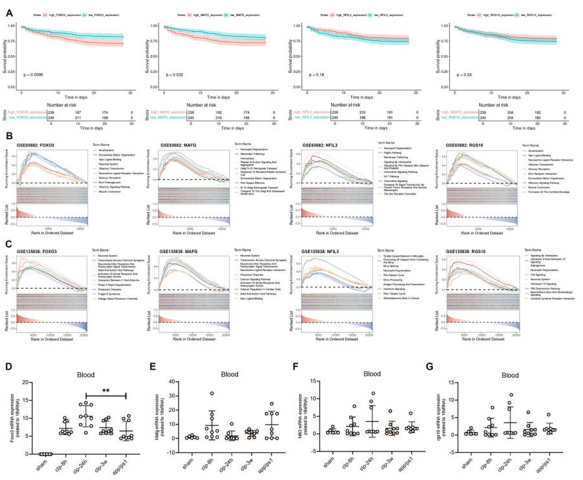


Fig. 5 (abstract 000289) Prognostic value and functional mechanisms of biomarkers. (A) KM survival analysis of high/low gene expression groups; (B-C) single-gene GSEA: (B) sepsis blood (GSE65682), (C) brain tissue (GSE135838); (D-G) RT-qPCR validation of dynamic gene expression in Sham, CLP and APP/PS1 mice. *P < 0.05; ***P < 0.001. Error bars: SEM

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Topic: Neurointensive care

000290

Incidence and outcomes from severe respiratory tuberculosis requiring mechanical ventilation in the United States: a retrospective cohort study 2006–2022

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Intensive care Medicine Experimental 2025* 13(1):*000290.

Introduction: Since 2020 in the United States (US), the incidence rate of TB cases been increasing after nearly 30 years of decline.1 Respiratory tuberculosis (TB) rarely causes acute respiratory failure requiring invasive mechanical ventilation (IMV). Mortality ranges from 24–81% for patients with TB requiring IMV, however current evidence is limited to single-center studies with small sample sizes.2,3 Large population-based studies on outcomes associated with TB and IMV in the developed world are needed to understand the epidemiology and outcomes of TB acute respiratory failure on a national scale.
Objectives: To examine the incidence and outcomes of acute respiratory TB requiring IMV in the US.
Methods: We conducted a retrospective cohort analysis including all adults (^{3}18 years) admitted to hospital in the US wTabarith tuberculosis that required IMV between 2006–2022. IMV and TB were identified using ICD9/10 codes. The Nationwide Inpatient Sample (NIS), a national in-patient database capturing 20% of all US hospitalizations was utilized for this analysis. The database is structured to produce national estimates of in-patient care across the US. Multivariate logistic regression modelling was used for the primary outcome of in-hospital mortality on IMV.
Results: We identified 41,975 hospitalizations for TB, of which 2,896 (6.9%) were treated with IMV. All-cause mortality for patients on IMV was 42.5%. The mean age was 58.1 years (SD 18.1). Patients treated with IMV were more likely to be male (66.9%) and of lower socioeconomic status (39.1% from lowest income quartile, 22.3% from second lowest). Human immunodeficiency virus (HIV) infection was present in 311 IMV patients (10.8%), solid organ cancers in 303 (10.5%), and lymphoma/leukemia in 50 (1.7%). The median hospital length of stay was 17 days (IQR 8–32) and tracheostomy was performed in 593 patients (20.5%). After multivariate adjustment, risk factors associated with increased mortality included: age (Odds Ratio (OR) 1.34 per 10-year increase, 95% confidence interval (CI) 1.21–1.45, $p < 0.01$), Hispanic race (OR 1.43, 95% CI 1.11–1.83, $p < 0.01$), lymphoma (OR 2.29, 95% CI 1.25–4.20, $p < 0.01$), and liver failure (OR 1.81, 95% CI 1.45–2.26, $p < 0.01$). HIV infection was not associated with worse mortality (OR 1.26, 95% CI 0.95–1.67, $p = 0.10$). The incidence of TB treated with IMV fell from 0.39 cases/100,000 persons in 2006 to 0.16 cases/100,000 persons in 2022 ($p < 0.01$).
Conclusions: The incidence of acute respiratory TB treated with IMV has decreased in the US, however the mortality remains high.

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Topic: Acute respiratory failure and mechanical ventilation

000291

Hemodynamic phenotypes from carotid artery and internal jugular Doppler ultrasound associate with adverse outcome in septic emergency department patients

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Intensive care Medicine Experimental 2025* 13(1):*000291.

Introduction: A hemodynamic framework encompassing 'Doppler quadrants' and the 'Doppler Starling curve' has been proposed to conceptually integrate surrogates of stroke volume (SV) and right atrial hemodynamics from common carotid artery and internal jugular vein Doppler measures, respectively; how these Doppler quadrants associate with the probability of preload responsiveness (PR) and patient outcome is unknown.
Objectives: 1.) Describe the association between initial Doppler quadrant and the frequency of preload responsiveness in fluid-naïve patients presenting to the emergency department (ED) with suspected sepsis.
2.) Describe the association between initial Doppler quadrant and the frequency of adverse clinical outcome defined as a composite score of rapid response activation, intensive care unit admission, or mortality.
Methods: We enrolled a convenience sample of fluid-naïve, adult patients with suspected sepsis presenting to the ED of a quaternary care hospital as a prospective cohort study. Patients were excluded if they were intubated, on vasopressors, in whom there was known bilateral severe carotid stenosis or patients who were deemed at high risk for receiving intravenous fluids (e.g., overt pulmonary edema, volume overload).
In the semi-recumbent position, a wearable, wireless Doppler ultrasound system (Flosonics Medical, Sudbury, Canada) was placed on the neck over the common carotid artery and internal jugular vein; patients were allocated into Doppler quadrants based upon their baseline internal jugular Doppler morphology and absolute common carotid corrected flow time (ccFT) (Q1— 'warm-dry'; Q2—'warm-wet'; Q3—'cold-dry'; Q4— 'cold-wet'). Then, a rapid fluid challenge (RFC) consisting of 250—300 mL of crystalloid was delivered at a rate of at least 100 mL/min. PR, the primary outcome, was identified as a ccFT change (ccFTΔ), of at least + 7 ms between baseline and RFC.
The secondary outcome was whether adverse outcome (i.e., defined as a composite score of rapid response activation, intensive care unit admission, or mortality) differed between the 4 Doppler quadrants.
Results: Among 80 patients analyzed, 52.5% began in Doppler quadrant 3 (Q3 or 'cold-dry'); 26.0% of these patients were preload unresponsive. Patients who began in quadrant 2 (Q2 or 'warm-wet') more frequently developed adverse outcome compared with patients who began in Q1 ($p = 0.03$; 83.3% vs. 33.3%), Q3 ($p = 0.02$; 83.3% vs 40.5%), or Q4 ($p = 0.02$; 83.3% vs 27.3%)). Q4 patients had the highest in-hospital mortality (27%) though this was not statistically significantly different.
Conclusions: Most ED patients needing fluid resuscitation begin in Doppler quadrant Q3; nevertheless, a clinically significant proportion of these patients are fluid unresponsive. Patients presenting Q2, have a significantly increased risk of adverse outcome. Simultaneous internal jugular and common carotid Doppler may help direct fluid management and triage of septic patients in the ED.

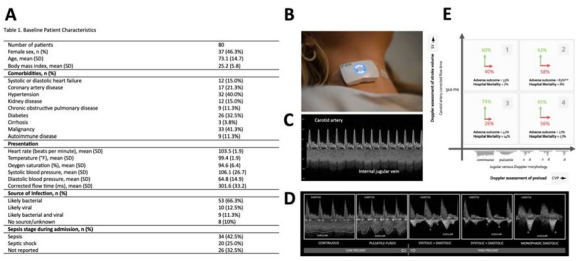


Figure. **A.)** Baseline patient characteristics; **B.)** wearable Doppler system on a healthy subject; **C.)** normal common carotid (above) and internal jugular (below) spectrograms; **D.)** examples of internal jugular spectrograms of displaying increased right atrial filling; **E.)** the Doppler Starling quadrants showing proportions of preload responsive/unresponsive patients per initial quadrant, adverse outcome and mortality.

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Topic: Cardiovascular issues in ICU

000293

Clinical profile of tetanus patients treated in tertiary ICU in Indonesia: a retrospective observational study

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Intensive care Medicine Experimental 2025* 13(1):*000293.

Introduction: Tetanus is a worldwide health problem, especially in developing countries. It occurred particularly in rural-agricultural areas, warm-humid environments, easy contact with soil or animal feces, and made worse by inadequate immunization among adult (Table 1). In 2020, more than 11.750 cases worldwide were reported, with the majority reported from Africa and Southeast Asia, where Indonesia is located. Besides the mortality problem, tetanus often requires advanced technology with high costs. The long course of tetanus requires prolonged supportive care in the ICU which can have a significant impact on survival and health system.
Objectives: In this study, we identify the clinical profile of adult patients with severe tetanus requiring intensive care at one of the tertiary referral hospitals in Indonesia. We aim to obtain data on clinical characteristics and mortality risk of tetanus patients to plan further studies with a larger scope by including several regional hospitals.
Methods: We analyzed retrospectively observational data of tetanus cases in tertiary ICU from 2020 to 2024. Adult patients diagnosed with tetanus were included in this study. Data on clinical features, therapies, and complications were recorded from medical records from the time the patient was admitted to the hospital. Descriptive analysis and mortality risk relationships were carried out using statistical Methods:
Results: This study included 12 patients with the immunization history of all patients unknown. The mean age of the patients was 62.9 ± 9.8 years and 75% were male. Eleven patients suffered from severe or very severe tetanus (Ablett's classification). Wounds on the lower extremities and cavities were the most common sources of infection (41.7%). Trismus and generalized spasm were the most common presenting symptoms, 58.3% and 66.7%, respectively. In survived patients, the mean length of stay in the ICU was 26 ± 9.19 days, while the median days on mechanical ventilation was 19.5 [17–40]. Continuous sedation and vasopressors were required in 83.3% of patients. Complications that often occur were pneumonia (100%), shock (66.7%), and AKI (66.7%). The overall mortality rate was 50%. Statistical analysis of factors that predicted to affect mortality (age, SAPS II score, AKI, and vasopressor use) showed not significant differences ($p > 0.05$) (Table 2).
Conclusions: The small number of cases we get is probably because our hospital is a tertiary referral hospital so that cases that came are only cases with severe conditions. The long duration of ventilator use and ICU stay indicate that tetanus has an impact on complications and high costs so that it requires financing support. Moreover, tetanus is a preventable disease so that re-immunization efforts need to be strengthened. The results of this study provide important initial insights. Further research with a wider population in regional hospitals is important to be carried out to identify risk factors that can affect mortality so that improvements can be made to the overall health system.

Table 1 (abstract 000293) Profile of tetanus that can cause problems in Indonesia

Profile of tetanus
▪ Most cases in Africa and Southeast Asia
▪ Most common in rural and agricultural areas
▪ Contact with soil or animal feces
▪ Warm and humid environments
▪ Inadequate tetanus immunization
▪ Requires sophisticated technology at high cost
▪ Requires long intensive care in the ICU
▪ Limited health funding

Table 2 (abstract 000293) Identification of factors associated with mortality

Identification of factors associated with morality			
Parameters	**Not survived**	**Survived**	**p value**
Age	63.67 ± 11.45	62.17 ± 8.95	0.806
SAPS II score	45 [35 – 84]	39.5 [37 – 70]	0.422
Shock	6 (75)	2 (25)	0.061
Acute kidney injury	5 (62.5)	3 (37.5)	0.545
Vasopressor use	6 (75)	2 (25)	0.061
Tracheostomy	3 (33.33)	6 (66.67)	0.182
Length of ICU stay	7.83 ± 5.78	26.00 ± 9.19	0.002
Length of hospital stay	9.50 ± 7.48	37.17 ± 9.95	0.000

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Topic: Infections and prevention

000295

Influence of time-varying fluid parameters on progression of acute kidney injury in septic patients requiring vasopressors: an international cohort study

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Intensive care Medicine Experimental 2025* 13(1):*000295.

Introduction: Fluid management is a fundamental treatment for septic patients and exerts a substantial influence on renal function [1]. Previous studies have proved that certain fluid parameters can guide fluid management in sepsis, but they are limited and mostly static, making them insufficient to estimate prognosis [2–5].
Objectives: This study aimed to evaluate the association between time-varying fluid parameters and acute kidney injury (AKI) progression in septic patients, and identify the most critical fluid parameter.
Methods: This multicenter study analyzed data from the Chinese Database in Intensive Care (CDIC) and the Medical Information Mart for Intensive Care IV (MIMIC-IV), which included adult septic patients requiring vasopressors. Patients with ICU stays < 24 h, AKI stage 3 at ICU admission, or undergoing hemodialysis were excluded. The exposures of interest were various time-varying fluid parameters, including fluid balance, fluid intake, fluid output, and the fluid accumulation index, defined as the ratio of fluid balance to fluid intake. The primary outcome was AKI progression, defined as the new onset of AKI or a worsening of AKI by at least one Kidney Disease: Improving Global Outcomes (KDIGO) stage within 7 days of enrollment [6]. Multivariable Cox regression models were employed to explore the association between different time-varying fluid parameters and AKI progression.
Results: A total of 824 septic patients from the CDIC cohort and 7918 from the MIMIC-IV cohort were included, with AKI progression rates of 34.6% and 49.8%, respectively. After adjusting for confounders, Cox regression analysis demonstrated that all time-varying fluid parameters were associated with AKI progression in both cohorts (Fig. 1). Compared with other fluid parameters, the fluid accumulation index had the best-fit Cox regression model, with the lowest Akaike information criterion (AIC) and highest C-index (Fig. 2). The impact of fluid parameters on AKI progression was primarily presented in patients with AKI progression to stage 3 (Fig. 3). In addition, fluid accumulation index was correlated with AKI progression in the early and middle phases (days 1–5), but not in the later phase (days 6–7) in CDIC cohort.
Conclusions: All time-varying fluid parameters demonstrated independent associations with AKI progression in septic patients, with the fluid accumulation index emerging as the strongest predictor.

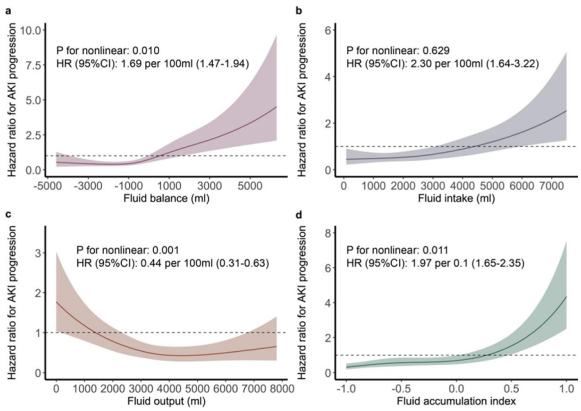


Fig. 1 (abstract 000295) The correlation between time-varying fluid parameters and AKI progression in CDIC cohort. a: Fluid balance. b: Fluid intake. c: Fluid output. d: Fluid accumulation index

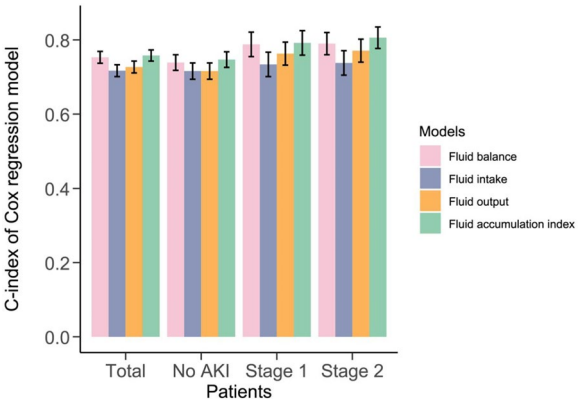


Fig. 2 (abstract 000295) The C-index of each Cox regression model in total patients and patients with different AKI stage on the first day in CDIC cohort

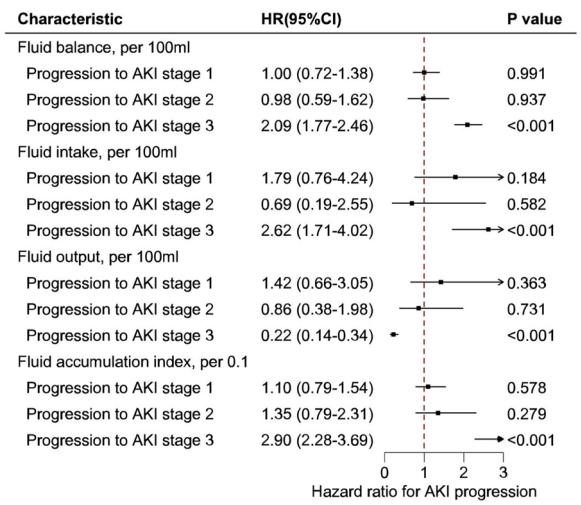


Fig. 3 (abstract 000295) The correlation between fluid parameters and progression of different AKI stages in CDIC cohort

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Topic: Acute Kidney Injury and haemofiltration

000296

Performances of the Day 1 SOFA and modified SOFA score in predicting ICU mortality across varying levels of respiratory support: insights from the MIMIC-IV cohort

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***Intensive care Medicine Experimental 2025* 13(1):*000296*.**

Introduction: The Sequential Organ Failure Assessment (SOFA) score is widely used to predict ICU mortality. However, the predictive performance of the SOFA score for ICU mortality in patients treated with non-invasive ventilation (NIV) or high-flow nasal cannula (HFNC) remains unclear.
Objectives: In this study, we evaluated whether the Day 1 SOFA score accurately predicts ICU mortality in patients receiving various types of respiratory support, comparing the original SOFA score with a modified version that incorporates the SpO_2/FiO_2 ratio and allows for higher respiratory sub-scores in non-intubated patients.
Methods: This retrospective cohort study used the MIMIC-IV database (2008–2019). Patients receiving invasive ventilation, NIV, or HFNC on ICU day 1 were included. Two cohorts were defined: Cohort 1 for the original SOFA score using only the PaO_2/FiO_2 ratio, and Cohort 2 for the modified SOFA score incorporating both PaO_2/FiO_2 and SpO_2/FiO_2 ratios and allowing respiratory sub-scores ≥ 3 in non-intubated patients. The predictive performance of Day 1 SOFA scores for ICU mortality was assessed using the area under the receiver operating characteristic curve (AUC).
Results: A total of 10,302 and 12,353 patients were included in Cohort 1 and 2, respectively. In both cohorts, the predictive performance of Day 1 SOFA and modified SOFA was highest in invasively ventilated patients (AUCs: original 0.774; modified 0.778). In non-intubated patients, the AUCs were 0.698 (original) and 0.723 (modified) for NIV; 0.621 (original) and 0.635 (modified) for HFNC. Patients who required subsequent intubation had higher mortality with OR 2.33 (1.68 – 3.20, $p < 0.001$), while those who remained on non-invasive support during ICU stay had the lowest mortality with OR 0.62 (0.50 – 0.76, $p < 0.001$). The trajectory of SOFA scores varied according to intubation status, showing a marked upward trend in patients who were eventually intubated after initial non-invasive support.
Conclusions: The Day 1 modified SOFA score showed similar predictive performance to the original score overall. However, its ability to predict ICU mortality was limited in non-intubated patients, particularly those treated with HFNC. These results highlight the need to consider clinical trajectory in addition to early SOFA scores when assessing prognosis in patients receiving non-invasive respiratory support.

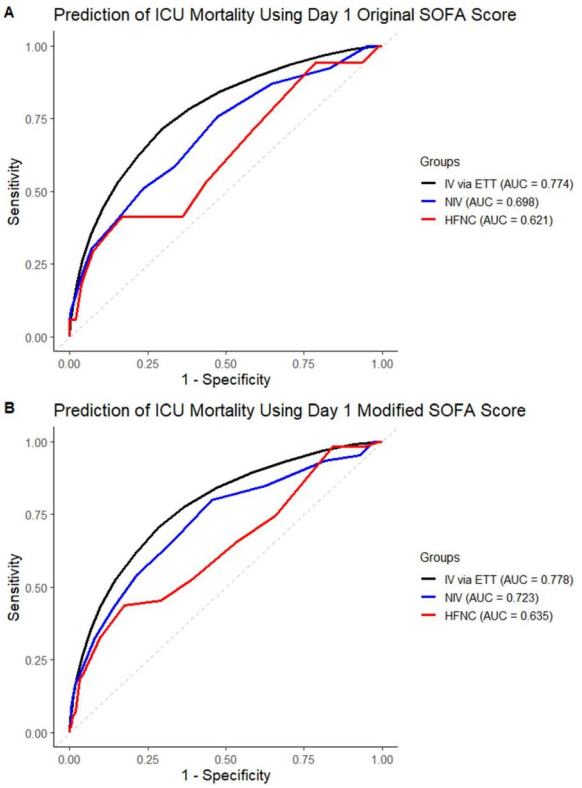


Fig.1 (abstract 000296) Comparison of day 1 original and modified SOFA scores for predicting ICU mortality across oxygen devices (Abbreviations: SOFA, sequential organ failure assessment; ICU, intensive care unit; IV via ETT, invasive ventilation via endotracheal tube; NIV, non-invasive ventilation; HFNC, high-flow nasal cannula)

Topic: Acute respiratory failure and mechanical ventilation

000297

Clinical value of circulating bioactive adrenomedullin for prediction of outcome and hydrocortisone response in sepsis patients—a post hoc analysis of the HYPRESS trial

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***Intensive care Medicine Experimental 2025* 13(1):*000297*.**

Introduction: Sepsis requires stratification for host-directed therapies through the discovery of adequate biomarkers enabling prediction of outcomes and treatment responses. Adrenomedullin contributes to endothelial homeostasis and has previously demonstrated potential for prognostic enrichment.
Objectives: This study aimed to assess associations of bioactive adrenomedullin (bio-ADM) levels at ICU admission and sepsis outcomes and to evaluate the potential value of bio-ADM as marker to identify subgroups of patients with moderate disease severity that might benefit from hydrocortisone treatment.
Methods: We used data from the HYPRESS trial (NCT00670254; 317/353 patients) to investigate, if bio-ADM is useful to predict sepsis outcomes (septic shock, 90- and 180-day mortality) and benefit or harm by hydrocortisone treatment. Optimal cut-offs for outcome predictions were determined by Youden's index. Logistic regression was used to assess bio-ADM subgroups and treatment interaction, and predictive enrichment for hydrocortisone therapy.
Results: Bio-ADM levels differed significantly in patients with or without septic shock within 14 days ($p = 0.011$). While the area under the ROC curve (AUC) was only 0.603 (CI 0.531–0.676), patient subgrouping according to an optimal bio-ADM cut-off level of 37 pg/mL (primary endpoint) showed significantly higher cumulative incidence of septic shock within 14 days in the subgroup of patients with bio-ADM levels ≥ 37 pg/mL ($p < 0.001$). The odds ratio for the development of septic shock in this bio-ADM group was 4.67 (95% CI 1.53, 20.3, $p = 0.016$). A bio-ADM cut-off of ≥ 136 pg/mL was predictive for 90-day (OR 6.51, 95% CI 2.04–20.6, $p = 0.001$) and 180-day mortality (OR 3.82, 95% CI 1.23–11.6, $p = 0.017$). Hydrocortisone therapy did not significantly reduce the incidence of septic shock (OR 1.59, 95% CI 0.37–8.15, $p = 0.54$) regardless of bio-ADM stratification (p-value for interaction test = 0.58). Likewise, hydrocortisone neither reduced 90- nor 180-day mortality (OR 1.53, $p = 0.22$ and OR 1.41, $p = 0.25$, respectively), irrespective of bio-ADM group (interaction term $p = 0.31$ for 90-day mortality and 0.58 for 180-day mortality).
Conclusions: Whereas bio-ADM levels are associated with sepsis outcomes, our data do not indicate usefulness of the marker to identify patients potentially benefitting from hydrocortisone therapy.

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Topic: Sepsis

000298

Management of massive bleeding following REBOA balloon rupture in a pregnant woman with placenta accreta

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Intensive care Medicine Experimental 2025 **13(1)**:***000298***.

Introduction: Obstetric hemorrhage is the leading cause of maternal mortality worldwide.
Objectives: We present a case of a patient with placenta percreta who suffered massive blood loss of 6 L due to intra-aortic balloon rupture during REBOA and subsequent atonic bleeding.
Methods: Patient R., 34 weeks of pregnancy, BMI = 27 kg/m2, underwent combined anesthesia and lower midline laparotomy, corporal cesarean section. The balloon catheter in the aorta was dilated for 23 min. Metroplasty was performed, but excessive bleeding was observed due to balloon rupture (blood during desufflation, visually complete rupture of the balloon).
Results: The volume of blood loss was 2000 ml. Reinfusion of autoblood 600 ml, donor erythrocytes 600 ml, FFP 600 ml (FFP: erythrocytes ratio 1:2). ROTEM was performed: EXTEM: CT = 69, CFT = 154, A10 = 39; INTEM: = CT 313, CFT = 141, A10 = 42; HEPTEM: CT = 197, CFT = 127, A10 = 42; FIBTEM A10 = 5 mm. Additionally, fibrinogen concentrate 3 g was administered until FIBTEM A10 = 10 mm was reached.
Within 10 min after the end of the operation, rapid one-time blood loss from the vagina of more than 1000 ml led to unstable hemodynamics (SI—Allgower shock index = 2), against the background of infusion therapy with crystalloids, the norepinephrine rate was increased to 0.7 μg / kg / min, Gelofusine 1000 ml was added. Blood loss severity class according to ATLS is IV (BE = -12 mmol/l, lactate = 1.3 mmol/l, Hb = 64 g/l, Ht = 20, pH = 7.2). The situation was assessed as critical, a red code was declared, which made it possible to immediately activate the protocol of massive transfusion into three venous accesses with repeated administration of 1 g of tranexamic acid against the background of relaparotomy and extirpation of the uterus in order to stop atonic bleeding. Then 10 doses of cryoprecipitate lyophilisate and 1000 IU of prothrombin complex concentrate were administered. The ratio of the administered transfusion products was 1:2 (FFP = 1110 ml:donor erythrocytes—1520, autoblood—700 ml). Hypocalcemia was corrected with CaCl2 2 g.
Further treatment was carried out purposefully under the control of the acid–base state, clinical blood test (Hb = 102 g/l, Ht = 29, PLT = 44 × 109/l ROTEM: EXTEM: CT = 54, CFT = 184, A10 = 34; INTEM: = CT 184, CFT = 175, A10 = 37, FIBTEM A10 = 12 mm. Additionally, 8 donor doses of platelets were administered. The operation lasted 6 h, the total blood loss was 6000 ml, the total infusion-transfusion therapy intraoperatively was 6830 ml, diuresis was 1000 ml.
For 9 h after the operation, mechanical ventilation was performed, after which the patient was transferred to spontaneous breathing. In the postoperative period, multimodal analgesia was performed: paracetamol and 0.1% ropivacaine epidurally. Prevention of thromboembolic complications was started after 8 h with low molecular weight heparin (fragmin 2500 IU). On the 10th day the patient was discharged home.
Bleeding management should involve mobilization of a multidisciplinary team, which is facilitated by the implementation of color codes, including in the operating room and debriefing after emergencies [1,2].
Conclusions: This case shows the importance of communication between team members for rapid implementation of a massive blood loss protocol in the treatment of obstetric emergencies such as placenta accreta or inadvertent balloon rupture. The use of thromboelastometry helped to control bleeding, conduct targeted treatment, reduce the volume of transfusion media, and avoid potential complications of massive blood transfusion [3]. Consent to publish had been obtained.

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Topic: Transfusion and haemostasis disorders

000300

Risk factors associated with delayed cerebral ischemia in patients with aneurysmal subarachnoid hemorrhage in a neurotrauma ICU of a tertiary hospital during 11 years

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Intensive care Medicine Experimental 2025* 13(1)*:000300.

Introduction: Approximately 30% of patients with aneurysmal subarachnoid hemorrhage (SAH) suffer delayed cerebral ischemia (DCI), which is the leading cause of death and treatable disability in these patients. Several studies have proposed markers to predict this complication, and numerous radiologic risk scales have been developed, although their predictive ability has been poorly studied and compared.
Objectives: To prospectively evaluate the risk factors for DCI in patients with SAH who are admitted to a neurotrauma intensive care unit (ICU).
Methods: Prospectively collected data of SAH patients admitted to a 10-bed neurotrauma ICU from October 2013 to December 2024. We analyzed: major diagnosis at admission; demographics, including sex and race; neurological data (clinical examination, pupil reactivity and size, and Glasgow Coma Score: GCS; aneurysm location and size; presence of intracranial hematoma (ICH); presence and volume of intraventricular hemorrhage; days to development of vasospasm; development of DCI; Fisher Scale (FS), Modified Fisher Scale (MFS), Hunt and Hess Scale (HHS), Word Federation of Neurosurgeons Scale (WFNS); presence of vasospasm on Doppler or arteriography; delayed ICU admission; aneurysm treatment; complications including infection; Glasgow Outcome Scale (GOS) at ICU discharge and 6 months after ICU discharge; and several other risk factors. A univariate analysis of DCI was performed, and variables that showed a significant association in the univariate analysis were entered into the multivariate logistic regression analysis. To obtain a prediction rule for DCI, a prediction model was obtained using the Classification and Regression Trees (CART) method [1]. CART classifies data using a sequence of if–then rules. The basis of decision tree algorithms is the recursive binary partitioning of the data. First, the most discriminative variable is selected to partition the data set into child nodes. The partitioning continues until a stopping criterion is reached. At each terminal node, the probability of DCI was estimated as the proportion of patients belonging to that node who developed the event. The tree was constructed according to the following algorithm: in the first step, the tree grows until all cases are correctly classified, and in the second step, we used the tenfold cross-validation method of successive pruning [1]. Finally, the tree that minimized the error measure (deviation) was selected. For this predictor, the corresponding ROC curve was obtained and the AUC was estimated using a 95% CI.
Results: We enrolled 291 patients with SAH and 66 (22.6%) developed DCI. APACHE II and SOFA on admission, as well as the FMS, HHS, and WFNS scales were significantly higher in patients with DCI, but the Fisher scale was not. Patients with DCI also had significantly lower GCS on admission to the emergency department and intensive care unit. Posterior communicating artery aneurysm was significantly associated with the development of DCI. The most common complications in these patients were: cerebral infarction 47 (71.2%), hydrocephalus 35 (53.0%), and ventriculitis 10 (15.2%). Patients with SAH with delayed admission after the bleeding, requiring clipping, and those with stuporous neurological status and pupillary anisocoria were associated with more DCI. In the ICU, 12 (18.2%) patients with SAH and DCI died, but there was no significant difference in mortality among patients who developed DCI (Tables 1a and 1b). The decision tree showed that the probability of developing DCI is 23%. However, this probability decreases to 6.2% in patients with a FM < 3, while it increases to 27% in patients with a FM of at least 3. In these patients, if the HH scale is < 2, the probability of DCI remains at 17%, while in the 151 patients with at least a HH scale of 2, the probability of DCI increases to 32% (Fig. 1). The AUC was 0.662 (0.602–0.722) (Fig. 2).
Conclusions: Our data show that 22.6% of our SAH patients developed DCI. Patients with SAH with delayed post-bleeding admission, who required clipping, those with stuporous neurological status and pupillary anisocoria were associated with greater development of DCI. The decision tree showed that in patients with SAH and FM scale ≥ 3 and HH > 2, the probability of DCI increased to 32%. Finally, mortality was not significantly higher compared to those who did not develop DCI.

Table 1a (abstract 000300) Univariate analysis DCI

Table 1a. Univariate analysis	*DCI*			
	SAH N = 291	No N = 225	Yes N = 66	P
Age (years)	56.2 ± 13.4	56.9 ± 13.9	54.0 ± 11.4	0.128
Sex female	193 (66.3)	144 (64.0)	49 (74.2)	0.122
Apache-II at admission	14.0 ± 7.8	13.4 ± 7.9	16.0 ± 7.3	0.018
SOFA ICU admission	2 (0.2; 6.8)	2 (0; 5)	4 (1; 8)	0.003
Death	64 (22.0)	46 (20.4)	18 (27.3)	0.239
Death at ICU discharge	45 (15.5)	33 (14.7)	12 (18.2)	0.487
Hospital death	14 (4.8)	11 (4.9)	3 (4.5)	1
Arterial hypertension	132 (45.4)	100 (44.4)	32 (48.5)	0.562
Diabetes	28 (9.6)	22 (9.8)	6 (9.1)	0.868
Dyslipemia	69 (23.7)	54 (24.0)	15 (22.7)	0.831
Smoker	121 (41.6)	90 (40.0)	31 (47.0)	0.312
Platelet inhibitors	25 (8.6)	21 (9.3)	4 (6.1)	0.404
Emergency surgery at admission	49 (16.8)	33 (14.7)	16 (24.2)	0.068
Oriented	148 (51.2)	130 (58.0)	18 (27.7)	< 0.001
Alert	161 (55.3)	137 (60.9)	24 (36.4)	< 0.001
Confused	44 (15.1)	32 (14.2)	12 (18.2)	0.43
Stuporous	71 (24.4)	45 (20.0)	26 (39.4)	0.001
Bilateral midriasis	11 (3.8)	9 (4.0)	2 (3.0)	1
Anisochoric pupils	32 (11.0)	19 (8.4)	13 (19.7)	0.01
Isochoric pupils	251 (86.2)	198 (88.0)	53 (80.3)	0.11
Both pupils reactive	255 (87.6)	201 (89.3)	54 (81.8)	0.103
No reactive pupil	17 (5.8)	12 (5.3)	5 (7.6)	0.55
Anterior communicating artery aneurysm	83 (28.5)	62 (27.6)	21 (31.8)	0.5
Posterior communicating artery aneurysm	43 (14.8)	28 (12.4)	15 (22.7)	0.038
Anterior Cerebral Artery Aneurysm	24 (8.2)	16 (7.1)	8 (12.1)	0.193
Aneurysm clipping	53 (18.2)	35 (15.6)	18 (27.3)	0.03
Intravetricular thrombolysis	4 (1.4)	4 (1.8)	0	0.578
Embolization of the aneurysm	166 (57.0)	122 (54.2)	44 (66.7)	0.073
Decompressive craniectomy	14 (4.8)	9 (4.0)	5 (7.6)	0.322
Intraoperative aneurysm rupture	18 (6.2)	12 (5.3)	6 (9.1)	0.256
Died after treatment	8 (2.8)	6 (2.7)	2 (3.0)	1
External ventricular device	141 (48.5)	97 (43.1)	44 (66.7)	< 0.001
MV > 7 days	93 (32.0)	61 (27.1)	32 (48.5)	0.001
Stroke	84 (28.9)	37 (16.4)	47 (71.2)	< 0.001
Cerebrospinal fluid fistula	19 (6.5)	13 (5.8)	6 (9.1)	0.395
Hydrocephalus	118 (40.5)	83 (36.9)	35 (53.0)	0.019
Ventriculitis	24 (8.2)	14 (6.2)	10 (15.2)	0.02
Frontal ICH	48 (16.5)	36 (16.0)	12 (18.2)	0.675
Temporal ICH	36 (12.4)	31 (13.8)	5 (7.6)	0.178
Vasospasm Doppler	61 (24.9)	32 (17.3)	29 (48.3)	< 0.001
Vasospasm Arteriographgy	60 (22.1)	23 (11.0)	37 (59.7)	< 0.001

Values are frequencies (%), means ± SD and medians (IQR). DCI: delayed cerebral ischemia, SAH: subarachnoid hemorrhage, SOFA: Sequential Organ Failure Assessment, MV: mechanical ventilation, ICH: intracerebral hematoma.

Table 1b (abstract 000300) DCI 11 YEARS UNIVARIATE ANALYSIS

Table 1b. Univariate analysis	*DCI*			
	SAH N = 291	No N = 225	Yes N = 66	P
Acute cerebral isquemia	24 (8.2)	21 (9.3)	3 (4.5)	0.214
Caucasian race	276 (94.8)	214 (95.1)	62 (93.9)	0.752
Black race	2 (0.7)	2 (0.9)	0	1
Fisher scale	4 (3; 4)	4 (3; 4)	4 (3; 4)	0.127
Fisher modified scale	4 (3; 4)	3 (2; 4)	4 (3; 4)	0.001
Hunt and Hess scale	2 (1; 4)	2 (1; 3)	3 (2; 4)	< 0.001
WFNS scale	2 (1; 4)	1 (1; 4)	3 (1; 5)	0.002
Delayed re-admission to the ICU for re-bleeding	10 (2; 24)	9 (2; 24)	12 (5.8; 24)	0.043
GCS on site	15 (12; 15)	15 (13; 15)	14 (9.2; 15)	0.065
GCS in the emergency room	14 (9; 15)	14 (10; 15)	12 (7; 15)	0.007
GCS at ICU admission	14 (4.5; 15)	14 (6; 15)	9 (3; 15)	0.005

Values are frequencies (%), means ± SD and medians (IQR). DCI: delayed cerebral ischemia, SAH: subarachnoid hemorrhage, WFNS: World Federation Neurosurgical Societies, SOFA: Sequential Organ Failure Assessment. GCS: Glasgow coma score.

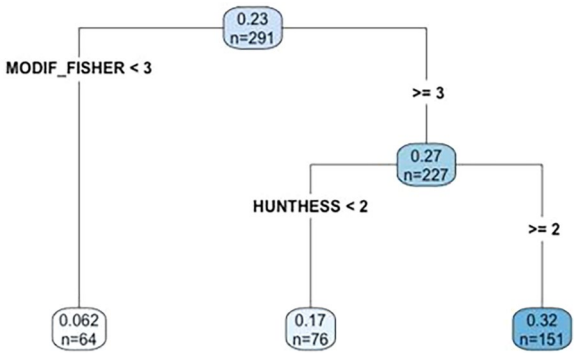


Fig. 1 (abstract 000300) Decision rule for the delayed cerebral ischemia (DCI)

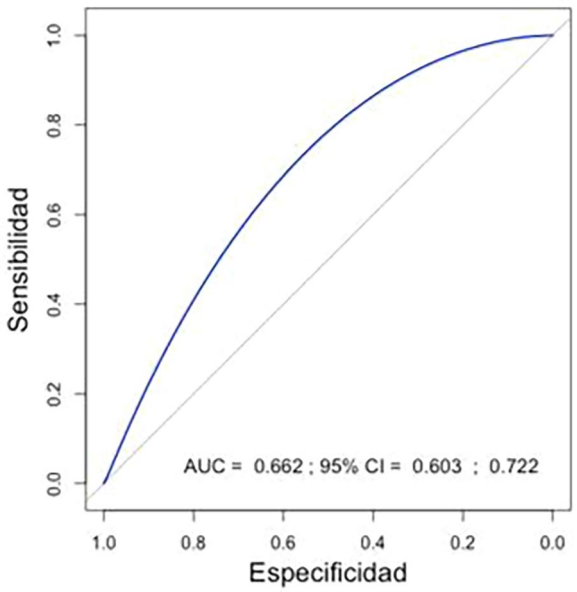


Fig. 2 (abstract 000300) ROC curve for the score deduces from the decision tree for DCI

Figures 1 and 2. DCI 11 YEARS.

Reference

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Topic: Neurointensive care

000301

Dipeptidyl peptidase 3 to predict response to angiotensin II versus standard-of-care vasopressor therapy in the treatment of septic shock: preliminary results of the DARK-Sepsis randomized controlled trial

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Intensive care Medicine Experimental 2025* 13(1):*000301.

Introduction: Since the introduction of angiotensin II (AT2), multiple mechanistically distinct vasopressors are available to treat septic shock, but limited data exist regarding which patients are most likely to benefit from each agent. Dipeptidyl peptidase 3 (DPP3), a component of the alternative arm of the renin–angiotensin–aldosterone system, has been proposed to be a potentially useful biomarker to guide AT2 use in septic shock (1–3).
Objectives: To determine whether baseline plasma DPP3 levels may be used to identify patients with vasodilatory shock most likely to respond to AT2 therapy.
Methods: This was an investigator-initiated industry-funded, open-label, single-center randomized controlled trial of the use of AT2 versus standard of care (SOC) vasopressor therapy in patients with vasodilatory shock requiring norepinephrine ≥ 0.1 mcg/kg/min for ≥ 30 min. Of 40 enrolled subjects, 36 with available baseline DPP3 measurements are included in this preliminary analysis. The primary outcome was the ability of DPP3 to predict responsiveness to AT2, as measured by change in total norepinephrine equivalent dose (NED) (4,5) of vasopressors at 3 h post-drug initiation or the equivalent time-point in the SOC arm as assessed by linear regression. Secondary outcomes included in-hospital mortality. The trial protocol is registered at clinicaltrials.gov (NCT05824767) and was previously published (2).
Results: Baseline data and outcomes are shown in Table 1. Baseline DPP3 values and changes in NED at 3 h are plotted in Fig. 1. Higher baseline DPP3 was associated with an increase in NED at 3 h (β = 0.0022, 95% confidence interval [CI] 0.00022–0.0041, p = 0.031), though this association was attenuated when adjusting for baseline Sequential Organ Failure Assessment (SOFA) score (β = 0.0015, 95% CI −0.00056–0.0036, p = 0.15). When stratified by treatment arm, DPP3 was associated with an increase in NED at 3 h in the AT2 arm (β = 0.0062, 95% CI 0.0025–0.0098, p = 0.0025) but not the SOC arm (β = −0.00052, 95% CI −0.0012–0.00021, p = 0.15). In-hospital mortality was 11.1% in the AT2 arm and 22.2% in the SOC arm (p = 0.37). Across the full cohort, baseline DPP3 was associated with in-hospital death (β = 0.0050, 95% CI 0.0017–0.0083, p = 0.0043), an association which was partly attenuated by adjustment for baseline SOFA (β = 0.0034, 95% CI 0.0000014–0.0068, p = 0.050).

Table 1 (abstract 000301) χ2 for categorical variables; Mann–Whitney U for continuous variables

	All (n = 36)	AT2 (n = 18)	SOC (n = 18)	P value*
Age, years, median [interquartile range]	68.5 [60–73.5]	70.5 [64–78]	64.5 [59–70]	0.081
Sex, female, no. (%)	21 (58.3%)	14 (77.8%)	7 (38.9%)	0.23
Baseline SOFA	9 [7–11]	9 [7–11]	8.5 [7–12]	0.89

	All (n = 36)	AT2 (n = 18)	SOC (n = 18)	P value*
Time from pressor start to baseline, h	19.0 [13.5–27.9]	20.8 [13.5–34.4]	19.0 [13.6–24.3]	0.56
Baseline NED, mcg/kg/min	0.18 [0.13–0.24]	0.19 [0.14–0.24]	0.15 [0.12–0.23]	0.53
Change in NED at 3 h, mcg/kg/min	0 [−0.083–0.02]	−0.025 [−0.09–0.04]	0 [−0.04–0]	0.056
Baseline DPP3, ng/mL	27.7 [18.2–38.3]	27.7 [20.1–33.3]	27.7 [15.1–45.0]	0.72
In-hospital mortality	6 (16.7%)	2 (11.1%)	4 (22.2%)	0.37

Conclusions: In these preliminary data, baseline DPP3 was associated with an increase in NED at 3 h among subjects randomized to AT2 but not in the SOC arm. Thus, elevated DPP3 did not identify those with increased vasopressor responsiveness to AT2. Rather, our results suggest that lower circulating DPP3 may increase the efficacy of AT2, consistent with prior data showing that DPP3 cleaves and inactivates AT2 (6). As in multiple prior critically ill cohorts (1,3,7), baseline DPP3 was independently associated with an increased risk of mortality.

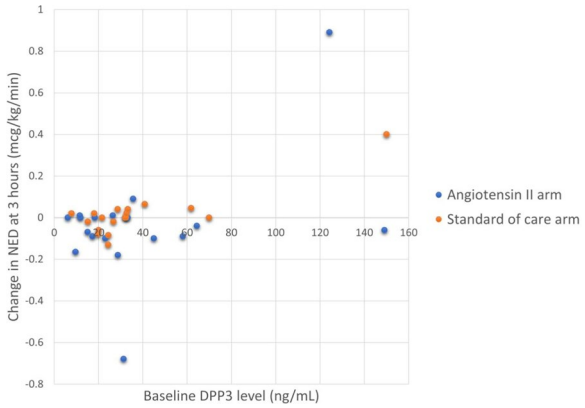


Fig. 1 (abstract 000301) Baseline dipeptidyl peptidase 3 (DPP3) level versus change in norepinephrine equivalent dose (NED, as per Khanna et al. and See et al.) at 3 h

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Topic: Sepsis

000303

Clinical spectrum of ICU-acquired invasive pulmonary aspergillosis according to SARS-CoV2 infection: a multicenter prospective cohort study

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Intensive care Medicine Experimental 2025* 13(1):*000303.

Introduction: Invasive pulmonary aspergillosis (IPA) is a common cause of fungal infection acquired in intensive care. Although the SARS-CoV-2 infection has recently emerged as a significant risk factor for these events, the clinical landscape of IPA according to SARS-CoV-2 infection status remains poorly explored.
Methods: We included all mechanically ventilated patients hospitalized for at least 48 h from January 2018 to January 2024 in participating Intensive Care Units (ICUs) of the French REA-REZO network. Baseline characteristics and clinical course, including survival after IPA according to COVID-19, were assessed. Then, we aimed to identify variables associated with ICU survival in IPA patients using a Cox proportional hazard model. Finally, incidence rates of IPA according to SARS-CoV-2 status, as well as factors associated with IPA, were assessed using a Fine–Gray competing risk regression.
Results: A total of 120,993 patients were included during the study period. An IPA was diagnosed in 254 patients (2.1%). Of those, 149 were COVID-19-associated pulmonary aspergillosis (CAPA), while 105 IPAs occurred in non-COVID-19 (NC) patients. In competing risk regression, immunosuppression (either neutropenia or other kinds of immunosuppression) (sdHR = 3.41 [95% CI: 1.81–6.45]; p < 0.001 and sdHR = 2.14 [95% CI: 1.61–2.855]; p < 0.001), medical reasons for ICU admission (sdHR = 2.34 [95% CI: 1.41–3.89]; p < 0.001), antibiotherapy ± 2 days before or after ICU admission (sdHR = 1.83 [95% CI: 1.32–2.53]; p < 0.001), and the need for a central venous catheter (sdHR = 9.27 [95% CI: 1.29–66.46]; p = 0.027) were found to be

independent risk factors for IPA. Finally, the incidence rate of IPA was higher in COVID-19 patients (incidence rate 0.7 per 1,000 patient-days versus 0.08 per 1,000 patient-days; incidence rate ratio: 8.45 [95% CI: 6.59–10.87]; p < 0.001). CAPA patients were significantly older (median age 69 [IQR 62–73] years versus 63 [56–70] years; p < 0.001), less frequently immunocompromised (0.7% of CAPA patients with neutropenia and 23.5% of CAPA patients with other immunosuppression versus 8.6% and 32.4%, respectively; p = 0.001), and less severe at baseline compared to NC-IPA patients (median SAPS II score 45 [35–54] versus 55 [39–65]; p < 0.001) (Table 1). During their stay, CAPA patients had a longer duration of mechanical ventilation and ICU length of stay compared to NC-IPA patients (Table 2). Despite variations in baseline characteristics and clinical trajectories, the mortality rate was similar between CAPA and NC-IPA patients (56.4% versus 58.1%; p = 0.886) (Table 2, Fig. 1). Finally, the ICU mortality rate of patients with IPA was higher compared to patients without IPA (57.1% versus 24.9%; p < 0.001).

Conclusions: In this large multicenter cohort of mechanically ventilated ICU patients, IPA had a similar impact on survival depending on SARS-CoV-2 infection status, even though baseline characteristics and clinical trajectories varied between CAPA and NC-IPA patients.

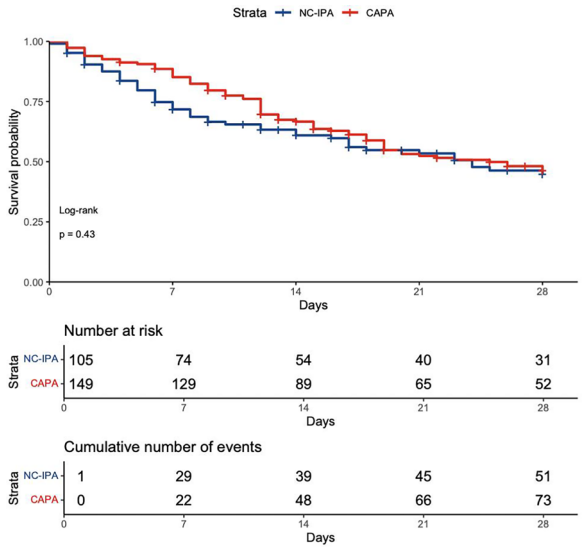


Fig. 1 (abstract 000303) Cumulative incidence of death in invasive pulmonary aspergillosis patients according to COVID-19 status

Table 1 (abstract 000303) Baseline characteristics of invasive pulmonary aspergillosis patients according to COVID-19 status

	All patients n=254	NC-IPA n=105	CAPA n=149	*p* value
Baseline characteristics				
Age (years)	67 [59-72]	63 [56-70]	69 [62-73]	<0.001
Male sex	188 (74)	78 (74.3)	110 (73.8)	>0.99
Immunosuppression				0.001
No immunodepression	175 (68.9)	62 (59.0)	113 (75.8)	
Neutropenia	10 (3.9)	9 (8.6)	1 (0.7)	
Other immunosuppression	69 (27.1)	34 (32.4)	35 (23.5)	
Simplified acute physiology score II	48 [36-60]	55 [39-65]	45 [35-54]	<0.001
Reason for admission				0.004
Elected surgery	1 (0.4)	1 (1.0)	0 (0.0)	
Urgent surgery	17 (6.7)	13 (12.4)	4 (2.7)	
Medical	236 (92.9)	91 (86.7)	145 (97.3)	
Admission from community/nursing home	115 (45.3)	44 (41.9)	71 (47.7)	0.437
Trauma reason for ICU admission	3 (1.2)	1 (1.0)	2 (1.3)	>0.99
Antibiotherapy +/- 2 days before or after ICU admission	209 (82.2)	95 (90.5)	114 (76.5)	0.007
Duration of mechanical ventilation before IPA	9 [6-15]	9 [6-15]	9 [6-14]	0.552
ICU length of stay before IPA	11 [7-17]	10 [7-15]	11 [7-18]	0.309
Coinfection	91 (35.8)	35 (33.3)	56 (37.6)	0.574
Nosocomial infections before IPA	87 (34.2)	29 (27.6)	58 (38.9)	0.083
Central venous catheter before IPA	253 (99.6)	104 (99.0)	149 (100.0)	0.860
Aspergillus species: *Fumigatus*	207 (81.5)	85 (81.0)	122 (81.9)	0.981

Data are presented as median (IQR: interquartile), n (%).
Abbreviations: CAPA: COVID-19 associated pulmonary aspergillosis; ICU: Intensive Care Unit; IPA: Invasive Pulmonary Aspergillosis; NC-IPA: Non-COVID-19 Invasive Pulmonary Aspergillosis

Table 2 (abstract 000303) Clinical course of invasive pulmonary aspergillosis patients according to COVID-19 status

	All patients n=254	NC-IPA n=105	CAPA n=149	*p* value
Nosocomial infection after IPA	104 (40.9)	33 (31.4)	71 (47.7)	0.014
Duration of mechanical ventilation after IPA	14 [6-30]	8 [4-26]	16 [9-33]	0.002
Need for dialysis catheter	98 (38.6)	47 (44.8)	51 (34.2)	0.117
ICU length of stay after IPA	8 [4-26]	14 [6-30]	18 [10-38]	0.015
Veno-venous ECMO	13 (5.1)	6 (5.7)	7 (4.7)	0.942
ICU case fatality	145 (57.1)	61 (58.1)	84 (56.4)	0.886

Data are presented as median (IQR: interquartiles), n (%).
Abbreviations: CAPA: COVID-19 associated pulmonary aspergillosis; ECMO:Extracorporeal membrane oxygenation; ICU: Intensive Care Unit; IPA: Invasive Pulmonary Aspergillosis; NC-IPA: Non-COVID-19 Invasive Pulmonary Aspergillosis

Reference

1. This abstract is submitted on the behalf of the REAREZO study group.

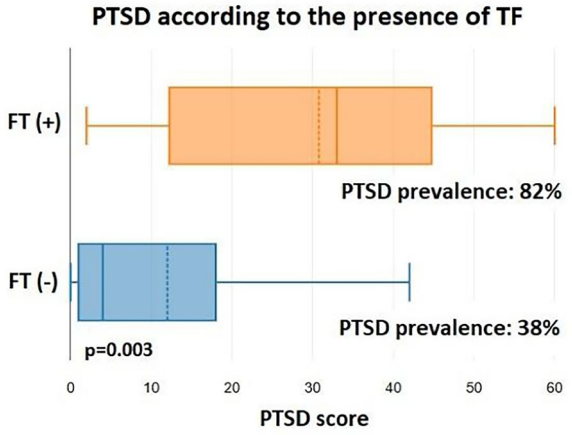
Topic: Infections and prevention

000304

Impact of financial toxicity on the development of post-ICU syndrome

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Intensive care Medicine Experimental 2025* 13(1)*:000304.

Introduction: Post-ICU syndrome (PICS) is defined as "New or worsening of existing health problems related to the critical illness that persist at discharge in the survivor or family member." And financial toxicity (FT) is defined as "the perception of subjective financial hardship as a result of an objective financial burden", understanding objective financial burden as direct and indirect costs related to health care. In oncologic patient, FT is a risk factor for worse clinical outcomes, including death and diminished quality of life. In critically ill patient the impact of FT on the development and intensity of PICS is unclear.
Objectives: To determine the prevalence of PICS, quantify the development of FT and evaluate its impact on the intensity of PICS, particularly on post-traumatic stress disorder (PTSD), 3 months after hospital discharge.
Methods: Multicenter prospective observational cohort study in ICU survivors' patients, older than 18 y/o, connected to mechanical ventilation for at least 48 h, with deep sedation. All patients were evaluated after 3 months after discharge. Patients were considered as suffering PICS if any of its dimensions were impaired: the applied tests evaluated physical (dynamometry, maximum inspiratory pressure, Barthel, WHODAS and frailty scores), cognitive (Montreal Cognitive Assessment) and emotional (HADS, PTSD and pain) dimensions. Patients were classified as having no, moderate or severe FT using the FACIT-COST test. All tests were applied in person by home visits or by citation to the originating hospital. The study was performed from January 2024 to January 2025. For data analysis sample size was calculated to observe a 40% increase in the rate of PTSD associated with increased FT (power of 80%, type I error 0.05). Data were analyzed considering a normal distribution. The study was approved by Clinica Santa María Ethic committee (Code approval 080705-24) and all recruited patients have their informed consent.
Results: 40 patients were included, age of 57 ± 19 y/o, 52% were women with an APACHE II score of 15.9. 49% were admitted for respiratory failure and 30% for sepsis. 88% were independent prior to ICU stay (Barthel > 90 points). 49% of patients were on 3 sedation drugs at some point during their ICU stay. Only 9% of the population had completed university studies and the average income level of the family group was U$1377. 66% of patients were not working at 3 months, 61% were main providers, and 90% had public health insurance. 88.5% of the patients presented PICS in one or more of its dimensions. A total of 62.7% of the patients presented FT, 29% of whom had severe FT. Patients with FT, with respect to those without FT, presented significantly higher risk of PTSD (Fig. 1, p = 0.003), higher risk of depression (p = 0.04) and anxiety (p = 0.01), with a prevalence of 37% vs. 7% and 64% vs. 15%, respectively. 68% of patients with FT presented possible cognitive impairment, compared to 46% in patients without FT (p = 0.2). 80% of all patients presented some degree of muscle weakness by dynamometry, with no difference between groups.
Conclusions: In ICU patients who required MV and deep sedation for at least 48 h, the prevalence of PICS is very high in any of its dimensions. FT is associated with increased risk of PTSD, anxiety and depression. Further studies are required to evaluate the impact of FT on morbidity and mortality in the medium and long term.



PTSD prevalence according to FT.

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Topic: Sedation, analgesia and delirium

000306

Diabetic ketoacidosis management in a Portuguese intensive care unit: a retrospective analysis of current practices

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Intensive care Medicine Experimental 2025* 13(1)*:000306.

Introduction: Diabetic ketoacidosis (DKA) is a life-threatening complication of diabetes mellitus (DM) that may require admission in Intensive Care Units (ICU) in up to 50% of cases, mostly due to severe metabolic derangements. Although its mortality rate remains low, DKA still represents a substantial burden to individuals, families and healthcare systems. Moreover, clinical guidelines on this subject lack consensus when it comes to choice of fluids for resuscitation, insulin therapy and correction of metabolic disorders, leading to heterogeneous clinical practice and potentially slower resolution of DKA. Therefore, it is essential to assess if the management of this condition is being conducted according to ICU protocols, developed based on the best available evidence. In this context, Jozwiak and colleagues (2024) conducted an ESICM-endorsed international survey with the aim of evaluating the clinical management of adult patients with DKA in ICU comparing the results with existing literature.
Objectives: Building on Jozwiak's work, this study aimed to assess the treatment strategies employed for DKA in a Portuguese ICU and compare them with the latest available evidence.
Methods: A retrospective study was performed based on data from electronic clinical records of adult patients admitted to a Portuguese ICU with the main diagnosis of DKA, between January 2021 and March 2025. Recorded data included length of ICU stay, pre-existing DM with or without complications, DKA classification, type of resuscitation fluid, intravenous insulin therapy, sodium bicarbonate administration, timing of subcutaneous insulin introduction, use of glucose solution, resolution of DKA and ICU general outcome.

Results: A total of 44 patients were included, with 38.6% being male. The mean age was 45.6 ± 18.9 years, and the average length of ICU stay was 5.9 days. In 31.8% of cases, patients were admitted with their first episode of DKA. Of the 30 patients with a previous diagnosis of DM (68.2%), 36.7% had type 1 and 63.3% had type 2. Among these 30 patients, 43.3% had developed complications due to DM, with 20% presenting with both micro and macrovascular diseases. The most common factors for decompensation were non-compliance with therapy (40.9%) and infectious conditions (38.6%), mainly respiratory. DKA was considered severe in 50% of patients and moderate in 45.5%. The 2 patients with mild disease were admitted to the ICU due to the severity of the underlying causes of DKA, namely septic arthritis and moderate-risk pulmonary thromboembolism. For fluid resuscitation, 52.3% of patients received isotonic saline, 40.9% Plasma-Lyte 148, and only 6.8% were given both. 38.6% of patients received an initial intravenous bolus of insulin. Of the 44 patients, 63.3% started insulin infusion based on the ICU blood glucose protocol, while 31.8% initiated insulin administration with a fixed dose of 0.1 IU/kg/h. The remaining 2 patients started insulin infusion with initial fixed doses of 2 IU/h and5 IU/h. 79.5% of the patients started intravenous insulin at the same time as fluid resuscitation, with only 3 patients starting insulin administration after ICU admission. Sodium bicarbonate (8.4% solution) was administered to 52.3% of patients, 69.5% of whom had a pH < 7. For over half of the patients, resolution of DKA was determined by pH (> 7.3), bicarbonate (≥ 18 mmol/L), and blood ketone (< 0.6 mmol/L) levels, which was achieved within 12 to 24 h (40.9%) and 24 to 48 h (38.6%) after ICU admission. Subcutaneous insulin was resumed in the ICU in 84% of patients, usually after a 2-h period of overlapping continuous intravenous insulin and subcutaneous insulin boluses. Plasma-Lyte 148 + Glucose 5% was the most commonly used glucose solution (93.1%), for threshold blood glucose values lower than 250 mg/dL (45.5%), 200 mg/dL (36.4%), and 180 mg/dL (18.1%). A favorable outcome was achieved in 93% of patients, with 4 of them being discharged directly home. The remaining 3 were older and fragile, and eventually died in the ICU due to infectious complications.
Conclusions: This study's results align with Jozwiak's, particularly regarding variability in DKA management decisions. For instance, contrary to international trends, our clinical practice has shown a more frequent use of normal saline rather than balanced solutions like Plasma-Lyte 148. These findings highlight the need for better education, protocol adherence, and personalized approaches in DKA care in the ICU, as standardizing care could potentially improve outcomes, reduce hospital stays, and lower morbidity and mortality.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000307

Single-use versus multiple-use endotracheal suction catheters in mechanically ventilated patients: a feasibility randomised controlled trial

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Introduction: In resource-limited settings, reusable equipment is more commonly used, especially in low- and middle-income countries where healthcare resources are constrained. One example of such equipment is the single-use open endotracheal suctioning catheters, which are used multiple times for endotracheal suctioning in resource limited Intensive Care Units (ICUs) [1,2]. The current evidence of this practice on ventilator-associated pneumonia (VAP) among mechanically ventilated patients remains unclear [3].
Objectives: The aim of this study was to evaluate the feasibility of single-use and multiple-use endo-tracheal suction catheters flushed with chlorhexidine versus standard care (multiple-use endo-tracheal suction catheters flushed with normal saline) to reduce VAP in resource-limited ICUs and to inform study methods for the design of a future definitive randomized controlled trial (RCT).
Methods: A three-armed feasibility RCT was conducted in three ICUs at a university hospital in Egypt. Sixty mechanically ventilated patients were randomized into three groups: single-use catheters (Intervention I group; n = 20), multiple-use catheters flushed with chlorhexidine (Intervention II group; n = 20), and standard care group (n = 20). Data on feasibility parameters, intervention adherence, and patient outcomes were collected. Ethical approvals were obtained from two ethical committees. The study was prospectively registered on ClinicalTrials.gov (identifier: NCT06207513).
Results: Recruitment and retention rates were high across all groups, with 100% (n = 58) of participants completing the 3-day follow-up and 96.6% (n = 56) completing the 6-day follow-up. Adherence to intervention protocols was excellent, with 100% of participants receiving the designed interventions. No adverse events were reported. Chlorhexidine flushing and single-use catheters were practical and successfully implemented, however, challenges of budget constraints, supply shortages, and the need for additional staff training was observed (Table 1). The incidence of VAP was 31.6% in Intervention I group, 26.3% in Intervention II group, and 40% in the standard care group (95% CI: 0.723–0.740). Secondary outcomes, including ICU length of stay and modified clinical pulmonary infection score (MCPIS), were comparable across groups, with no differences observed (Table 2).
Conclusions: This feasibility RCT demonstrated that a full-scale RCT comparing single-use and multiple-use catheters with chlorhexidine flushing is feasible in resource-limited ICUs. While the study was not designed to assess efficacy, it provided valuable insights into the trial design, intervention feasibility, and potential improvements for future research. Further investigation into the effectiveness of the interventions on VAP prevention is needed in future definitive RCTs.

Table 1 (abstract 000307) Intended feasibility measures and findings

Parameter	Intended Measurement	Findings
Chlorhexidine flushing feasibility	Assess use of chlorhexidine for suction flushing	Feasible; nurses successfully used it and found it practical.
Single-use suction catheters	Evaluate practicality of single use of the suction catheter	Feasible; accepted with adequate supply.
Resource availability	Assess availability of supplies	Constraints required purchasing additional supplies.
Patient recruitment & retention	Track enrolment and withdrawals	60 enrolled, 2 withdrawn, 58 retained.
Confounding factors	Assess impact of age, disease severity, or underlying conditions	No differences between groups.
Mortality	Evaluate intervention impact on mortality	No difference; 1 death per each group

Table 2 (abstract 000307) Secondary outcomes

Variable	Intervention I	Intervention II	Control	95 % CI
	n	n	n	
Length of ICU stay (days)				
• 3 – 4 days	1 (5.3%)	3 (15.8%)	0 (0%)	
• 5 – 6 days	5 (26.3%)	1 (5.3%)	8 (40%)	0.354 – 1.298
• ≥ 7 days	13 (68.4%)	15 (78.9%)	12 (60%)	
MCPIS (Mean; SD)				
• Day 1	19 (1.53; 1.50)	19 (1.42; 0.96)	20 (1.55; 1.28)	
• Day 3	19 (4.73; 1.82	19 (3.74; 1.73)	20 (4.70; 1.89)	0.612 – 0.874
• Day 6	14 (5.29; 2.52)	14 (4.86; 1.83)	18 (6.05; 2.63)	
Incidence of VAP				
• VAP	6 (31.6%)	5 (26.3%)	8 (40%)	0.723 - 0.740
• Not VAP	13 (68.4%)	14 (73.7%)	12 (60%)	

Modified clinical pulmonary infection score (MCPIS), Ventilator associated pneumonia (VAP), Data are presented as numbers (n) and frequency (%), Significance was assessed using Fisher's exact test, with a 95% confidence interval (CI).

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4. Author MHE is funded by a PhD scholarship [MM71/22], Ministry of Higher Education of the Arab Republic of Egypt.

Topic: Nursing care and physiotherapy

000312

The role of gut microbiota in the progression of acute respiratory distress syndrome

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Introduction: Acute respiratory distress syndrome (ARDS) represents a critical challenge in intensive care medicine, with mortality rates persistently exceeding 30% despite advancements in ventilatory support1,2. While structural compromise of the alveolo-capillary unit and dysregulated cytokine storm remain pathognomonic features, emerging translational evidence implicates the gut–lung axis in orchestrating pulmonary immune homeostasis, with enteric commensals emerging as pivotal immunomodulators. This investigation elucidates the pathophysiological mechanisms through which intestinal microbial consortia and their biotransformation metabolites govern ARDS trajectories, building upon foundational evidence of bidirectional microbiome–immune signaling across visceral organ systems.
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Objectives: This study aims to investigate the role of gut microbiota in the progression of acute respiratory distress syndrome (ARDS) through the gut–lung axis.
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Methods: A murine ARDS model was established through intratracheal lipopolysaccharide (LPS) administration (5 mg/kg), with subsequent stratification of animals into survival and non-survival groups based on 72-h outcomes. Donor microbiota from both cohorts were transplanted into antibiotic-pretreated recipients via oral gavage for seven days prior to ARDS induction. Comprehensive assessments included: histopathological evaluation of lung injury using H&E staining and semi-quantitative scoring quantification of alveolar-capillary leakage via bronchoalveolar lavage fluid (BALF) protein levels and pulmonary edema measurement (lung wet weight/whole body weight); cytokine profiling of TNF-α, IL-1β, and IL-6 in BALF using ELISA. Additionally, metagenomic and metabolomic analyses were conducted on fecal samples from the survival and non-survival groups to explore differences in microbial composition and metabolite profiles between the two groups.
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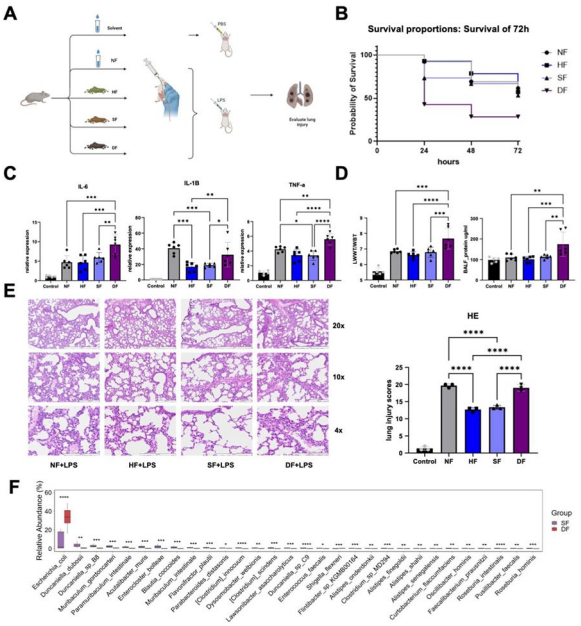
via bronchoalveolar lavage fluid (BALF) protein levels and pulmonary edema measurement (lung wet weight/whole body weight); cytokine profiling of TNF-α, IL-1β, and IL-6 in BALF using ELISA. Additionally, metagenomic and metabolomic analyses were conducted on fecal samples from the survival and non-survival groups to explore differences in microbial composition and metabolite profiles between the two groups.

Results: Recipients of survival-group FMT demonstrated substantially attenuated lung injury compared to non-survival FMT recipients, with histological evidence of preserved alveolar architecture. Barrier function metrics showed significant improvements, including decreased BALF protein concentration and lower pulmonary edema indices. Pro-inflammatory cytokine levels were markedly suppressed in both lung tissue and BALF samples. Metagenomic analysis revealed distinct dysbiosis patterns, with non-survival microbiota dominated by Enterobacteriaceae species, particularly Escherichia coli. In contrast, survival-associated microbiota exhibited greater phylogenetic diversity with enrichment of Duncaniella family. Metabolic pathway analysis identified enhanced butyrate synthesis capacity in survival-group microbiota, corroborated by metabolomic detection of elevated fecal butyrate levels.

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Conclusions: This study establishes proof-of-concept that gut microbiota significantly impacts ARDS outcomes, potentially mediated through butyrate-driven immunoregulation. The findings implicate Escherichia coli overgrowth as a risk factor for barrier disruption. These results advance our understanding of gut–lung interactions in ARDS and support further investigation of microbiome-targeted therapies, including probiotic formulations and SCFA-based interventions, for critical care applications.

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The role of gut microbiota in the progression of acute respiratory distress syndrome. A. Schematic diagram illustrating the experimental procedure for fecal microbiota transplantation (FMT). B. Kaplan–Meier survival curves comparing survival proportions among all experimental groups. Statistical significance was determined using the Gehan–Breslow–Wilcoxon test, with p-values as follows: SF vs. DF, $p = 0.0876$; HF (healthy fecal transplant) vs. DF, $p = 0.0128$; NF (normal fecal transplant) vs. DF, $p = 0.0155$. C. mRNA expression levels of pro-inflammatory cytokines (TNF-α, IL-1β, and IL-6) in lung tissue, quantified by quantitative real-time PCR (qRT-PCR). D. Total protein content in bronchoalveolar lavage fluid (BALF) and lung wet/dry weight ratio. E. Representative images of hematoxylin and eosin (HE)-stained lung tissue sections and corresponding lung injury scores, assessed based on alveolar wall thickness, hemorrhage, and inflammatory cell infiltration. F. Metagenomic analysis depicting the relative abundance of differentially enriched bacterial species between the surviving fecal transplant group (SF) and the deceased fecal transplant group (DF).

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3. The study is supported by funds of National Natural Science Foundation of China(6,590,009,780)

Topic: Acute respiratory failure and mechanical ventilation

000313

Cardiopulmonary complications of aneurysm subarachnoid hemorrhage

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Introduction: Aneurysmal subarachnoid haemorrhage (SAH) is a condition that predominantly affects women between forty and sixty. Its incidence is low compared to other types of strokes, but due to the characteristics of the patients it affects, its socio-health burden is high, and the loss of working life years is similar to that of other stroke types. Hospital mortality is around 25–50%, mainly due to the direct effects of the initial bleeding and secondary complications, both neurological and systemic. Systemic complications have a similar attributable mortality rate to neurological complications or the haemorrhage itself. Among these, cardiopulmonary complications are numerous and may present with a wide range of signs and symptoms.
Objectives: To assess the presence of cardiopulmonary complications in patients with SAH at the time of admission, track their evolution during ICU stay, and determine their impact on morbidity and mortality. We also aim to evaluate risk factors for these complications.
Methods: A prospective cohort study was conducted, including all patients with SAH who were admitted to the ICU at the General University Hospital of Castellón from March 2017 to August 2020. Data were collected at five time points: upon admission, 24 h, 48–72 h, 5 days, and 7 days. Demographic, clinical, ultrasound, and outcome variables were recorded. Statistical analysis was performed using STATA 14.0. Quantitative variables are presented as means and standard deviations and compared using Student's t-test, while categorical variables are described with percentages and compared using Chi-square tests.
Results: A total of 57 patients were included, 73.7% of whom were women, with a median age of 58 years (50–63). 77.2% presented with ultrasound complications upon ICU admission, and 43.2% of these resolved by discharge. No significant differences were found between groups of patients with and without complications. However, patients with complications were older (59 ± 12 vs. 53 ± 13, $p = 0.10$) and had higher severity scores (Hunt–Hess 3 (IQR 2–5) vs. 2 (IQR 2–3), $p = 0.20$), though these differences were not statistically significant. Among the groups that did and did not resolve from these complications, those who recovered were less likely to present with low levels of consciousness at onset (21% vs. 56%, $p = 0.02$).
Systolic function abnormalities appeared in 10.5% of patients, diastolic function in 28%, contractility changes in 12.3%, cardiac output abnormalities in 56.1%, and pulmonary oedema in 1.75% upon ICU admission. Systolic dysfunction and pulmonary oedema were fully recovered, 71% of contractility changes, 50% of diastolic dysfunction, and 40% of cardiac output issues also resolved. Patients with complications had more abnormalities in their ECG ($p = 0.06$) and elevated CPK ($p = 0.04$) and troponin levels ($p = 0.13$). The incidence of stress cardiomyopathy was 12.3%.
The mortality was 30% in the complication group and 15.4% in the non-complication group ($p = 0.48$). ICU stay was longer in the complication group (8 vs. 4 days, $p = 0.27$), but hospital stay did not differ. 3-month prognosis was better for the non-complication group by RSm scale 62% vs. 73%, but no difference was found at 6 months.
Mortality was 21% in the group that resolved and 36% in the group that did not resolve these complications ($p = 0.28$). ICU stay was longer in the group that resolved the complications (9 vs. 5 days, $p = 0.07$) and hospital stay was also longer (22 vs. 12 days, $p = 0.02$). The prognosis at 3 months was similar, but at 6 months, the group that did not recover had a better prognosis by RSm scale 69% vs. 86%, $p = 0.30$.
Diastolic abnormalities and low cardiac output were associated with mortality, alongside elevated troponin levels. Patients who did not resolve abnormalities in e' values and low cardiac output had higher mortality and worse prognosis.
The risk factors for complications were primarily higher scores on severity scales and initial systolic blood pressure. In the case of non-recovery of complications, severity grading and low levels of consciousness at the onset of symptoms were also significant factors.
Conclusions: The incidence of cardiac complications is high, though a significant percentage recover by discharge from the ICU. Patients with complications have higher mortality, longer ICU stays, and worse prognosis at three months. Detecting these abnormalities should alert us to possible associated clinical complications that could worsen the short-term prognosis.

Topic: Neurointensive care

000314

Associations between blood alcohol concentration, risky riding behaviors, and fatal injuries in motorcyclists: a nationwide study (2011–2023)

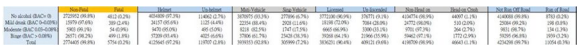
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Introduction: Motorcycle crashes are a major public health concern worldwide, especially in low- and middle-income countries. Behaviors such as riding without a helmet, operating a motorcycle without a valid license, or driving under the influence of alcohol significantly increase the risk of severe or fatal injuries. Among these, alcohol consumption plays a important role by impairing cognitions and increasing the chance of engaging in risky behavior. Despite existing traffic laws, binge drinking remains widespread and has been linked to higher crash severity.
Objectives: This study explored how different levels of alcohol consumption relate to risky riding behaviors and fatal injuries among motorcyclists in Taiwan over a 13-year period.
Methods: This study analyzed police-reported traffic accident data from Taiwan's A1A2 dataset, spanning 2011 to 2023. Only motorcycle crashes that resulted in injuries or fatalities (classified as A1 and A2) were included in the analysis, while other types of road users and property-damage-only cases (A3) were excluded. Blood alcohol concentration (BAC) of the motorcyclist was divided into four groups: none (BAC = 0), low (BAC 0 ~ 0.03%), moderate (0.03% ~ 0.08%), and binge drinking (BAC > 0.08%). The study aimed to examine how BAC relates to behaviors such as helmet use, license status, crash type, and whether the crash involved a head-on crash or a run-off-road scenario. To assess the relationships between BAC levels and different variables, descriptive statistics and Chi-square tests were conducted across defined BAC categories.
Results: Riders with positive for blood alcohol concentration (BAC) were significantly more likely to engage in risky behaviors and suffer fatal injuries. Those with a BAC above 0.08% had a fatality rate of 1.8%, compared to just 0.2% among riders with no alcohol detected. Alcohol-impaired motorcyclists were more likely to ride un-helmeted (6.6% vs. 2.7%), without a valid license (35.9% vs. 9.1%), and to be involved in single-vehicle crashes (38.3% vs. 6.7%), head-on collisions (2.9% vs. 1.1%), and run-off-road incidents (3.2% vs. 0.2%).
Fatal injury risk rose sharply with age among binge drinkers, from 1.7% in riders under 18 to 3.5% in those aged 65 and older, compared to just 0.7% in sober riders of the same age. Young to middle-aged adults (18–40) accounted for the highest number of alcohol-related crashes, with 1.6% resulting in death.
Temporal and environmental factors further influenced outcomes. Elderly riders in rural areas with speed limits ≥ 51 km/h experienced fatality rates as high as 5.2%. While protective gear significantly reduced fatal outcomes, the highest fatality rate—18.4%—was seen in older male binge drinkers who were unhelmeted and crashed in high-speed rural areas.
Conclusions: The findings highlight that elevated BAC levels—particularly when combined with older age, rural environments, and the absence of protective gear—significantly increase the risk of fatal injuries in motorcycle crashes. Targeted safety interventions are essential to mitigate these risks and improve outcomes for motorcyclists.

Table 1 (abstract 000314) Distribution of fatal and non-fatal outcomes across key variables

Variable	Not Drunk		Not Binge		Binge	
	Non-Fatal	Fatal	Non-Fatal	Fatal	Non-Fatal	Fatal
Age category						
Age Category <18	99.8% (59086)	0.2% (109)	97.6% (741)	2.4% (18)	98.3% (343)	1.7% (6)
Age Category 18-40	99.9% (1836605)	0.1% (1548)	98.4% (10900)	1.6% (181)	98.4% (12888)	1.6% (204)
Age Category 41-64	99.8% (815783)	0.2% (1478)	98.4% (9137)	1.6% (145)	98.0% (13545)	2.0% (270)
Age Category >65	99.3% (286613)	0.7% (1926)	95.5% (2417)	4.5% (113)	96.5% (1511)	3.5% (54)
Gender						
Sex (Male)	99.8% (1680860)	0.2% (3461)	98.2% (18555)	1.8% (333)	98.1% (24010)	1.9% (472)
Sex (Female)	99.9% (1317227)	0.1% (1600)	97.4% (4640)	2.6% (124)	98.6% (4277)	1.4% (62)
Protective Equipment						
Protective Equipment (Worn)	99.8% (2971976)	0.2% (4647)	98.2% (22461)	1.8% (412)	98.4% (27050)	1.6% (442)
Protective Equipment (Not Worn)	98.4% (26111)	1.6% (414)	94.2% (734)	5.8% (45)	93.1% (1237)	6.9% (92)
Driving Qualification						
Licensed	99.9% (2728920)	0.1% (4064)	98.0% (16493)	2.0% (339)	98.2% (18063)	1.8% (337)
Unlicensed	99.6% (269167)	0.4% (997)	98.3% (6702)	1.7% (118)	98.1% (10224)	1.9% (197)
Season						
Summer	99.8% (715344)	0.2% (1315)	98.1% (5791)	1.9% (112)	98.2% (6481)	1.8% (122)
Autumn	99.8% (754402)	0.2% (1259)	98.2% (5787)	1.8% (108)	98.1% (7102)	1.9% (135)
Winter	99.8% (779467)	0.2% (1281)	98.2% (5861)	1.8% (107)	98.2% (7667)	1.8% (143)
Spring	99.8% (748874)	0.2% (1206)	97.8% (5756)	2.2% (130)	98.1% (7037)	1.9% (134)
Crash Time						
Midnight/Early Morning	99.7% (157798)	0.3% (536)	97.5% (2688)	2.5% (69)	97.8% (4861)	2.2% (107)
Rush Hours	99.9% (1018117)	0.1% (1510)	98.3% (6987)	1.7% (124)	98.5% (6129)	1.5% (91)
Non-Rush Hours	99.8% (1351262)	0.2% (2382)	97.8% (8800)	2.2% (200)	98.2% (7691)	1.8% (144)
Evening	99.9% (470910)	0.1% (633)	98.7% (4720)	1.3% (64)	98.0% (9606)	2.0% (192)
Weather						
Adverse	99.9% (620558)	0.1% (869)	98.2% (4489)	1.8% (82)	98.1% (5877)	1.9% (111)
Fine	99.8% (2377524)	0.2% (4192)	98.0% (18706)	2.0% (375)	98.1% (22410)	1.9% (423)
Crash Partner Age						
Crash Partner Age (<18)	99.8% (160020)	0.2% (251)	98.7% (155)	1.3% (22)	98.3% (343)	1.3% (6)
Crash Partner Age (18-40)	99.8% (1565838)	0.2% (2573)	98.4% (157)	1.6% (181)	98.4% (12888)	1.6% (204)
Crash Partner Age (41-64)	99.8% (1018239)	0.2% (1833)	97.8% (103)	1.7% (145)	98.0% (13545)	2.0% (270)
Crash Partner Age (>65)	99.8% (1869)	0.2% (404)	98.2% (183)	2.4% (52)	96.5% (1511)	3.5% (54)
Crash Partner (Motorcycle)	99.9% (2155441)	0.1% (2734)	99.5% (299)	1.4% (225)	98.5% (18214)	1.5% (270)
Crash Partner Vehicle Type						
Crash Partner (Car)	99.8% (806167)	0.2% (2000)	97.9% (157)	2.7% (188)	97.6% (9490)	2.4% (233)
Crash Partner (Heavy Goods Vehicle)	99.1% (36479)	0.9% (327)	93.1% (123)	11.5% (44)	95.0% (583)	5.0% (31)
Urban (≤50 km/h)	99.8% (2845241)	0.2% (4280)	98.3% (21607)	1.7% (384)	98.3% (26189)	1.7% (442)
Rural (≥51 km/h)	99.5% (152825)	0.5% (781)	95.6% (1588)	4.4% (73)	95.8% (2098)	4.2% (92)
Lit condition						
With Lit	98.3% (4070459)	1.7% (69941)	97.3% (33420)	2.7% (940)	94.5% (56237)	5.5% (3265)
Un-Lit	97.5% (8252)	2.5% (211)	97.0% (860)	3% (27)	90.8% (1572)	9.2% (160)
Engine size						
Motorcycle >550cc	99.0% (15320)	1.0% (151)	84.8% (117)	15.2% (21)	90.1% (73)	9.9% (8)
Motorcycle ≤250-550cc	99.5% (194841)	0.5% (97)	94.4% (136)	5.6% (8)	95.5% (127)	4.5 % (6)
Motorcycle 125-250cc	99.8% (3915635)	0.2% (7581)	97.5% (32105)	2.5% (815)	97.1% (54244)	2.9% (1625)
Motorcycle 50-125cc	99.7% (187624)	0.3% (629)	97.9% (1971)	2.1% (43)	98.2% (4981)	1.8% (93)
Motorcycle <50cc	99.8% (2345)	0.2% (5)	100% (31)	0% (0)	100% (77)	0% (0)

Table 2 (abstract 000314) Association between risky behavior and blood alcohol concentration



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Topic: Trauma

000315

Identifying facilitators and barriers for palliative and end-of-life care in ICU: a sub-study of the "Enhancing palliative care in ICU" (EPIC) study

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Intensive care Medicine Experimental 2025* 13(1)*:000315.

Introduction: In order to improve palliative and end-of-life care in the ICU, knowledge about facilitators and barriers is needed. A number of studies have previously identified facilitators or barriers (1), but the studies are mostly mono-national.

Objectives: The objective of the study was to explore facilitators and barriers to palliative and end-of-life care in the ICU among multinational ICU healthcare professionals.
Methods: As part of a "European Survey on Palliative Care and Law Perceptions" for ICU physicians and nurses, four questions about facilitators and barriers were included (one Likert Scale and three free text). The survey was distributed via an open, anonymous link at conferences, ICU networks, etc., from April 2024 to January 2025.
Results: A total of 586 ICU healthcare professionals (510 European, 55 from outside Europe, 21 unknown), representing 58 countries (40 European), responded to the question: "Do you believe that there is adequate focus on palliative care needs in your ICU?" Of these, 38% found this to be the case to a high or very high degree, while 16% responded, "No, not at all."
Of the 586, 164 (28%) had added free text comments. Main identified facilitators and barriers for palliative and end-of-life care in ICU were:

Facilitators (1)		**Barriers (1)**	
Education and training	16%	Resource limitation/wrong use of resources	26%
Staff recognition of the need for palliative care	15%	Absence/lack of knowledge of clear legislation	20%
Legislation/Guidelines	11%	Personal staff differences	15%
Interprofessional teamwork	8%	Lack of training	10%
Ethics and timely discussions/decision-making	7%	Unrealistic expectations of family/non-ICU staff	9%
Family inclusion	5%	Lack of palliative care specialists and guidelines	6%
Palliative care integration	5%	Fear of misconduct/legal repercussion	4%
Environment (e.g. time prioritized, open visitation, enough staff)	4%	Disagreements within the team	4%
Knowledge about patients' wishes	4%	Misconceptions about palliative care	4%
Poor prospect for patient	4%	Cultural and religious influence	4%

1. Percentages of the 164, who had added free text comments

Conclusions: The survey results show that the focus on palliative care in the ICU varies greatly. Likewise, the results reveal a complex interplay of factors that promote and hinder effective palliative and end-of-life care in the ICU. The identified facilitators and barriers can help provide a roadmap for improving palliative and end-of-life care in ICU settings.

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Topic: Ethics and end of life care

000318

ICU nurses' perception of communication barriers with patient's families and end-of-life care practices

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Intensive care Medicine Experimental 2025* 13(1)*:000318.

Introduction: Although end-of-life (EoL) care is important in intensive care units due to the high severity of illness and mortality rates, it is often overlooked for various reasons. EoL care includes both treatment of dying patients and support provided to patients' families. A patient-family-centered approach is strongly recommended to ensure high-quality EoL care in intensive care. A key element of this approach is sharing information with family members, which requires open communication between them and the nurses. Therefore, in providing EoL care in the intensive care unit, it is important to recognize the patient's family members as recipients of care and to identify any communication barriers with them.
Objectives: The aim of this study was to identify the communication difficulties with patient's families recognized by intensive care unit nurses. In addition, the importance and performance of EoL care for the family members as recipients of care were explored.
Methods: This study was conducted from March 4 to March 31, 2022, with intensive care unit nurses at a university hospital in Seoul. The survey accessed communication barriers with the patient's families, as well as the importance and performance of end-of-life care practices among 124 ICU nurses.
Results: 1) The mean score of communication barriers with patient's families perceived by intensive care nurses was 3.60 ± 0.49 out of 5. The highest score of communication barriers was 'Family' (mean 3.73, S.D. = 0.52).

Table 1 (abstract 000318) Self-perceived communication barriers with patient's families

Variables	M ± SD
Communication barrier	3.60 ± 0.49
Nurses	3.62 ± 0.54
Family	3.73 ± 0.52
Environment	3.34 ± 0.63
Patient condition	3.51 ± 0.74

2)The importance of EoL care practices recognized by intensive care nurses was 4.06 ± 0.40 and the performance of EoL care practices was 3.50 ± 0.48 out of 5. The highest score of the importance of EoL care practices was 'Explaining and providing information' (mean = 4.37, S.D. = 0.48). The highest score of performance of EoL care practices was 'Symptom management and comfort care'(mean = 4.21, S.D. = 0.52).

Table 2 (abstract 000318) The importance and performance of EoL care practices

Variables	Importance M ± SD	Performance M ± SD
End-of-life care practices	4.06 ± 0.40	3.50 ± 0.48
Patient and family centered decision-making scale	4.24 ± 0.50	3.22 ± 0.84
Explaining and providing information	4.37 ± 0.48	4.05 ± 0.55
Continuity of care	4.26 ± 0.58	3.57 ± 0.72
Emotional and practical support for patients and families	3.96 ± 0.54	3.06 ± 0.75
Symptom management and comfort care	4.05 ± 0.48	4.21 ± 0.52
Comfort care-environmental factors	3.97 ± 0.52	3.52 ± 0.63

3) The importance of EoL care practices (t = 2.661, p = 0.009) and the performance (t = 3.114, p = 0.002) were differed significantly by EoL care education.
4) The communication barriers with the patient's families had a significant positive correlation with the importance of care practices(r = 0.38 p < 0.001) and the performance(r = 0.21 and p = 0.017). The importance of EoL care practices had a significant positive correlation with the performance of EoL care practices(r = 0.45, p < 0.001).
Conclusions: It is necessary to develop various intervention to address communication barriers with patient's families in intensive care units. Furthermore, end-of-life care education programs is critical in order to improve awareness of comprehensive end-of-life care and effectively communicate with nurses and patient families.

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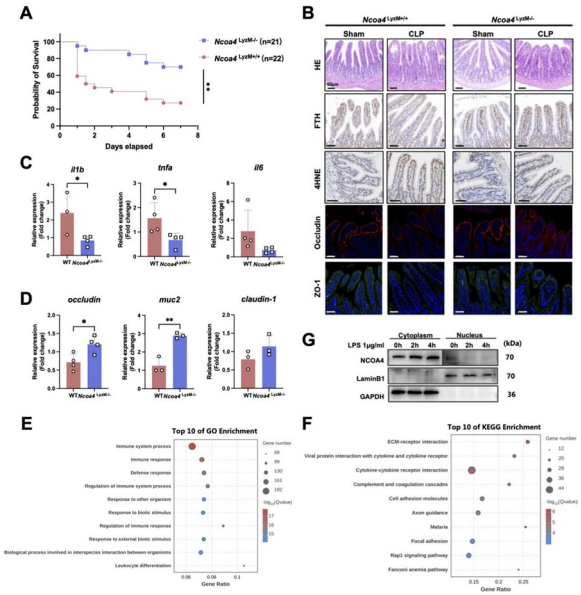
Topic: Ethics and end of life care

000319

NCOA4-mediated iron dysregulation and immune dysfunction in macrophage drives sepsis-induced intestinal injury

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Introduction: The gut is commonly affected in sepsis, and patients with intestinal injury have a poor prognosis[1]. Recent research and our prior work have indicated that dysregulation of iron metabolism within macrophages may exacerbate organ injury by modulating immune responses[2,3]. Nuclear receptor coactivator 4 (NCOA4) plays a critical role in both regulating iron homeostasis and immune homeostasis. However, the function and precise regulation of NCOA4 in sepsis-induced intestinal injury remains to be elucidated clearly.
Objectives: To investigate the role and molecular mechanisms of NCOA4 in sepsis-induced intestinal injury, providing novel insights and potential therapeutic targets for sepsis prevention and treatment.
Methods: To explore the role of NCOA4 in macrophages, we generated the conditional ablation of *Ncoa4* in macrophages (*Ncoa4*LyzM-/-) in mice by using Cre/loxP technology, and a mouse model of severe sepsis was established by cecal ligation and puncture (CLP). The 7-day mortality of *Ncoa4*LyzM-/- and wild-type mice were compared. Intestinal histopathological damage, epithelial barrier function, and immune barrier function were further examined. Intestinal iron and lipid peroxidation levels were measured, and transcriptomic analysis combined with NCOA4 expression and distribution changes in macrophages were used to explore the underlying molecular mechanisms.
Results: We found that the *Ncoa4*LyzM-/- septic mice exhibited significantly lower 7-day mortality, reduced intestinal barrier injury, decreased inflammatory cytokine levels, and alleviated iron dysregulation and lipid peroxidation compared to wild-type mice. Thoroughly, it showed that the immune response and regulation are among the top 5 pathways enriched in peripheral blood mononuclear cells (PBMCs) of *Ncoa4*LyzM-/- CLP mice. Consistently, NCOA4 may influence adhesion and cytokine-receptor interactions of macrophage, based on GSVA analysis of all the differentially expressed genes in bone marrow-derived macrophage (BMDM) of *Ncoa4*LyzM-/- mice with the Kyoto Encyclopedia of Genes and Genomes (KEGG). Mechanistically, during early stage of sepsis, NCOA4 distribution in macrophages was disrupted, with cytoplasmic accumulation and a significant reduction in nuclear, indicating hyperactivation of its iron regulatory and pro-inflammatory (cytoplasmic) functions and suppression of its anti-inflammatory and antioxidant (nuclear) functions.
Conclusions: NCOA4 within macrophages acts as a pathogenic driver, accelerating intestinal injury during sepsis. Mechanistically, aberrant cytoplasmic-nuclear distribution of NCOA4 in macrophages may lead to iron dysregulation and immune dysfunction. Therapeutic strategies targeting NCOA4 trafficking may mitigate sepsis-induced intestinal injury.



NCOA4 deficiency in macrophage alleviate sepsis-induced intestinal barrier injury. (A) Survival analysis of WT and Ncoa4LyzM-/- mice is shown. (B) Representative histopathological section images, immunohistochemical or fluorescent images in the intestinal tissues of indicated mice. (C) qPCR analysis of il-1b, tnf-a and il-6 mRNA in intestinal tissues from mice with sepsis. (D) qPCR analysis of occludin, muc2 and claudin-1 mRNA in intestinal tissues from mice with sepsis. (E) Differential pathways enriched in WT and Ncoa4LyzM-/- mice after CLP model by GSVA. (F) Differential pathways enriched in BMDM with LPS at 4 h (1 μg/ mL) from WT and Ncoa4LyzM-/- mice by GSVA. (G) Immunoblot analysis of the indicated proteins in BMDMs treated with 1 μg/ mL LPS for 2 and 4 h.

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Topic: Sepsis

000320

A machine learning approach to prediction of postoperative morbidity and mortality in elective surgical patients using pre and intraoperative data

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Intensive care Medicine Experimental 2025* 13(1)*:000320.

Introduction: ICU beds are a scarce resource, and elective surgical admissions account for a significant and rising proportion of demand (1). Currently, cases are selected for ICU admission preoperatively using clinical judgement and statistical risk scores such as the SORT score (2), and intraoperative data are not used in risk prediction. Using both pre- and intraoperative data could improve postoperative morbidity and mortality (POMM) risk prediction models, enabling better prioritisation of patients for ICU admission following elective surgery.

Objective:

Compare the performance models using only preoperative data, and pre- and intraoperative data, to predict POMM relevant to need for ICU care.

Evaluate importance of intraoperative features.

Methods: The dataset included adult elective surgical cases at a large UK NHS Trust planned for inpatient surgery under general anaesthesia lasting over 30 min between 1st May 2019 and 31st December 2024.

Features included patient and surgery characteristics, preoperative laboratory test results, physiological observations and echocardiograms, and intraoperative physiological observations and ventilation parameters.

POMM outcomes definitions were based on a review of literature on perioperative outcome definitions, electronic health record data availability, and relevance to ICU care needs.

Data were split into 80% for training and 20% for testing. Machine learning models were trained to predict each outcome using preoperative data only, or pre- and intraoperative data. Accuracy, average precision and area under receiver operator curve (AUROC) were calculated in the test set. DeLong's test was used to compare AUROCs of preoperative and pre- and intraoperative models (3). Feature importances were evaluated using SHapley Additive exPlanation values (4).

Results: The dataset included 31,332 cases, with 20.3% admitted to ICU postoperatively (Table 1). Models using combined pre- and intraoperative data showed significantly better performance in predicting respiratory and cardiovascular morbidity, postoperative infection, prolonged ICU stay, and composite POMM outcomes (Table 2). There was no significant difference in the AUROCs of the preoperative and pre- and intraoperative models predicting hospital mortality. Both performed significantly better than the SORT score (AUROC 0.847), with the caveat that the SORT score predicts 30-day mortality rather than hospital mortality.

Intraoperative features are important in prediction models. For cardiovascular and respiratory morbidity models, 10 and 6 of the top 20 features described cardiovascular and respiratory physiology, respectively (Fig. 1).

Conclusions: Updating estimates of risk using intraoperative data could significantly improve discriminative performance of morbidity prediction models, and better inform decisions around postoperative ICU admission. Postoperative risk predictions could help anaesthesia and outreach services reviewing surgical cases postoperatively to more appropriately prioritise patients.

Table 2 (abstarct 000320) Performance of models using preoperative data only and pre + intraoperative data to predict each outcome measure. P values for Delong's test comparing AUROCs for preoperative and pre + intraoperative data models for each outcome are shown

	Accuracy	Avg Precision	AUROC	P-val AUROC
Hospital Mortality				0.527
Preop	0.998 (0.996 – 0.999)	0.158 (0.053 – 0.395)	0.954 (0.912 – 0.987)	
Pre + Intraop	0.998 (0.996 – 0.999)	0.117 (0.038 – 0.306)	0.945 (0.880 – 0.987)	
Respiratory Morbidity				**<0.001**
Preop	0.946 (0.940 – 0.951)	0.222 (0.187 – 0.269)	0.788 (0.762 – 0.812)	
Pre + Intraop	0.946 (0.940 – 0.951)	0.276 (0.234 – 0.328)	0.820 (0.797 – 0.844)	
Cardiovascular Morbidity				**<0.001**
Preop	0.937 (0.931 – 0.943)	0.391 (0.342 – 0.445)	0.854 (0.836 – 0.873)	
Pre + Intraop	0.944 (0.938 – 0.950)	0.503 (0.447 – 0.553)	0.890 (0.874 – 0.907)	
Acute Kidney Injury				0.906
Preop	0.971 (0.967 - 0.975)	0.222 (0.169 – 0.285)	0.830 (0.799 – 0.857)	
Pre + Intraop	0.972 (0.968 – 0.976)	0.225 (0.170 – 0.301)	0.828 (0.798 - 0.857)	
Return to Theatre				0.061
Preop	0.988 (0.985 – 0.990)	0.075 (0.042 – 0.139)	0.733 (0.668 – 0.797)	
Pre + Intraop	0.988 (0.985 – 0.990)	0.071 (0.042 – 0.126)	0.758 (0.687 – 0.818)	
Postoperative Infection				**<0.001**
Preop	0.906 (0.899 – 0.913)	0.389 (0.352 – 0.431)	0.811 (0.791 – 0.828)	
Pre + Intraop	0.909 (0.902 - 0.917)	0.436 (0.394 – 0.479)	0.837 (0.822 – 0.854)	
>48 Hour ICU Stay				**<0.001**
Preop Data	0.943 (0.937 – 0.948)	0.569 (0.524 – 0.614)	0.925 (0.913 – 0.936)	
Pre + Intraop	0.945 (0.940 – 0.951)	0.647 (0.602 – 0.687)	0.952 (0.944 – 0.960)	
Composite Morbidity and Mortality				**<0.001**
Preop Data	0.851 (0.842 – 0.861)	0.613 (0.587 – 0.640)	0.821 (0.806 – 0.835)	
Pre + Intraop	0.866 (0.858 – 0.875)	0.660 (0.635 – 0.686)	0.842 (0.829 – 0.855)	

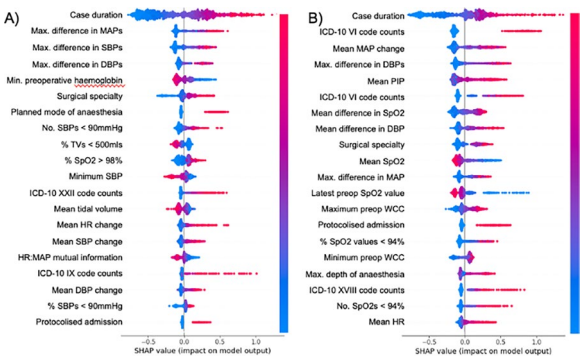


Fig. 1 (abstarct 000320) Feature importances for A) pre + intraoperative data model predicting cardiovascular morbidity and B) pre + intraoperative data model predicting respiratory morbidity. MAP = mean arterial pressure, SBP = systolic blood pressure, DBP = diastolic blood pressure, TV = tidal volume, ICD-10 XXII code = special purposes codes, ICD-10 IX code = circulatory disease codes, ICD-10 VI code = central nervous disease codes, ICD-10 XVIII = abnormal clinical and laboratory findings

Table 1 (abstarct 000320) Patient and surgery characteristics and outcomes stratified by postoperative destination

	Non-ICU Admissions (n =24,949)	ICU Admissions (n =6,383)
Age (SD)	56 (17.1)	64 (15.0)
ASA N (%)		
I	3,125 (12.5)	54 (0.8)
II	15,218 (61.0)	1,810 (28.4)
III	6,349 (25.4)	4,154 (65.1)
IV	78 (0.3)	299 (4.7)
Missing	179 (0.7)	66 (1.0)
Surgical specialty (five most represented) N (%)		
Urology	9,171 (36.8)	1,409 (22.0)
Gynaecology	2,764 (11.1)	879 (13.8)
Orthopaedics	2,578 (10.3)	242 (3.8)
Ear Nose and Throat	2,152 (8.6)	46 (0.7)
Thoracic	2,078 (8.3)	1,132 (17.7)
Surgical Severity N (%)		
Complex	4,583 (18.4)	2,349 (36.8)
XMajor	3,037 (12.3)	965 (15.1)
Major	8,677 (34.8)	2,006 (31.4)
Intermediate	4,567 (18.3)	554 (8.7)
Minor	2,470 (9.9)	175 (2.7)
Unknown	1,570 (6.3)	334 (5.2)
Outcomes N (%)		
Composite POMM	2411 (9.7)	2349 (36.8)
Hospital mortality	15 (0.1)	67 (1.0)
Respiratory morbidity	685 (2.7)	1308 (20.5)
Cardiovascular morbidity	424 (1.7)	1909 (29.9)
Acute kidney injury	439 (1.8)	663 (10.4)
Postoperative infection	1185 (4.7)	1956 (30.6)
Return to theatre	235 (0.9)	182 (2.9)
>48 hour ICU stay	0 (0.0)	2033 (31.9)

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Topic: Perioperative care

000323

Intraoperative brainstem auditory evoked potentials and postoperative nausea and vomiting after microvascular decompression

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Introduction: We performed this study to investigate the effect of intraoperative brainstem auditory evoked potential (IBAEP) changes on the development of postoperative nausea and vomiting (PONV) after microvascular decompression (MVD) for neurovascular cross compression.
Methods: A total of 373 consecutive cases were treated with MVD. The use of rescue antiemetics after surgery was used as an objective indicator of PONV. IBAEP monitoring was routinely performed in all.
Results: The use of rescue antiemetics was significantly associated with female sex (OR = 3.427; 95% CI, 2.077–5.654; p < 0.001), PCA use (OR = 3.333; 95% CI, 1.861–5.104; p < 0.001), and operation time (OR = 1.017; 95% CI, 1.008–1.026; p < 0.001). A Wave V peak delay of more than 1.0 ms showed a significant relation with the use of rescue antiemetics (OR = 1.787; 95% CI, 1.114–2.867; p = 0.016) and a strong significant relation with the use of rescue antiemetics more than five times (OR = 2.426; 95% CI, 1.372–4.290; p = 0.002).
Conclusions: A wave V peak delay of more than 1.0 ms, might have value as a predictor of PONV after MVD. More detailed neurophysiological studies will identify the exact pathophysiology underlying PONV after MVD.

Topic: Perioperative care

000325

Identification and validation of clinical phenotypes in non-intubated patients with acute respiratory failure: a multi-cohort study

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Intensive care Medicine Experimental 2025* 13(1):*000325.

Introduction: Acute respiratory failure (ARF) is a heterogeneous disease caused by multiple etiologies, including infection, shock, and trauma [1]. Researches have focused predominantly on patients receiving IMV and precision therapies [2–4], with limited attention given to those receiving non-invasive respiratory strategies.
Objectives: We aimed to explore the heterogeneity among non-intubated ARF patients and the interactions between phenotypes and treatment strategies.
Methods: In this retrospective study, both severe COVID-19 and non-COVID-19 patients were recruited (training cohort, n = 609; validation cohort A, n = 409; validation cohort B, n = 706). Unsupervised algorithms were employed to derive phenotypes. We used the Cox regression model to explore the associations between phenotypes and 28-day mortality. The heterogeneity of the treatment effect (HTE) was investigated. Finally, we developed a parsimonious model for phenotype classification.
Results: In the severe COVID-19 training cohort, a two-class model was identified and had the optimal fit. Phenotype 1 (hypoinflammatory phenotype) presented slight oxygenation impairment and nearly normal inflammation, whereas Phenotype 2 (hyperinflammatory phenotype) presented poorer oxygenation and a hyperinflammatory state. Patients with Phenotype 2 had worse outcomes, with higher intubation and mortality rates. Similar phenotypes were identified in two dependent validation cohorts. HTE revealed that patients with Phenotype 1 could benefit more from prolonged awake prone positioning than from standard care in the validation cohort A. Moreover, three or four variables had accurate performance for the assignment of phenotypes.
Conclusions: We identified and validated two distinct phenotypes in non-intubated ARF patients, with both prognostic and predictive enrichment. The phenotypes could be accurately identified with simple classifier models.

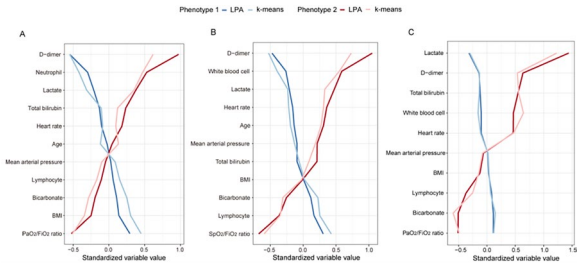


Fig. 1 (abstract 000325) Comparison of variables that contribute to clinical phenotypes in three cohorts. A: the training cohort, B: the validation cohort A, C: the validation cohort B

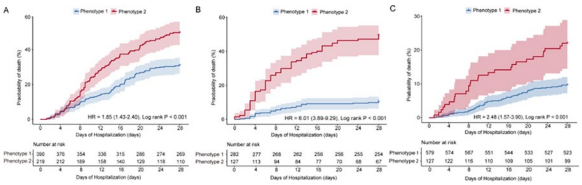


Fig. 2 (abstract 000325) Probability of death by phenotypes. A: the training cohort, B: the validation cohort A, C: the validation cohort B. Hazard ratio was calculated by Cox proportional-hazards model. The log-rank test demonstrated a significant between-group difference

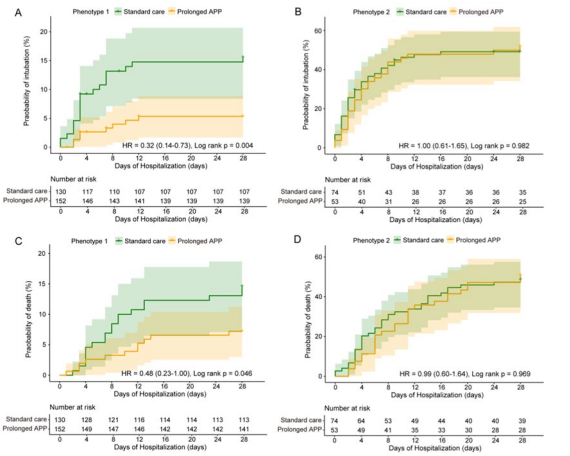


Fig. 3 (abstract 000325) Probability of endotracheal intubation and death by awake prone positioning in the validation cohort A. A&C: Phenotype 1, B&D: Phenotype 2. Hazard ratio was calculated by Cox proportional-hazards model. The log-rank test demonstrated a significant between-group difference. Prolonged APP: prolonged awake prone positioning, a minimum of 12 h daily with several breaks if needed for up to 7 days. Standard care: whether to be prone or not according to patients' wishes, however, they were not encouraged to remain in the prone position for a prolonged period of time (> 12 h/day)

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5. This work was supported, in part, by the Noncommunicable Chronic Diseases-National Science and Technology Major Project (2023ZD0506500, 2023ZD0506506); National Natural Science Foundation of China, Grant/Award (Numbers: 81971885, 82,341,032, 82,402,565, 81,930,058); National Key Research and Development Program of China (2022YFC2504405); Zhongda Hospital Affiliated to Southeast University, Jiangsu Province High-Level Hospital Construction Funds (GSP- LCYIFH13); Nanjing Technology Development Program (ZKX24066).

Topic: Acute respiratory failure and mechanical ventilation

000327

Divergent views on the perceived importance of study outcomes in airway management research between patients and clinicians: an Airway Terminology and Outcome Measures (ATOM) project report

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***Intensive care Medicine Experimental 2025* 13(1):*000327*.**

Introduction: Outcomes reported in airway management studies are heterogeneous, hampering evidence synthesis [1,2]. Furthermore, there is a paucity of published literature on patient views of outcomes relevant to airway management research. The Airway Terminology and Outcome Measures (ATOM) project set out to invite views from clinicians, researchers and patients to identify a range of core outcomes to be used in all future airway management studies. Here, we report preliminary findings of the first phase of a modified Delphi process.
Methods: We conducted a Delphi study using a sample of outcomes from airway studies published between January 2006 and November 2023. The first two rounds were surveys distributed internationally to clinicians of any specialty involved in airway management, researchers and patients with previous experience of airway management, in both elective and emergency settings. Outcomes were divided into five domains: procedural effectiveness; physiology; adverse events; patient-reported outcomes and other outcomes. To aid comprehension, lay explanations were provided for each outcome and animated videos co-created with a lay representative. All participants were asked to score the perceived importance of each proposed outcome on a nine-point scale. Prespecified thresholds for outcome inclusion and exclusion were used [3]. Decisions were analysed according to stakeholder group and outcome domain, with Fisher's exact test used to compare clinician and patient decisions, and odds ratios (OR) and 95% confidence intervals (CI) calculated using logistic regression.
Results: In the first round, we presented 68 outcomes to 453 respondents, of which 328 (72%) were clinicians, 67 (15%) patients, and 58

(13%) researchers or others. Participants were predominantly from Europe (51%), with additional representation from Oceania (21%), North America (13%), Asia (9.5%), South America (3.5%) and Africa (2.4%). Ten outcomes were included and seven excluded at this stage, with decisions for each outcome presented in Fig. 1. Patients were significantly more likely to exclude outcomes compared with clinicians (OR 12.2, 95% CI 4.5–36.7, p < 0.001), with exclusion rates of 68% versus 15% across domains, respectively (Table 1). Decisions on outcome inclusion were most congruent for 'Adverse events' (p = 0.699), but highly discordant for 'Procedural effectiveness' (p < 0.001), with patients more likely to exclude outcomes that clinicians included.

Table 1 (abstract 000327) Comparison of stakeholder decisions according to outcome domain

Domain	Outcomes, n	Stakeholder group	Inclusion, n (%)	Exclusion, n (%)	Indeterminate, n (%)
Procedural effectiveness	28	Clinicians	22 (79%)	0 (0%)	6 (21%)
		Patients	0 (0%)	16 (57%)	12 (43%)
Adverse events	15	Clinicians	11 (73%)	0 (0%)	4 (27%)
		Patients	9 (60%)	0 (0%)	6 (40%)
Physiology	11	Clinicians	5 (45%)	1 (9%)	5 (45%)
		Patients	1 (9%)	3 (27%)	7 (64%)
Patient-reported outcomes	7	Clinicians	1 (13%)	4 (50%)	3 (38%)
		Patients	3 (38%)	5 (63%)	0 (0%)
Other outcomes	6	Clinicians	2 (33%)	2 (33%)	2 (33%)
		Patients	0 (0%)	3 (50%)	3 (50%)

Conclusions: In the first survey round of the ATOM Delphi study, there was substantial agreement on the inclusion of adverse event outcomes between patients, clinicians and other stakeholders. Procedural outcomes were favoured by clinicians, but not by patients, presenting a challenge for finding consensus in upcoming stages of the project. This work represents a novel glimpse into patient views on outcomes relevant to airway management research. Insights from subsequent Delphi rounds will inform future airway management research.

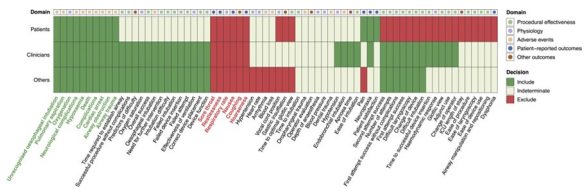


Fig. 1 (abstract 000327) Heatmap of decisions on outcomes according to stakeholder group and outcome domain following the first stage of the ATOM Delphi process. Outcomes are displayed on the x-axis and highlighted in green (Include) and red (Exclude) where all three stakeholder groups reached the same decision

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Topic: Health Services Research and Outcome

000328

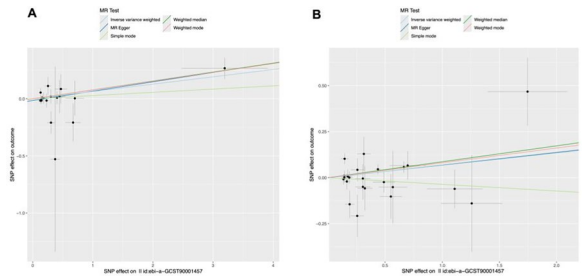
Single-cell transcriptome profiling of sepsis identifies the hypermetabolic, biosynthetically active phenotype of CD11c + HLA + + monocytes: a novel sepsis biomarker

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Intensive care Medicine Experimental 2025* 13(1):*000328.

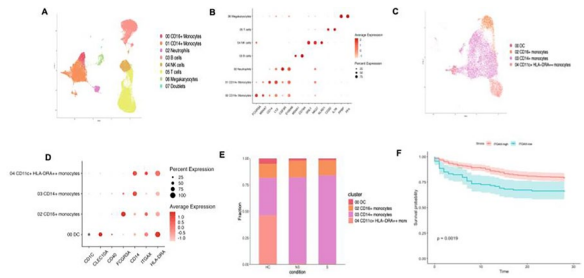
Introduction: Sepsis results from a dysregulated host immune response to infection. However, studies on the immune traits of sepsis remain limited, restricting their potential as biomarkers for prognosis prediction.
Objectives: This study aims to investigate the relationship between CD11c + HLA + + monocytes and sepsis, as well as their prognostic value, and to explore its potential biological functions during sepsis.
Methods: The study analyzed 731 peripheral blood immune cell traits [1] from the UK Biobank database, combined with GWAS data of sepsis and sepsis mortality at 28 days, using two-sample bidirectional MR. Publicly available scRNA-seq datasets (GSE67363) were analyzed to validate the selected immune subsets, successfully clustering the CD11c + HLA-DR + + monocyte subset. Based on the hub genes of the CD11c + HLA-DR + + monocyte subset, differentially expressed gene (DEG) analysis and enrichment analysis were performed.
Results: This study systematically evaluated the causal relationship between peripheral blood immune cell phenotypes and both sepsis susceptibility and 28-day mortality by two-sample bidirectional MR analysis. We identified multiple immune cell subsets, including CD11c + HLA-DR + + monocytes, CD40 + CD14 + CD16- monocytes, CD40 + CD14-CD16 + monocytes, CCR2 + monocytes and granulocytes, CD24 + CD27 + B cells, CD127−CD8 + T cells, CD28 + CD45RA + CD8dim T cells, CD28 + CD45RA + CD8 + T cells, CD28 + CD45RA-CD8 + T cells, CD28-CD127-CD25 + + CD8 + T cells, and CD25 + CD39 + CD4 + regulatory T cells, were significantly associated with sepsis and 28-day mortality risk of sepsis. However, validation using multiple scRNA-seq PBMC datasets revealed that only the $CD11c^{+}HLA\text{-}DR^{++}$ monocyte subset could be reliably annotated.
The higher percentage of CD11c + HLA-DR + + monocytes was associated with a lower risk of sepsis (OR = 1.07, 95% CI: 1.01–1.12, P = 0.0145) and lower 28-day mortality in sepsis patients (OR = 1.07, 95% CI: 1.00–1.13, P = 0.0378). The immune subset of CD11c + HLA-DRA + + monocytes is identified in scRNA-seq data of the PBMC of septic patients. In healthy controls, CD11c + HLA-DRA + + monocytes constituted approximately 47.5% of total monocytes, but their proportion significantly decreased in septic patients. In septic survivors, the proportion of CD11c + HLA-DRA + + monocytes is 2.6% and 1.5% in sepsis non-survivors. Survival analysis based on the AmsterdamUMCdb database (GSE65682) showed that sepsis patients with high ITGAX(CD11c) expression in monocytes had significantly better outcomes compared to those with relatively low ITGAX expression, with a significant difference (P = 0.0019).

Enrichment analysis of upregulated differentially expressed genes specific to CD11c + HLA-DRA + + monocytes revealed significant enrichment in ATP synthesis coupled electron transport, with cellular components primarily localized to the ribosomal subunit and ficolin-1-rich granule lumen. This suggests that ribosome biogenesis and mitochondrial functions in CD11c + HLA-DRA + + monocytes may undergo significant changes in sepsis, which requires further validation.

Conclusions: This study identified CD11c + HLA + + monocytes as a novel immune biomarker negatively associated with sepsis. Their depletion in sepsis, potentially driven by enhanced mitochondrial activity, ribosome function and autophagy triggered by ficolin-rich granules, may contribute to immune suppression and poor prognosis. Future studies will validate their depletion, assess prognostic relevance, and investigate underlying molecular mechanisms.



Scatter plot of the MR analysis showing the relationships of eosinophil levels with risks of sepsis (A) and sepsis-related mortality (B). MR, Mendelian randomization; SNP, single-nucleotide polymorphism.



scRNA-seq analysis validates the CD11c + HLA + + monocytes in PBMCs of sepsis patients and healthy controls. CD11c + HLA + + monocytes are significantly reduced in septic patients. (A) UMAP plots of PBMCs, with identified cell clusters. (B) Marker gene identification for each cluster, with dot size representing the proportion of cells expressing the gene and color indicating average expression. (C) Frequency of each cell type. (D) UMAP projection of monocytes, clustered into CD16 + , CD14 + , and CD11c + HLA-DRA + + monocytes. (E) Dotplot showing marker genes for monocyte and dendritic cell clusters. (F) Survival analysis curve using deconvolution method shows that patients with high ITGAX (CD11c) expression have better prognosis than those with low expression.

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2. This work was supported by the National Key Research and Development Program of China (grant number: 2021YFC2500804), by the grant from National Natural Science Foundation of China (grant number: 82072155; 82,272,210).

Topic: Sepsis

000331

Prognostic significance alkalemia at the emergency department

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Intensive care Medicine Experimental 2025* 13(1)*:000331.

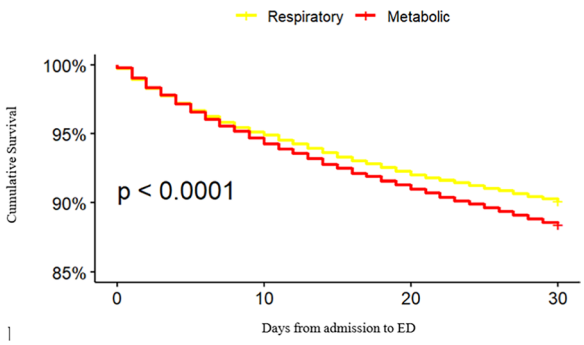
Introduction: Acid base disturbances are frequently found in patients presenting to the emergency department (ED). Recently, we found that in patients presenting to the ED with significant alkalemia, the mechanism of alkalemia, i.e., primarily metabolic versus primarily respiratory, rather than the absolute degree of alkalemia, is associated with increased mortality (1).

Objectives: To evaluate the prognostic significance of alkalemia (significant or mild) upon emergency department admission.

Methods: We retrospectively reviewed the records of all patients aged 18 years or older evaluated in the ED of a tertiary referral center during 1999–2024 with the first measurement of pH > 7.45. Alkalemia was defined as primarily metabolic (PM) if PCO2 was ≥ 35 mmHg and primarily respiratory (PR) if bicarbonate ≤ 24 mEq/L. The primary outcome was survival 30 days from ED presentation.

Results: Patients with PM had a 10.02 times higher hazard of death at 30 days from ED presentation (95% CI: 2.55–39.36, p < 0.001) compared to patients with either PR or combined alkalemia. (figure) Higher serum pH (HR = 1.8 95% CI: 1.3–2.2, p = 0.006) and older age (HR = 4.72, 95% CI: 1.42–15.68, p = 0.011) were independently associated with an increased 30 day mortality, with the effects of higher pH more pronounced in older age (interaction HR = 0.81, 95% CI: 0.69–0.95, p = 0.011). While hyperkalemia was only marginally associated with increased 30 days mortality in the cohort as a whole (HR = 1.33, 95% CI: 0.96–1.84, p = 0.082), this association was much more pronounced in the PM group (HR = 0.60, 95% CI: 0.42–0.86, p = 0.005), suggesting an interaction.

Conclusions: In patients presenting to the ED with alkalemia, the mechanism of alkalemia (PM versus other), age, and pH levels are important predictors of 30 day mortality.



Comulative survival rate according to the origin of alkalosis.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000332

Out-of-hospital versus in-hospital cardiac arrest: neuro-prognostication practice adherence in a tertiary NHS hospital

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Intensive care Medicine Experimental 2025* 13(1):*000332.

Introduction: Out-of-hospital (OHCA) and in-hospital cardiac arrest (IHCA) can lead to a variety of neurological deficits. Almost 80% of patients admitted to intensive care (ICU) post return of spontaneous circulation (ROSC) are comatose and with uncertain prognosis [1]. For these, under certain criteria, a multimodal neuro-prognostication approach consisting of various validated tests, is advised, to help steer treatment decisions, that ultimately can lead to withdrawal of life-sustaining therapy (WLST) [2;3].
Objectives: This audit aimed to compare local prognostication guidelines adherence, based on current international neuro-prognostication practice, between OHCA and IHCA patients staying comatose after 72 h post-ROSC, in an NHS hospital.
Methods: Audit approved by Kings College NHS Hospital (KCH) Critical Care Board in October 2023, as service evaluation project. Included adult patients (≥ 18 years) admitted to KCH 6 ICUs post cardiac arrest (CA) (OHCA or IHCA) in the preceding 24 h, from July 1st, 2021, to June 30th, 2023. Data were collected on patient demographics, CA location, and neuro-prognostication adherence concerning clinical neurological examination (pupillary reactivity; motor score; cough/gag reflex; seizures/status myoclonus) and timing of tests performed: CT/MRI head, two EEGs; SSEP; NSE.
Results: 368 post-CA patients were admitted to KCH ICUs during this period, of whom 114 remained comatose 72 h post-ROSC, mostly OHCA patients (n = 84), male (n = 69) and 59 years median age. Post-OHCA patients had poorer clinical neurological findings (fixed dilated pupils ($p = 0.018$), lower motor scores ($p = 0.003$), absent cough/gag reflex ($p = 0.035$)). CT Head at 48 h occurred in 98.2% of patients, being repeated in 78.1% of patients, with no differences between groups. MRI Head was done in 13.2% patients (n = 15) mainly post-IHCA ($p = 0.016$). No group differences were seen on timings of EEG (performed in 80.7% of patients, repeated in 47.4%), SSEP (done in 31.6% of patients) and NSE (taken in 15.8% of patients) (Table 1).
Conclusions: For post-CA comatose patients, KCH ICU adherence to multimodal neuro-prognostication approach was similar between groups, though more MRI head were performed post IHCA. A NSE underutilisation as prognostication tool was noted, aspect highlighting need for awareness and future improvement.

Table 1 (abstract 000332) Neuro-prognostication adherence before considering WLST

		IHCA (N=30)	OHCA (N=84)	TOTAL (N=114)	p-value
Gender:	Male	16 (53.3%)	53 (63.1%)	69 (60.5%)	0.388
	Female	14 (46.7%)	31 (36.9%)	45 (39.5%)	
Age	Median [IQR]	60 [18]	59 [25]	59 [24]	0.347
Neuro-prognostication adherence before considering WLST					
Clinical Neurological Examination:					
	Fixed + Dilated pupils present	7 (23.3%)	41 (48.8%)	48 (42.1%)	***0.018***
	Seizures/Status Myoclonus present	7 (23.3%)	18 (21.4%)	25 (21.9%)	1.000
	Cough + Gag Reflex absent	4 (13.3%)	29 (34.5%)	33 (28.9%)	***0.035***
Neuroimaging:	CT Head 1st 48h	28 (93.3%)	84 (100.0%)	112 (98.2%)	0.086
	CT Head repeated 72h after 1st CT	21 (70.0%)	68 (81.0%)	89 (78.1%)	0.303
	MRI Head	8 (26.7%)	7 (8.3%)	15 (13.2%)	***0.016***
NSE Biomarker at 48/72h		2 (6.7%)	16 (19.0%)	18 (15.8%)	0.148
EEG initial		23 (76.7%)	69 (82.1%)	92 (80.7%)	0.591
	EEG repeated	14 (46.7%)	40 (47.6%)	54 (47.4%)	1.000
SSEP performed		10 (33.3%)	26 (31.0%)	36 (31.6%)	0.822
	SSEP Bilateral N20-wave absent	7 (70.0%)	24 (92.3%)	31 (86.1%)	0.217

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4. None

Topic: Neurointensive care

000333

Out-of-hospital versus in-hospital cardiac arrest: a 2-year overview of comatose patients' characteristics and outcomes in a tertiary NHS hospital ICU

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Intensive care Medicine Experimental 2025* 13(1):*000333.

Introduction: After cardiac arrest (CA) circulation ceases, triggering systemic metabolic failure, with shock from ischaemia–reperfusion patterns present in 50–70% of patients after return of spontaneous circulation (ROSC) [1,2]. Albeit a temporary complication, it can lead to systemic inflammation and multi-organ failure, with 20–55% in-hospital mortality, hence post cardiac arrest (CA) patients may need intensive care (ICU) admission, for specialised treatment management and optimised recovery [3].
Objectives: This audit aimed to compare treatment management and outcomes between out-of-hospital (OHCA) or in-hospital cardiac arrest (IHCA) patients, in a subgroup of patients remaining comatose after 72 h post-ROSC, in a tertiary NHS Hospital.
Methods: Audit approved by Kings College NHS Hospital (KCH) Critical Care Board in October 2023, as service evaluation project. Included adult patients (≥ 18 years) admitted to KCH 6 ICUs, after receiving cardiopulmonary resuscitation for OHCA or IHCA in the preceding 24 h, that remained comatose after 72 h post-ROSC, from July 1st, 2021, to June 30th, 2023. Data were collected on patient demographics, CA location, ICU-days of organ systems supported (respiratory, cardiac, neurological, and renal), ICU length of stay (LOS), ICU/Hospital mortality and withdrawal of life-sustaining therapy timing (WLST).
Results: Of the 368 post-CA patients admitted to KCH ICUs in this period, 114 remained comatose 72 h post-ROSC, mostly OHCA patients (n = 84), male (n = 69) and 59 years median age. No differences were seen concerning gender or age, between groups (p = 0.388 and p = 0.347, respectively). It was observed that post IHCA patients had more ICU median days of respiratory (p = 0.027), cardiac (p = 0.048) and renal support (p = 0.002) compared to post OHCA patients. The opposite was noted for ICU median days of neurological monitoring (p = 0.021) in the post OHCA group. Post IHCA median ICU LOS was longer (p = 0.015), however no differences existed in ICU or hospital mortality between groups (p = 0.453 and p = 0.838, respectively). There were no differences between groups in WLST (p = 0.829), though WLST occurred sooner for post OHCA patients (p = 0.033) (Table 1).
Conclusions: In post-CA comatose patients, no group differences existed as for gender, age ICU or hospital mortality and WLST. Post IHCA patients had more ICU median days of respiratory, cardiac, and renal support, while post-OHCA patients had more ICU median days of neurological monitoring. ICU LOS was longer in post IHCA patients and WLST occurred sooner post OHCA.

Table 1 (abstract 000333) Characteristics of a subgroup of patients remaining comatose after 72 h post-ROSC in a tertiary NHS Hospital

		IHCA (N=30)	OHCA (N=84)	TOTAL (N=114)	p-value
Gender:	Male	16 (53.3%)	53 (63.1%)	69 (60.5%)	0.388
	Female	14 (46.7%)	31 (36.9%)	45 (39.5%)	
Age	Median [IQR]	60 [18]	59 [25]	59 [24]	0.347
Advanced Respiratory Support days	Median [IQR]	15 [17]	8 [6]	9 [12]	***0.027***
Advanced Cardiac Support days	Median [IQR]	4 [6]	2 [4]	3 [4]	***0.048***
Advanced Neurological Monitoring days	Median [IQR]	2 [5]	4 [4]	4 [6]	***0.021***
Renal Replacement Therapy days	Median [IQR]	13 [23]	2 [8]	5 [15]	***0.002***
WLST		20 (66.7%)	54 (64.3%)	74 (64.9%)	0.829
Post-CA to WLST time (in days)	Median [IQR]	13 [15]	8 [5]	9 [8]	***0.033***
ICU LOS (in days)	Median [IQR]	17 [24]	9 [8]	9 [14]	***0.015***
Status at ICU Discharge:	Alive	9 (30.0%)	18 (21.4%)	27 (23.7%)	0.453
	Dead	21 (70.0%)	66 (78.6%)	87 (76.3%)	
Status at Hospital Discharge:	Alive	4 (13.3%)	10 (11.9%)	14 (12.3%)	0.838
	Dead	26 (86.7%)	74 (88.1%)	100 (87.7%)	

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4. None

Topic: Cardiac arrest

000334

Risk Factors associated with disability in patients with aneurismal Subarachnoid Hemorrhage in a neurotrauma ICU in an eleven-year study

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Intensive care Medicine Experimental 2025 **13(1)**:***000334***.

Introduction: Aneurysmal subarachnoid hemorrhage (SAH) is a global health burden with serious consequences, including permanent disability. To reduce this burden, it is important to understand the risk factors for disability and identify those that can be prevented.

Objectives: To evaluate risk factors for disability at discharge from a tertiary hospital neurotrauma ICU in patients with SAH.

Methods: Prospective study of patients with SAH admitted from October 2013 to December 2024, in a 10-bed neurotraumatic ICU. We analyzed: main diagnosis at admission; demographic data, neurological data (clinical exam and pupillary size, and Glasgow Coma Score (GCS); location and size of the aneurysm; presence and size of the aneurysm; presence of intracranial hematoma (ICH); presence of intraventricular intraventricular hemorrhage; days to develop vasospasm; development of delayed cerebral ischemia (DCI) Fisher scale, modified Fisher scale, Hunt and Hess scale, Hunt and Hess scale, Hess and scale, Hunt and Hess scale, Word Federation of Neurosurgeons (WFNS) scale; presence of vasospasm on Doppler and/or arteriography; delay in ICU admission; aneurysm treatment; complications, including aneurysm; complications, including infections; Glasgow Outcome Scale (GOS) in the ICU; at discharge and 6 months after discharge from the ICU and other factors; a univariate study and multivariate logistic regression analysis of disability at ICU discharge. To determine the discriminatory capacity of the score, an analysis of the recipient's receiver operating characteristic (ROC) analysis was performed. The diagnostic ability of the score was assessed using the area under the ROC curve, which was estimated using a 95% confidence interval. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated for the chosen cutoff point.Statistical significance was set at < 0.05. Data were analyzed using the R package, version 4.2.1 (R Development Core Team, 2022).

Results: Of the 291 admitted SAH patients had 107 (36.76%) severe disability at discharge with a GOS ≤ 3. Demographics and associated factors of disability at ICU discharge, in univariate analysis, are described in Table 1. Those who developed acute cerebral ischemia (ACI) (15.9%) and those who required decompressive craniectomy (12.2%) had significantly greater disability. Independent factors associated with disability were: (Table 2) and mechanical ventilation (MV) greater than 7 days 6.469 (2.993; 13.981), ACI:4.842 (1.342; 17.465); Hunt and Hess scale OR:1.475 (1.139; 1.911), and APACHE II on admission OR: 1.181 (1.108; 1.258).A prediction score was obtained:$0.166 \times$ APACHE II score $+ 1.867 \times$ MV > 7 days $+ 1.557 \times$ AH F $+ 0.389 \times$ Hunt and Hess scale score.MV > 7 days: 1/0 depending on whether V M > 7 days or not (Fig. 1).The area under the curve was 0.924 CI 0.892; 0.954 (Fig. 2). Cut-off point: 3.848; specificity 84.3 [78.1; 89.3]; sensitivity: 88.9 [81.2; 94.1] NPV: 92.6 [87.7; 96.1]; PPV: 77.2 [68.8; 84.3] (Table 3).

Conclusions: The 36.76% of patients with SAH were severely impaired at the time of discharge from the ICU. Independent factors associated with disability were: APACHE II on admission, Hunt and Hess scale, AHF and MV > 7 days. A score was obtained to predict disability at ICU discharge.

Table 1a (abstract 000334) Univariate analysis SAH and Disability 11 year

Table 1.a. Univariate analysis	SAH patients N = 291	GOS > 3 N = 184	GOS ≤ 3 N = 107	P
Age (years)	56.2 ± 13.4	53.7 ± 12.9	60.6 ± 13.2	< 0.001
Sex female	193 (66.3)	122 (66.3)	71 (66.4)	0.993
Apache-II at admission	14.0 ± 7.8	10.2 ± 5.6	20.6 ± 6.8	< 0.001
SOFA ICU admission	2 (0.2; 6.8)	1 (0; 3)	7 (4; 9)	< 0.001
Death	64 (22.0)	4 (2.2)	60 (56.1)	< 0.001
Death at ICU discharge	45 (15.5)	0	45 (42.1)	< 0.001
Hospital death	14 (4.8)	3 (1.6)	11 (10.3)	< 0.001
Death at hospital discharge	5 (1.7)	1 (0.6)	4 (3.8)	0.062
Arterial hypertension	132 (45.4)	68 (37.0)	64 (59.8)	< 0.001
Diabetes	28 (9.6)	12 (6.5)	16 (14.9)	0.019
Dyslipemia	69 (23.7)	38 (20.6)	31 (29.0)	0.108
Smoker	121 (41.6)	75 (40.8)	46 (43.0)	0.71
Black race	2 (0.7)	1 (0.5)	1 (0.9)	1
Emergency surgery at admission	49 (16.8)	21 (11.4)	28 (26.2)	0.001
Oriented	148 (51.2)	127 (69.8)	21 (19.6)	< 0.001
Alert	161 (55.3)	132 (71.7)	29 (27.1)	< 0.001
Confused	44 (15.1)	23 (12.5)	21 (19.6)	0.102
Stuporous	71 (24.4)	24 (13.0)	47 (43.9)	< 0.001
Bilateral midriasis	11 (3.8)	1 (0.5)	10 (9.3)	< 0.001
Anisochoric pupils	32 (11.0)	12 (6.5)	20 (18.7)	0.001
Isochoric pupils	251 (86.2)	170 (92.4)	81 (75.7)	< 0.001
Both pupils reactive	255 (87.6)	172 (93.5)	83 (77.6)	< 0.001
No reactive pupil	17 (5.8)	4 (2.2)	13 (12.2)	< 0.001
Bilateral aneurysm	18 (6.2)	15 (8.2)	3 (2.8)	0.068
Anterior Cerebral artery aneurysm	24 (8.2)	12 (6.5)	12 (11.2)	0.161
Anterior communicating artery aneurysm	83 (28.5)	47 (25.5)	36 (33.6)	0.14
Posteroinferior Cerebellar Artery aneurysm	10 (3.5)	4 (2.2)	6 (5.6)	0.18
Intravetricular thrombolysis	4 (1.4)	1 (0.5)	3 (2.8)	0.142
Embolization of the aneurysm	166 (57.0)	108 (58.7)	58 (54.2)	0.456
External ventricular device	141 (48.5)	56 (30.4)	85 (79.4)	< 0.001
Stroke	84 (28.9)	33 (17.9)	51 (47.7)	< 0.001
Hydrocephalus	118 (40.5)	46 (25.0)	72 (67.3)	< 0.001
MV > 7 days	93 (32.0)	18 (9.8)	75 (70.1)	< 0.001

Values are frequencies (%), means ± SD and medians (IQR). DCI: delayed cerebral ischemia, SAH: subarachnoid hemorrhage, SOFA: Sequential Organ Failure Assessment, MV: mechanical ventilation

Table 1b (abstract 000334) USAH and disability 11 year

Table 1.b. Univariate analysis	HSA patients N = 291	GOS > 3 N = 184	GOS ≤ 3 N = 107	P
Hematoma intracraneal	77 (26.5)	31 (16.9)	46 (43.0)	< 0.001
Frontal ICH	48 (16.5)	14 (7.6)	34 (31.8)	< 0.001
Temporal ICH	36 (12.4)	16 (8.7)	20 (18.7)	0.013
Vasospasm Doppler	61 (24.9)	42 (26.2)	19 (22.4)	0.502
Vasospasm Arteriographgy	60 (22.1)	38 (21.7)	22 (22.9)	0.82
Acute cerebral isquemia	24 (8.2)	7 (3.8)	17 (15.9)	< 0.001
Delayed cerebral isquemia	66 (22.7)	35 (19.0)	31 (29.0)	0.051
Resangrado a 72 h	15 (5.2)	2 (1.1)	13 (12.2)	< 0.001
Delayed re-admission to the ICU for re-bleeding	10 (2; 24)	9 (2; 24)	11 (3; 24)	0.796
Ventriculitis	24 (8.2)	11 (6.0)	13 (12.2)	0.065
Fisher scale	4 (3; 4)	3 (2; 4)	4 (3; 4)	< 0.001
Fisher modified scale	4 (3; 4)	3 (2; 4)	4 (3; 4)	< 0.001
Hunt and Hess scale	2 (1; 4)	1 (1; 2)	4 (2; 5)	< 0.001
WFNS scale	2 (1; 4)	1 (1; 2)	4 (2; 5)	< 0.001
APACHE II vasoespasm	14.0 ± 7.8	10.2 ± 5.6	20.6 ± 6.8	< 0.001
SOFA vasoespasm	2 (0.2; 6.8)	1 (0; 3)	7 (4; 9)	< 0.001
GCS on site	15 (12; 15)	15 (14; 15)	13 (6; 15)	< 0.001
GCS in the emergency room	14 (9; 15)	15 (14; 15)	9 (6; 14)	< 0.001
GCS at ICU admission	14 (4.5; 15)	15 (13; 15)	5 (3; 10)	< 0.001
Decompressive craniectomy	14 (4.8)	1 (0.5)	13 (12.2)	< 0.001
Intraoperative aneurysm rupture	18 (6.2)	11 (6.0)	7 (6.5)	0.847
Died after treatment	8 (2.8)	0	8 (7.5)	< 0.001

Values are frequencies (%), means ± SD and medians (IQR). DCI: delayed cerebral ischemia, SAH: subarachnoid hemorrhage, SOFA: Sequential Organ Failure Assessment, ICH: intracerebral hematoma.

Table 2. Multivariate logistic regression for GOS ≤ 3 (worse prognosis)

Variable *	P-value**	Odd-Ratio (95% CI)
Apache-II at admission (per unit)	< 0.001	1.181 (1.108; 1.258)
Mechanical ventilation > 7 days	< 0.001	6.469 (2.993; 13.981)
Acute Cerebral Ischemia	0.014	4.842 (1.342; 17.465)
HUNT- HESS scale	0.003	1.475 (1.139; 1.911)

(*) Variables were selected using the best subset regression method jointly with the Bayesian information criteria (BIC)
(**) Likelihood ratio test

Table1b and Table 2 SAH and disability 11 year

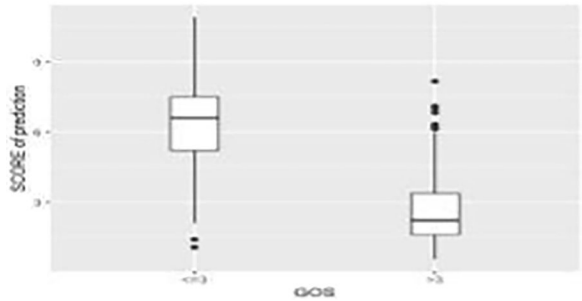


Fig. 1 (abstract 000334) Boxplot for score according GOS groups

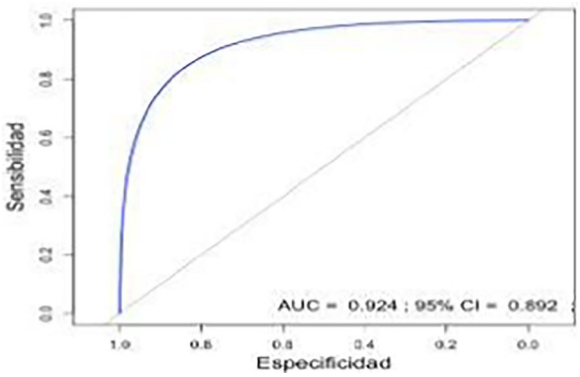


Fig. 2 (abstract 000334) ROC curve for the score deduced from the logistic regression as predictor of the GOG< 3

Table 3 (abstract 000334) Diagnostic value for the score using a cut-off of 3.848 (closest to the upper left comer)

Sensitivity	Specificity	Predictive Value	
		Positive	*Negative*
88.9 [81.2; 94.1]	84.3 [78.1; 89.3]	77.2 [68.8; 84.3]	92.6 [87.7; 96.1]

Figure 1, Figure 2, Table 3. SAH disabiity 11 year.

Topic: Neurointensive care

000336

Cerebral intra-arterial treatment in patients with aneurysmal subarachnoid hemorrhage and delayed cerebral ischemia: a 6-year analysis

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Introduction: Delayed cerebral ischemia (DCI) is recognized as a relevant cause of morbidity and mortality attributed to vasospasm in individuals with subarachnoid hemorrhage (SAH). Balloon angioplasty is indicated as the therapy of choice in case of vasospasm of proximal arteries. However, some vessels are not accessible to instrumentation due to the presence of carotid tortuosity or the distal location of perforating arteries. Some studies have reported that nimodipine appears to be a safe and effective alternative for the treatment of secondary vasospasm in individuals with SAH, either in the context of angioplasty or as pharmacological monotherapy depending on angiographic and anatomic parameters. We have some experience with intra-arterial cerebral treatments.

Objectives: To describe the results of intra-arterial treatment in patients with SAH who develop DCI in a neurotraumatic ICU.

Methods: Retrospective study of SAH patients with DCI requiring intra-arterial cerebral treatment, admitted to a 10-bed neurotrauma ICU from July 2018 to June 2024. We analyzed: demographic and neurological data; aneurysm location; degree of vasospasm before and after endovascular treatment; dose and type of vasodilator; Glasgow Outcome Scale (GOS); modified Rankin (MR) at ICU discharge, at hospital discharge, and at 1 year; and other variables. Categorical variables are expressed as frequencies and percentages, and continuous variables are expressed as means and standard deviations or medians and interquartile ranges. Univariate analysis was performed. Statistical significance was set at $p < 0.05$.

Results: The characteristics of the 26 patients with DCI are shown in Table 1. They required 40 sessions of cerebral intra-arterial endovascular treatment, which are described in Table 2a and Table 2b. Of the 40 procedures performed in these 26 patients, 25 (62.5%) had severe vasospasm. The angiographic result was good in 33 (82.5%) treatments The right and left anterior cerebral arteries were most frequently treated with 29 (72.5%), followed by the right middle cerebral artery with 24 (60%). Recovery of partial hemiparesis was achieved in 14 intravascular treatments (35%), recovery of total hemiparesis in 4 (10%) cases, and recovery of aphasia in 4 cases (10%). Of the 26 patients who underwent cerebral endovascular treatment, 3 required stent, 2 of whom had previous angioplasty in both middle cerebral arteries. All 3 had stent placement in the left middle cerebral artery. They also had regular angiographic results in 2 cases. The remaining 23 patients received intra-arterial vasodilator treatment. Only 4 of them received verapamil and the other 19 received nimodipine. Of the 40 arteriographies performed, 32 used nimodipine (80%). Seven patients required more than one intra-arterial treatment (two procedures each); the median number of days between these intra-arterial treatments was 2.3 (0.5; 3).Nine patients had severe disability with a GOS $\leq$ 3 (34.6%) at ICU discharge. These patients presented significant variables: a lower percentage of permeable cisterns, lower alert patients, as well as a lower GCS at ICU admission, but with a higher SOFA, Fisher scale, modified Fisher, as well as more patients with more than 7 days of mechanical ventilation. Three patients (11.5%) died in the ICU and 2 (7.7%) at hospital discharge. At ICU discharge modified Rankin was 4 (2; 5), at hospital discharge 3 (1; 5) and at 12 months improved to 2 (0; 5).

Conclusions: Preliminary results of cerebral intra-arterial treatment in our ICU are positive in SAH patients with DCI. The angiographic result was good in 82.5% of the procedures. There was recovery of partial hemiparesis in 35% and recovery in total hemiparesis in 10%.In 88.45% of the patients intrarterial vasodilators were used, 84.6% of them with nimodipine. At ICU discharge the modified Rankin was 4, while at hospital discharge it was 3 and 2 at 12 months. At ICU discharge severe disability was 34, 6% of patients and mortality 11.5%.

Table 1 (abstract 000336) Univariate analysis characteristics patients with SAH and DCI and cerebral intraarterial treatment

Table 1. Univariate analysis	SAH DCI Patients N=26	GOS ICU discharge > 3 N = 17	GOS ICU discharge ≤ 3 N = 9	*P*
Age (years)	51.6 ± 14.9	53.5 ± 11.7	48.0 ± 20.1	0.381
Sex female	17 (65.4)	12 (70.6)	5 (55.6)	0.667
Death	5 (19.2)	1 (5.9)	4 (44.4)	0.034
Death at ICU discharge	3 (11.5)	0	3 (33.3)	0.032
Hospital death	2 (7.7)	0	2 (22.2)	0.111
Arterial hypertension	6 (23.1)	4 (23.5)	2 (22.2)	1
Dyslipemia	3 (11.5)	3 (17.6)	0	0.529
Apache-II at admission	15 (8; 19)	11 (8; 17)	18 (8; 22)	0.16
SOFA ICU admission	2 (1; 5.8)	1 (1; 4)	6 (4; 8.0)	0.041
Fisher scale	4 (3; 4)	3 (3; 4)	4 (4; 4)	0.011
Fisher modified scale	3 (3; 4)	3 (3; 4)	4 (4; 4)	0.018
Hunt and Hess scale	3 (1; 4)	2 (1; 3)	3 (3; 5)	0.076
WFNS scale	3 (1; 4)	1 (1; 4)	3 (3; 5)	0.136
APACHE II vasoespasm	14 (10; 18)	14 (10.8; 16.8)	18 (12; 18.5)	0.55
SOFA vasoespasm	4 (3; 6)	3 (2.2; 4.8)	6 (4; 6.5)	0.035
Emergency surgery at admission	8 (30.8)	3 (17.6)	5 (55.6)	0.078
GCS on site	14 (10; 15)	15 (10; 15)	14 (10; 15)	0.55
GCS in the emergency room	13.5 (10; 15)	15 (10; 15)	10 (4; 14)	0.076
GCS at ICU admission	10.5 (7.5; 15)	15 (9; 15)	10 (3; 10)	0.034
Base cisterns Permeable	12 (48.0)	11 (64.7)	1 (12.5)	0.03
Oriented	8 (32.0)	7 (43.8)	1 (11.1)	0.182
Alert	12 (45.1)	11 (64.7)	1 (11.1)	0.014
Confused	5 (19.2)	2 (11.8)	3 (33.3)	0.302
Stuporous	11 (42.3)	5 (29.4)	6 (66.7)	0.103
Anisochoric pupils	5 (19.2)	2 (11.8)	3 (33.3)	0.302
Isochoric pupils	21 (80.8)	15 (88.2)	6 (66.7)	0.302
Both pupils reactive	23 (88.5)	16 (94.1)	7 (77.8)	0.268
No reactive pupil	1 (3.9)	0	1 (11.1)	0.346
Anterior Cerebral artery aneurysm	1 (3.9)	0	1 (11.1)	0.346
Anterior communicating artery aneurysm	8 (30.8)	6 (35.3)	2 (22.2)	0.667
Posterior communicating artery aneurysm	5 (19.2)	4 (23.5)	1 (11.1)	0.628
Middle cerebral artery aneurysm	6 (23.1)	5 (29.4)	1 (11.1)	0.38
Cerebral Posterior artery Aneurysm	2 (7.7)	0	2 (22.2)	0.111
Carotid Aneurysm	4 (15.4)	1 (5.9)	3 (33.3)	0.104
Multiple Aneurysm	5 (19.2)	2 (11.8)	3 (33.3)	0.302
Clipage	7 (25.9)	3 (17.6)	4 (44.4)	0.188
Lumbar drainage	3 (11.5)	2 (11.8)	1 (11.1)	1
Decompressive craniectomy	2 (7.7)	0	2 (22.2)	0.111
Died after treatment	1 (3.9)	0	1 (11.1)	0.346
External ventricular device	13 (50.0)	5 (29.4)	8 (88.9)	0.011
Stroke	17 (65.4)	9 (52.9)	8 (88.9)	0.098
Cerebrospinal Fluid Shunt	4 (15.4)	3 (17.6)	1 (11.1)	1
Hydrocephalus	10 (38.5)	5 (29.4)	5 (55.6)	0.234
MV > 7 days	11 (42.3)	4 (23.5)	7 (77.8)	0.014

Values are frequencies (%), means ± SD and medians (IQR). DCI: delayed cerebral ischemia, SAH: subarachnoid hemorrhage, SOFA: Sequential Organ Failure Assessment, MV: mechanical ventilation

Table 2a (abstract 000336) Intraarterial arteriographies in 26 HSA patients with SAH and DCI

Table 2a. Intra-arterial arteriographies in all 26 SAH patients with DCI	Procedures N = 40
Hemiparesis	18 (45.0)
Aphasia	12 (30.0)
Apraxia	0
Hemianopsia	1 (2.5)
Neglect	0
Decreased GCS 2 points	6 (15.0)
Sedated	17 (42.5)
Previous Mild vasoespasm	1 (2.5)
Previous Moderate vasoespasm	14 (35.0)
Previous Severe vasoespasm	25 (62.5)
Previous Bilateral vasoespasm	25 (62.5)
Right vasoespasm	10 (25.0)
Left vasoespasm	4 (10.0)
Diffuse vasoespasm	6 (15.0)
Right internal Carotid artery vasoespasm	6 (15.0)
Left Internal Carotid artery vasoespasm	7 (17.5)
Right Middle cerebral artery vasoespasm	24 (60.0)
Left Middle cerebral artery vasoespasm	22 (55.0)
Anterior comnunicating artery vasoespasm	1 (2.5)
Left Anterior Cerebral artery vasoespasm	29 (72.5)
Right Anterior Cerebral artery vasoespasm	29 (72.5)
Right Posterior communicating artery vasoespasm	3 (7.5)
Left Posterior communicating artery vasoespasm	1 (2.5)
Right Posterior Cerebral artery vasoespasm	7 (17.5)
Left Posterior Cerebral artery vasoespasm	6 (15.0)
Basilar artery teatment	3 (7.5)
Other	1 (2.5)
Right Angioplasty	11 (27.5)
Left Angioplasty	14 (35.0)
Combined Right treatment	9 (22.5)
Combined Left treatment	9 (22.5)
Dobutamine	34 (85.0)
Noradrenaline	22 (55.0)
Right Internal Carotid artery treatment	30 (75.0)
Left Internal Carotid artery treatment	26 (65.0)
Right Middle cerebral artery treatment	8 (20.0)
Left Middle cerebral artery treatment	7 (17.5)
Anterior comnunicating artery treatment	0
Right Anterior Cerebral artery treatment	6 (15.0)
Left Anterior Cerebral artery treatment	11 (27.5)
Right Posterior communicating artery treatment	1 (2.6)
Left Posterior communicating artery treatment	0

Data are frequencies (%), means ± SD and medians (IQR). DCI: delayed cerebral ischemia, SAH: subarachnoid hemorrhage; GCS: Glasgow coma score

Table 2b (abstract 000336) Intraarterial treatment arteriographies in 26 HSA patients with SAH and DCI.

Table 2b. Intra-arterial arteriographies in all 26 patients SAH with DCI	Procedures N = 40
Right Posterior Cerebral artery	7 (17.5)
Right Posterior Cerebral artery treatment	0
Left Posterior Cerebral artery treatment	1 (2.5)
Basilar artery treatment	2 (5.0)
Nimodipine use	32 (80)
Global angiographic result:	
Good	33 (82.5)
Fair	7 (17.5)
Recover Total Hemiparesis	4 (10.0)
RecoverTotal Aphasia	4 (10.0)
Recover Total Apraxia	0
Recover Total Hemianopsia	1 (2.5)
Recover Total_neglect	0
Recover GCS	6 (15.0)
Recovers partial hemiparesis	14 (35.0)
Recovers partial aphasia	4 (10.0)
Recovers partial apraxia	0
Recovers partial hemianopsia	0
Partial recovery of neglect	0
Sedated after treatment	14 (35.0)
Right intra-arterial vasodilator dose (mg)	
Left intra-arterial vasodilator dose (mg)	33 (82.5)
Modified Rankin ICU	7 (17.5)
Modified Rankin Hospital	2 (1; 5)
Modified Rankin 12 months after ICU admission	2 (0; 5)

Data are frequencies (%), means ± SD and medians (IQR). DCI: delayed cerebral ischemia, SAH: subarachnoid hemorrhage; GCS: Glasgow coma score

Topic: Neurointensive care

000337

Equipment fingerprint encodes surgical case identity

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Intensive care Medicine Experimental 2025* 13(1)*:000337.

Introduction: Case type is crucial for perioperative planning, yet traditional case descriptions rely on procedure names that are frequently ambiguous or inconsistent. State-of-the-art computational methods for handling case identity are complex machine learning approaches with significant technical overhead. I propose "equipment fingerprinting" as an intuitive alternative that conceptualizes surgical cases not by their names, but by their required equipment.
Objectives: To demonstrate how the pattern of surgical equipment used—the equipment fingerprint—can serve as an alternative method for characterizing surgical cases and understanding perioperative parameters.
Methods: We analyzed 1,568 surgical cases from Massachusetts General Hospital performed between January and September 2023. We calculated each case's equipment fingerprint, a binary vector representing the presence/absence of 121 equipment types for each case. Using simple analytical models, we tested how well these fingerprints could identify case types and predict important clinical outcomes.
Results: Equipment fingerprints revealed natural clustering of similar procedures. In a reduced-dimension space, visually distinct regions emerged for distinct case types. Within each region, similar procedures clustered together. Furthermore, by simply averaging similarly fingerprinted cases, we were able to accurately predict important case properties including EBL, duration, and ICU admission.
Conclusions: The equipment fingerprint offers a novel way to conceptualize surgical cases—not by what we call them, but by what tools they require. This approach has several practical advantages: it bypasses the ambiguities of text descriptions, provides an intuitive representation of case similarity, and could adapt in real-time as equipment needs change during surgery. For ICU teams preparing for post-surgical patients, equipment fingerprinting presents a complementary lens through which to understand incoming cases—one based on the concrete choices made by the OR team rather than potentially misleading case bookings.

Topic: Information systems and Data Science

000338

Survival and functional prognosis according to NIHSS in patients admitted to the ICU for acute ischemic stroke undergoing mechanical thrombectomy

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Intensive care Medicine Experimental 2025* 13(1)*:000338.

Introduction: The objective of this study is to analyse ICU, hospital, and at 6-month survivals, as well as functional prognosis at 6 months of patients with ischemic stroke undergoing mechanical thrombectomy (MT) and admitted to the ICU according to the initial NIHSS score.
Methods: Retrospective cohort study (January 2015–May 2024) including patients admitted to the ICU after MT. Patients were categorized into three cohorts based on NIHSS score at admission (Group A: NIHSS < 5; Group B: NIHSS 5–25; Group C: NIHSS > 25). The following variables were compared: age, gender, comorbidities, anticoagulation, antiplatelet therapy, Rankin score at admission, IV fibrinolysis, time from symptom onset to hospital arrival (excluding wake-up strokes), hospital and ICU length of stay, ICU, hospital and six-months survivals as well as the 6-month Rankin score.
Statistical analysis: Quantitative variables are presented as mean ± SD or median (IQR25–IQR75), and categorical variables as absolute values (%). The Kruskal–Wallis test was used for quantitative variables, while Fisher's exact test or the chi-square test was applied to categorical variables, according to sample size (n < 30; n > 30).
Results: 395 patients were included: 22 in Group A, 360 in Group B, and 13 in Group C. General characteristics are summarized in Table 1.
The differences between variables are shown at Table 2.
Conclusions: MT performed in patients with NIHSS > 25 is associated with higher mortality and functional dependency, suggesting that its indication in these cases may be detrimental to the patient. A NIHSS

score < 5 is associated with better functional outcomes, lower mortality, and shorter hospital stays.

Table 1 (abstract 000338) .

Variables	Group A (n=22)	Group B (n=360)	Group C (n=13)	p
Age	65,3±15,8	71,7±12,8	71,5±14,4	n. s
Male gender	11 (52%)	175 (49%)	7 (54%)	n. s
Hospital length of stay	7 (6,3-11)	12 (7-20,5)	8 (3-22)	0.040
ICU length of stay	1 (1-1)	1 (1-2)	2 (1-3)	0.013
Hypertension	13 (59%)	255 (71%)	8 (62%)	n. s
Dyslipidemia	8 (36%)	171 (48%)	8 (62%)	n. s
Diabetes Mellitus	5 (23%)	125 (35%)	3 (23%)	n. s
Smokers	4 (18%)	89 (25%)	3 (23%)	n. s
Alcohol abuse	2 (9.1%)	38 (11%)	1 (7.7%)	n. s
Atrial fibrillation	5 (24%)	97 (25%)	2 (15%)	n. s
Anticoagulation	4 (19%)	90 (25%)	3 (23%)	n. s
Antiplatelet therapy	4 (18%)	81 (23%)	4 (31%)	n. s
Rankin score at admission	0 (0-0)	0 (0-1)	0 (0-1)	0.014
Fibrinolysis	11 (50%)	112 (31%)	2 (15%)	n. s
Symptom to hospital time	2 (1,5-3)	2 (1-3)	2,5 (2-3)	n. s

Table 1.

Table 2 (abstract 000338) .

Variable	Group A (n=22)	Group B (n=360)	Group C (n=13)	p valor
ICU surv.	21 (95%)	322 (90%)	8 (62%)	0.014
Hosp. surv.	21 (95%)	280 (78%)	6 (46%)	0.003
6-month surv.	21 (95%)	263 (73%)	6 (46%)	0.004
6-month Rankin score	0 (0-1)	3 (1-6)	6 (4-6)	< 0.001

Topic: Neurointensive care

000339

Clinical characteristics and outcomes of confirmed pulmonary tuberculosis cases with acute respiratory failure

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***Intensive care Medicine Experimental 2025* 13(1):*000339*.**

Introduction: Tuberculosis (TB) remains a major public health issue worldwide, particularly in low- and middle-income countries. In 2021, an estimated 10.6 million people developed TB, with nearly 1.6 million deaths globally. Pulmonary tuberculosis with acute respiratory failure (TB-ARF) is associated with high mortality, particularly in patients requiring mechanical ventilation. Mortality rates among TB-ARF patients admitted to the ICU can reach 50–80%. Identifying risk factors associated with poor outcomes is essential for developing effective management strategies to improve survival.
Objectives: To evaluate the clinical characteristics, risk factors, and outcomes of patients with confirmed TB-ARF and identify prognostic factors associated with mortality.
Methods: This retrospective, cross-sectional study was conducted at Songkhla Provincial Hospital, a 508-bed hospital in Southern Thailand. All patients aged ≥ 15 years with a confirmed diagnosis of pulmonary tuberculosis and acute respiratory failure requiring mechanical ventilation and ICU admission between 2020 and 2024 were included. Data collected included baseline characteristics, clinical presentations, radiographic findings, laboratory results, and clinical outcomes.
Results: A total of 123 patients were included. The mean age was 55.85 ± 17.53 years, with 100 (81.3%) being male, and 52 (42.3%) aged over 60. Comorbidities were present in 70 (56.9%) patients, including diabetes (19.5%), HIV (13%), COPD (11.4%), old cerebrovascular disease with sequelae (9.8%), and heart disease (8.9%). The most common clinical presentation was dyspnea with acute respiratory failure (58.5%), followed by unconsciousness (12.2%). Over 80% of patients experienced symptoms for less than one week before admission.
Chest radiographs revealed consolidation in 27.6%, reticulonodular infiltrates in 26.8%, miliary patterns in 5.7%, and at least one radiographic finding in 38.2%. Cavitary lesions were observed in 32.5%, and pleural effusions in 27.6%. The overall hospital mortality rate was 48.0% (59 patients). The median length of hospital stay was 9 days (IQR: 4–16), and the median duration of mechanical ventilation was 5 days (IQR: 3–10).
Multivariate analysis identified low serum albumin levels (adjusted OR: 0.14; 95% CI: 0.03–0.56; p = 0.006) and higher SOFA scores at presentation (adjusted OR: 1.36; 95% CI: 1.09–1.69; p = 0.007) as significant predictors of mortality.
Table: Multivariate logistic regression for predictors of in-hospital mortality in TB-ARF patients.

Variable	Adjusted OR	95% CI	p-value
Serum Albumin (gm/dL)	0.14	0.03–0.56	0.006
SOFA score	1.36	1.09–1.69	0.007
Age	1.31	0.27–6.27	0.735
HIV	0.50	0.08–3.28	0.471
Old cerebrovascular disease with sequelae	0.70	0.04–11.27	0.805
AFB 3 +	3.75	0.67–20.97	0.132

Conclusions: Low serum albumin and high SOFA scores on admission are significant prognostic indicators of mortality in TB-ARF patients requiring ICU care. Early identification of these risk factors may guide clinical decision-making and improve patient outcomes.

Table 1 (abstract 000339) Legal picture

Table: Multivariate Logistic Regression for Predictors of In-Hospital Mortality in TB-ARF Patients

Variable	Adjusted OR	95% CI	p-value
Serum albumin	0.14	0.03–0.56	0.006
SOFA score	1.36	1.09–1.69	0.007
Age	1.31	0.27–6.27	0.735
HIV	0.50	0.08–3.28	0.471
Old cerebrovascular disease with sequelae	0.70	0.04–11.27	0.805
AFB 3+	3.75	0.67–20.97	0.132

OR: Odds Ratio; CI: Confidence Interval; SOFA: Sequential Organ Failure Assessment; AFB: Acid-fast bacilli smear

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Topic: Acute respiratory failure and mechanical ventilation

000340

Study on the role and mechanism of nano antibiotics HD5-myr in clearing bacterial endotoxins and protecting against sepsis

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Intensive care Medicine Experimental 2025* 13(1):*000340.

Introduction: Endotoxin (lipopolysaccharide, LPS) is recognized as a key factor in the development of sepsis and septic shock. Clinical studies have confirmed that elevated levels of endotoxin are associated with poor clinical outcomes. Therefore, timely clearance of endotoxin is crucial to prevent excessive inflammation, cell death, and organ damage. Traditional antibiotics do not neutralize endotoxin and may even lead to increased levels of circulating endotoxin and inflammatory mediators. HD5-myr, a C-terminally myristoylated version of human α-defensin 5 (HD5), is a redesigned antimicrobial peptide (AMP). In this study, we found that HD5-myr can neutralize endotoxin and mitigate LPS-induced inflammatory cytokine release and organ injury.
Objectives: This study aims to investigate the critical role of HD5-myr in alleviating organ damage and inflammation in an LPS-induced sepsis mouse model, and to explore its underlying mechanisms.
Methods: First, qPCR, HE staining, and other methods were used to validate the anti-inflammatory effects of HD5-myr at both cellular and animal levels. Surface plasmon resonance (SPR) and immunofluorescence techniques were then employed to explore the mechanism by which HD5-myr targets and binds LPS and affects its cellular entry. Finally, we investigated the intracellular degradation pathway of the HD5-myr/LPS complex in macrophages.
Results: In vitro experiments showed that HD5-myr effectively inhibited the pro-inflammatory effects of LPS. In vivo, HD5-myr improved survival rates and reduced lung injury in LPS-induced septic mice. SPR analysis demonstrated a strong binding affinity between HD5-myr and LPS. Immunofluorescence studies revealed that HD5-myr binds to LPS, forming HD5-myr/LPS complexes, which are more readily engulfed by macrophages through F-actin-dependent phagocytosis. When the disulfide bonds in HD5-myr were disrupted, its cellular uptake capacity was significantly diminished. Furthermore, immunofluorescence and Western blot analyses showed that HD5-myr/LPS complexes promoted the expression of acyloxyacyl hydrolase (AOAH) in macrophages, facilitating the intracellular degradation of LPS.
Conclusions: This study demonstrates that HD5-myr binds to LPS, forming HD5-myr/LPS complexes that are rapidly captured and phagocytosed by macrophages via an F-actin-dependent pathway, activating AOAH expression and promoting intracellular degradation of LPS. The disulfide bonds in HD5-myr play a critical role in this process. These findings highlight the potential of HD5-myr as a novel nanobiotic that not only exhibits antimicrobial activity, but also facilitates endotoxin clearance.

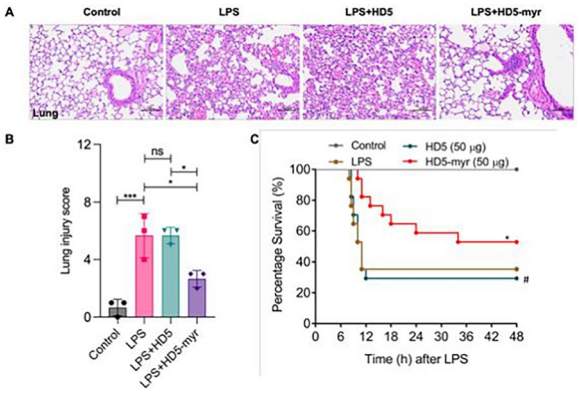


Fig. 1 (abstract 000340) H&E staining of lung tissues and lung injury scores from mice in the Blank, LPS, LPS + HD5, and LPS + HD5-myr groups, along with survival rates of each group

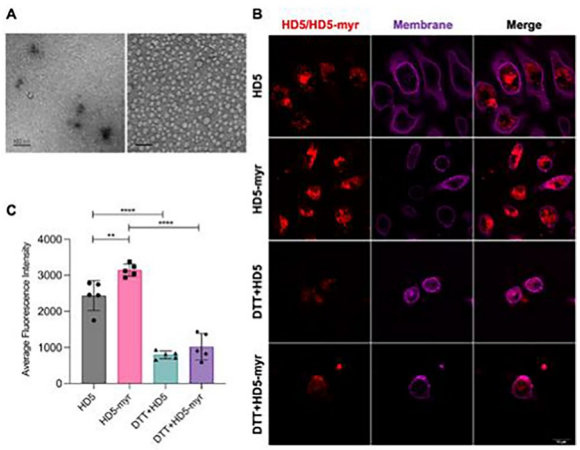


Fig. 2 (abstract 000340) HD5-myr can self-assemble into nanoparticles and rapidly enter cells; however, this ability is lost when the disulfide bonds of HD5-myr are reduced by dithiothreitol (DTT)

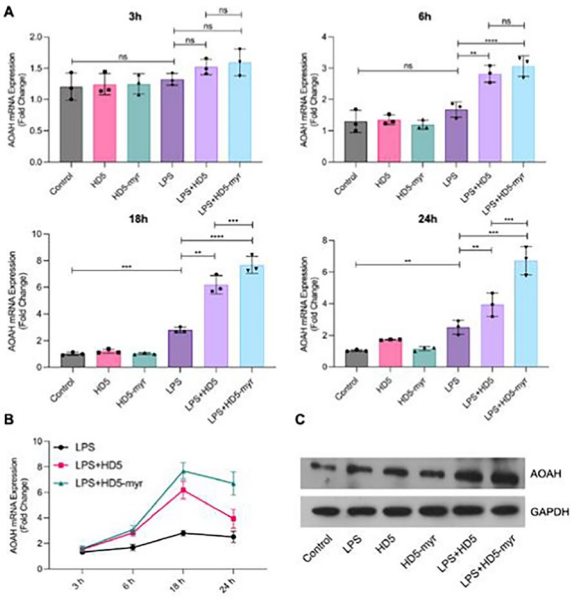


Fig. 3 (abstract 000340) The LPS/HD5-myr complex stimulates the expression of AOAH enzyme in macrophages

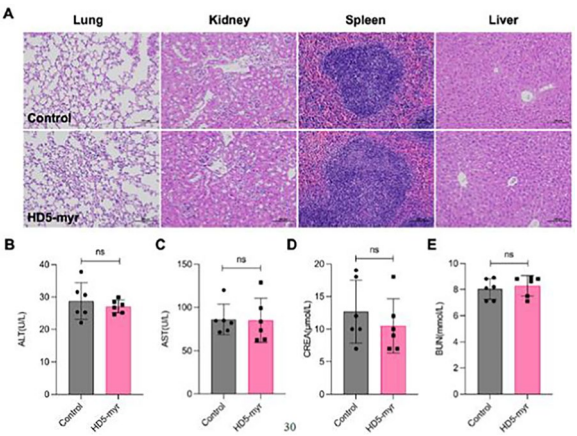


Fig. 4 (abstract 000340) Acute toxicity testing of HD5-myr shows no damage to the lungs, kidneys, spleen, or liver in mice

Reference

1. This study was supported by the National Key Research and Development Program of China(NO.2018YFC2001904)and the National Natural Science Foundation of China(NO.81902005).We thank Prof. Qikang Gao in the Analysis Center of Agrobiology and Environmental Sciences, Zhejiang University for his excellent technical assistance on surface plasmon resonance(SPR).

Topic: Sepsis

000341

Safety and efficacy of volatile sedatives in critically ill patients receiving mechanical ventilation: a meta-analysis

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Intensive care Medicine Experimental 2025 **13(1)**:*000341*.

Introduction: Volatile sedatives are increasingly used for sedation in critically ill patients undergoing invasive mechanical ventilation. Although various randomized controlled trials (RCTs) and observational studies have been conducted to compare volatile to intravenous sedation, its safety and efficacy remain controversial.
Objectives: This meta-analysis aimed to evaluate the safety and efficacy of volatile sedatives compared to intravenous agents in critically ill patients receiving mechanical ventilation.
Methods: A systematic search was conducted across PubMed, EMBASE, Cochrane Central Register of Controlled Trials, and Web of Science databases for studies published up to March 2025. RCTs, prospective studies, and observational studies that compared volatile sedation (isoflurane, sevoflurane, or desflurane) with intravenous sedation (propofol or midazolam) in patients admitted to intensive care unit (ICU) for mechanical ventilation were included for the analysis. Eligible studies included adults aged ≥ 18 years, invasive mechanical ventilation, volatile or intravenous sedative use, and at least one outcome for interest: incidence of delirium, mortality, ICU length of stay, and the duration of mechanical ventilation.
Results: Out of 3,181 identified publications, fourteen studies (n = 2,436; 8 RCTs, 1 prospective cohort study, and 5 observational studies including 3 propensity-matched) were included in the analysis (Fig. 1). Compared to intravenous sedation, volatile sedation was associated with a significantly lower incidence of delirium (risk ratio [RR] 0.68; 95% confidence interval [CI] 0.53 to 0.88), reduced ICU length of stay (mean difference -0.86 days; 95% CI -1.45 to -0.26), and shorter duration of mechanical ventilation (mean difference -29.26 h; 95% CI -37.66 to -20.86) (Fig. 2). No significant difference was observed in mortality between the two groups (RR 0.99; 95% CI 0.89 to 1.10).
Conclusions: Volatile sedation in critically ill patients was associated with a lower incidence of delirium and reductions in both ICU length of stay and the duration of mechanical ventilation compared to intravenous sedation. Further large-scale, high-quality randomized trials are warranted to confirm these benefits and define optimal patient selection for volatile sedation in critical care settings. (PROSPERO registry number: CRD420251024298).

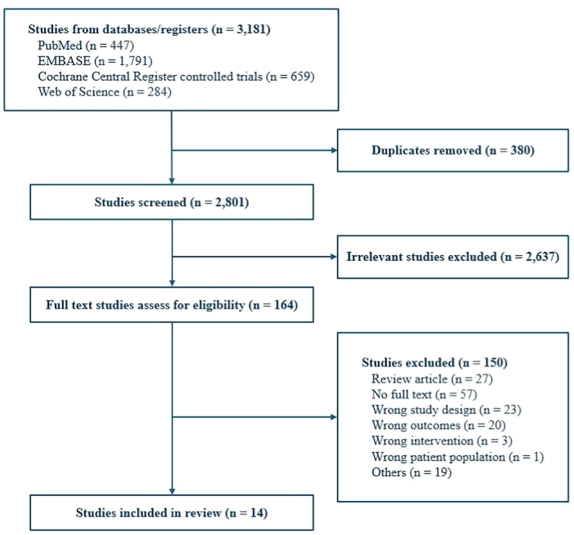


Fig. 1 (abstract 000341) Flowchart of systemic search and selection for meta-analysis

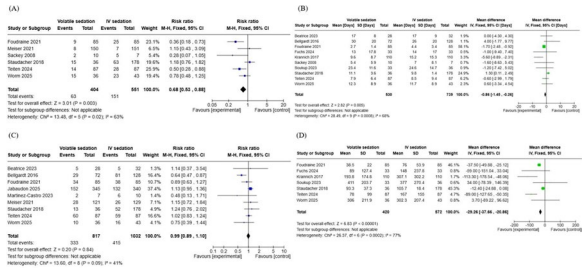


Fig. 2 (abstract 000341) Forest plots for comparison outcomes of volatile and intravenous sedatives. (A) Incidence of delirium, (B) ICU length of stay (days), (C) mortality, (D) duration of mechanical ventilation (hours). Abbreviation: CI, confidence interval; ICU, intensive care unit; IV, intravenous; SD, standard deviation

Topic: Sedation, analgesia and delirium

000343

Non-invasive ocular microtremor as an indicator of sedation depth

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Intensive care Medicine Experimental 2025* 13(1)*:000343.

Introduction: Accurately assessing depth of sedation in mechanically ventilated critically ill patients in ICU remains challenging. Current methods, such as the Richmond Agitation-Sedation Scale (RASS) and processed electroencephalography (EEG, e.g., BIS), have limitations in reliability and applicability [1]. Ocular microtremor (OMT), a nanoscale, involuntary eye movement driven by brainstem activity, specifically the reticular activating system (RAS), has been proposed as a potential biomarker of sedation depth [2]. Current acquisition techniques are invasive and thus unsuitable for routine clinical use [2]. We investigated whether non-invasive electrooculography (EOG), using electrodes located around the eyes, can be used to acquire OMT. Induction of general anaesthesia was used as an intervention model for RAS activation.
Objectives: To ascertain whether OMT can be acquired using EOG using elective surgical patients undergoing general anaesthesia as a model.
Methods: We conducted a prospective observational study in a University Hospital. After achieving consent, patients receiving general anaesthesia for elective surgery were included. Electrooculography (EOG) electrodes were placed peri-ocularly before undergoing anaesthesia. Anaesthetic depth was recorded concurrently using calculated effect site concentration of propofol. OMT frequency and amplitude were extracted using signal processing techniques, and correlations with sedation depth analysed.
Results: Figure 1 demonstrates the signal processing technique and results from a patient undergoing anaesthesia. Results were reproducible across other patients. Preliminary data suggest good correlation between depth of anaesthesia and signal processing results including power-spectral density and subsequent ocular microtremor.
Conclusions: OMT can be acquired using EOG with strong correlates to depth of anaesthesia. Future work is aimed at assessing EOG in critically ill ventilated patients to ascertain the technique's performance characteristics.

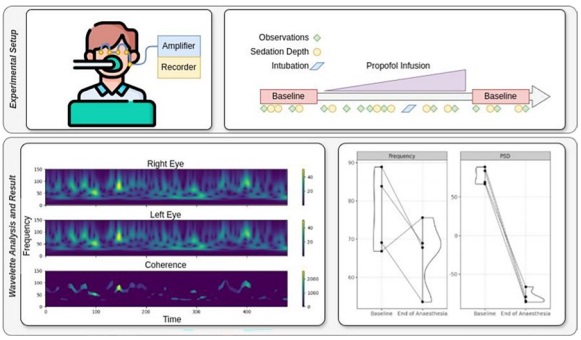


Illustration showing the apparatus, signal processing, and proof of concept results for the use of electro-oculography for the detection of ocular microtremor. Two-channel bipolar EOG is measured continuously during propofol anaesthesia. Signal processing techniques include wavelet coherence analysis with a 480 Hz window resolution. Averaged frequency and power spectral density are computed per window and plotted over time resulting in a decrement of frequency and power spectral density during induction.

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5. UCLH NIHR BRC for Critical and Perioperative Care for Recruitment Support.

Topic: Sedation, analgesia and delirium

000346

Multi-channel vital waveform 1D transformer-based alarm classification model for ventricular tachycardia in the ICU

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Intensive care Medicine Experimental 2025* 13(1):*000346.

Introduction: False alarms triggered by electrocardiographic (ECG) monitoring systems remain a significant challenge in intensive care units (ICUs). Although ECG signals serve as a critical modality for real-time cardiac monitoring of ICU patients, current bedside monitors frequently raise alarms in response to deviations from normal ECG patterns. A substantial proportion of these alarms, however, are false positives, contributing to alarm fatigue and creating a distracting, and potentially unsafe, clinical environment[1]. Among the various arrhythmias, ventricular tachycardia (VT) is particularly difficult to detect accurately due to the challenge of simultaneously achieving high sensitivity and positive predictive value[2,3].

Objectives: In this study, we propose a 1D Transformer-based deep learning model that classifies true and false VT alarms using multi-channel vital waveform data from the 10 s preceding each alarm event. By leveraging the self-attention mechanism, the model not only improves alarm precision, but also provides interpretability by highlighting which segments of the input signals contributed most to the classification decision. This approach enhances both the accuracy and transparency of alarm validation.
Methods: A total of 1,748 cases were extracted from PhysioNet's VTaC (ventricular tachycardia alarms from ICU monitors) dataset[4], which provides electrocardiographic (ECG) Lead II, photoplethysmogram (PPG), and arterial blood pressure (ABP) waveforms. Each case includes six minutes of data—five minutes preceding the alarm and one minute following it—but only the 10-s segment immediately prior to the alarm was utilized in this study (Fig. 1A). To preserve essential signal features while minimizing computational complexity, this 10-s segment was downsampled to 125 Hz. The proposed lightweight one-dimensional (1D) Transformer model comprises four Transformer encoder layers. Each waveform was divided into overlapping two-second patches at one-second strides. The model was trained to determine whether a VT alarm was true or false (Fig. 1B). Performance was tested using individual waveforms (Lead II, PPG, ABP) as well as pairs and triplets of these waveforms (Lead II + PPG, Lead II + ABP, PPG + ABP, Lead II + PPG + ABP).
Results: In the results, a clear trend emerged wherein incorporating additional waveforms led to improvements in accuracy, precision, recall, and F1-score. Notably, the highest performance was achieved when all three waveforms were used simultaneously, yielding an accuracy of 85.6% and an F1-score exceeding 0.90 (Table 1.). Furthermore, examination of the attention maps revealed distinct behaviors between single-waveform and multi-waveform models (Fig. 1C). Whereas the single-waveform approach relies solely on one signal to differentiate true from false alarms, the multi-waveform model leverages complementary information across two or more signals. This integration of cross-sensor data helps refine the decision process and provides a clearer basis for discriminating between alarm types, as the attention mechanism collectively focuses on salient features from each waveform (Fig. 1D).

Table 1 (abstract 000346) Performance metrics

Models	Accuracy	Precision	Recall	F1-Score
Lead II	0.767	0.861	0.813	0.836
PPG	0.742	0.846	0.784	0.814
ABP	0.781	0.866	0.816	0.841
Lead II, PPG	0.794	0.877	0.823	0.848
Lead II, ABP	0.837	0.892	0.867	0.871
PPG, ABP	0.811	0.883	0.860	0.871
Lead II, ABP, PPG	0.856	0.914	0.889	0.901

Conclusions: This finding underscores the value of complementary information across sensors in more effectively filtering out false alarms. Furthermore, visualizing the attention maps revealed that single-waveform models tended to focus narrowly on distortion-dominated regions, whereas the multi-waveform model leveraged information from multiple sensors to distinguish more accurately between sensor malfunctions and genuine changes in waveform. The proposed algorithm has the potential to classify VT alarms in the ICU with attention information of model in waveform, reducing fatigue of medical staff.

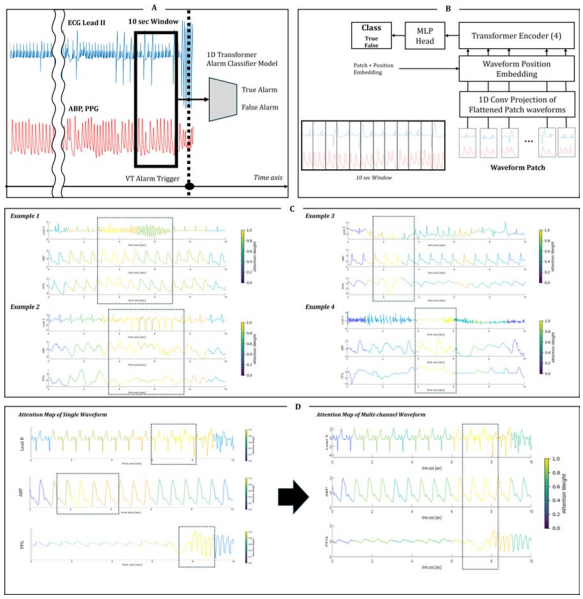


Fig. 1 (abstract 000346) Overview of the proposed 1D Transformer-based alarm classification pipeline using multi-channel vital waveforms and an attention results map. **A** 10-s window of multi-channel vital waveforms is extracted surrounding the VT alarm trigger. **B** An overview of the proposed 1D Transformer-based alarm classification model. **C** Representative examples of multi-channel waveform attention maps from the trained model. Each overlaid color scale indicates the attention weights. **D** Illustration of how single-waveform attention maps (left) be changed into a consolidated multi-channel attention map (right). This shows how the model integrates attention information across different waveforms to form a unified evidence for alarm classification

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Topic: Information systems and Data Science

000347

Ultrasonographic assessment of diaphragmatic function in Guillain–Barre syndrome patients admitted to the intensive care unit

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***Intensive care Medicine Experimental 2025* 13(1):*000347*.**

Introduction: This study evaluated diaphragm function using ultrasonography in Guillain–Barre syndrome (GBS) patients in the neurointensive care unit (NICU).
Objectives: The primary objective was to measure the diaphragmatic excursion (DE), diaphragmatic thickness fraction (DTF), peak contraction velocity (Vc) of diaphragm by ultrasound in patients with GBS at NICU admission and observe their association with discharge from NICU. Secondary objective was to observe the weekly changes of the diaphragmatic parameters until the patient was discharged or up to a maximum of 8 weeks.
Methods: After the ethical approval, all patients aged 18 to 70 years fulfilling the National Institute of Neurological Disorders and Stroke criteria for GBS and Brighton level of certainty of diagnosis of one or two and requiring NICU admission were included. Written consent was obtained from the patient's next of kin. Patients with refusal of consent, cardiac, renal or liver failure, preexisting uni- or bilateral diaphragmatic paralysis, and severe sepsis were excluded. All admitted patients were managed as per the standard guidelines. We recorded the DE, DTF and peak Vc of diaphragm by ultrasound on the 1st day of NICU admission and weekly once until the patients were discharged or for a maximum of 8 weeks, whichever was earlier. In patients requiring mechanical ventilation (MV), all assessments were done in the semi-recumbent position, in pressure support ventilation with a pressure support of 8–10 cm H2O and positive end-expiratory pressure of 0–5 cm H2O. The patients not requiring MV were monitored for diaphragmatic parameters at the predefined times. We defined early discharge as discharge within 3 weeks of NICU admission.
Results: We included 30 patients (17 male and 13 female) with a median (interquartile range) age of 44.5 (32.25–58.75) years and Erasmus GBS Respiratory Insufficiency Score of 4 (3–5). Out of the 30 patients, 6 did not need MV. The median duration of MV (n = 24) was 13 (10.25–26.50) days. Eleven out of the 30 patients (36.6%) had early discharge, while 18 (60%), had delayed discharge from NICU. Younger patients (32.5 vs 48 years; p = 0.04) and a higher proportion of females [8 (66.6%) vs 5 (29.4%); p = 0.018] were discharged earlier. In the early discharge group, the baseline peak Vc (cm/s) was significantly higher [4.04 (3.26–5.02) vs 3.03 (2.8–3.2); p = 0.024], the baseline DTF (%) was higher [36.67(15.44–51.39) vs 19.23 (11.1–33.3); p = 0.24] than those who had late discharge. Similarly, the baseline DE (mm) was higher in patients discharged earlier [16.55 (13.93–18.20) vs 12.5 (9–16); p = 0.08]. (Table-1) No differences were found in the weekly trend of the diaphragmatic parameters between the early and late discharge group of patients. (Figs. 1,2).
Conclusions: The peak Vc of the diaphragm at baseline was higher in GBS patients who were discharged early from NICU. Although the DE and DTF were also higher, the difference was not statistically significant.

Table 1 (abstract 000347) Comparison of baseline variables in patients with discharge < 3 weeks and beyond 3 weeks

Parameters	Early discharge (<3 weeks)		P-value
	Yes (12)	No (17)	
Age (years)	**32.5 (27-51.25)**	**48 (37-65)**	**0.013**
Female	**8 (66.6%)**	**5 (29.4%)**	**0.047**
EGRIS (High grade)	5 (41.6%)	7 (41.7%)	0.883
Baseline Excursion (mm)	16.55 (13.93-18.20)	12.5 (9-16)	0.08
Baseline DTF (%)	36.67(15.44-51.39)	19.23 (11.1-33.3)	0.24
Baseline Peak expiratory velocity (cm/s)	3.65 (3-4.04)	2.78 (2.53-3.25)	0.077
Baseline Peak contraction velocity (cm/s)	**4.04 (3.26-5.02)**	**3.03 (2.8-3.2)**	**0.024**

Data are presented as median (interquartile range), n (%).

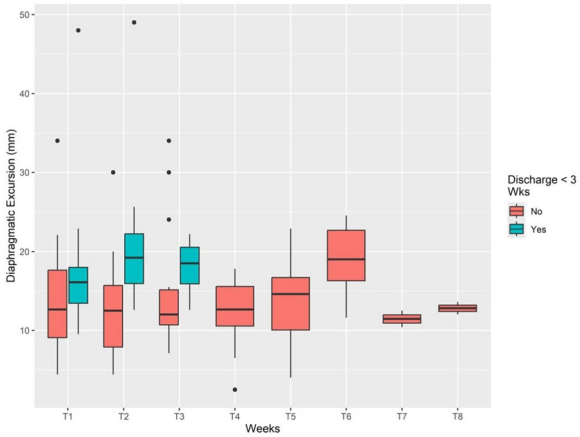


Fig. 1 (abstract 000347) Weekly trend of right hemidiaphragmatic excursion between the groups of early and delayed discharge. Note that the green bars represent data up to three weeks and the red bars represents data beyond three weeks

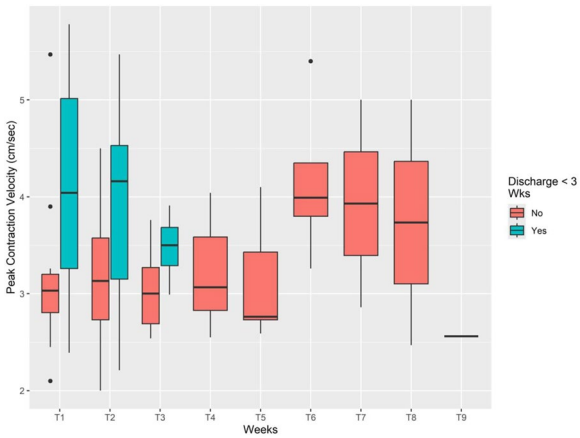


Fig. 2 (abstract 000347) Weekly trend of peak contraction velocity of the right hemidiaphragm between the groups of early and delayed discharge. Note that the green bars represent data up to three weeks and the red bars represents data beyond three weeks

Topic: Neurointensive care

000350

Nonagenarians in the ICU: defying expectations

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Introduction: With increasing life expectancy, the admission of very elderly patients (≥ 90 years) to intensive care units (ICUs) is becoming more frequent. However, despite their growing numbers, data on the outcomes and complications of nonagenarians and centenarians in the ICU remain scarce.
Objectives: To describe the clinical characteristics, ICU interventions, and outcomes of nonagenarians (90–99 years) and centenarians (≥ 100 years) admitted to a tertiary ICU.

Methods: This retrospective cohort study included all ICU admissions from January 2022 to December 2024 in a 30-bed tertiary ICU at Hospital Sírio-Libanês, São Paulo, Brazil. We used data from an administrative, electronic database of patients admitted to the ICU (Epimed Solutions®, Rio de Janeiro, Brazil).
Results: After excluding readmissions, a total of 757 unique patients were included in the study. Table 1 provides a detailed overview of patient characteristics at ICU admission. Notably, these patients were frequently bedridden and had a diagnosis of dementia in over 40% of cases. ICU interventions, including mechanical ventilation, vasopressor use, and renal replacement therapy, were frequent. Mortality and the standardized mortality ratio (SMR) were relatively low (Table 2). This could imply that higher mortality rates found in other studies in this age group could be the result of self-fulling prophecies. While functional dependence (being bedridden) was associated with lower survival (Fig. 1), dementia was not (Fig. 2).

Table 1 (abstract 000350) Baseline characteristics

Age catsegory (years)	90–99 (n = 727)	≥ 100 (n = 30)	P value
Age (mean (SD))	93.1(2.5)	102.0(1.9)	-
SAPS3 (median [IQR])	56[50,61]	57 [52,64]	0.221
Bedridden	210(29)	10(33)	0.257
Charlson Score (median [IQR])	2[1,3]	2[1,2]	0.496
Female Sex, n (%)	439(60)	19(63)	0.894
Medical admission (%)	617(85)	27(90)	0.542
Dementia, n (%)	298(41)	17(57)	0.129

Table 2 (abstract 000350) Outcomes

Age category (years)	90–99 (n = 727)	≥ 100 (n = 30)	P value
ICU mortality, n (%)	44(6.1)	3(10.0)	0.623
Hospital mortality, n (%)	123(17.0)	7(23.3)	0.515
SMR	0.6[0.5,0.7]	0.7[0.4,1.4]	0.605
ICU LOS	2[1–4]	2 [1–3]	0.274
Hospital length of stay	12[8–21]	10[6–19]	0.219
Mechanical ventilation (%)	58(8)	5(17)	0.177
Mechanical ventilation duration	3[1–6]	6 [5–7]	0.273
Vasopressors (%)	187(26)	9(30)	0.755
Renal replacement therapy (%)	17(2.3)	0 (0)	0.827
Decision to limit treatment	164(23)	15(50)	0.003

Conclusions: Our findings suggest that nonagenarians and centenarians can achieve relatively low ICU and hospital mortality rates, which challenge the notion that extreme age alone should guide ICU admission and treatment decisions. However, optimizing the decision to admit these patients to the ICU requires considerations beyond hospital survival. Long-term data on functional independence and quality of life remain crucial to fully assess the benefits and implications of ICU care in this population.

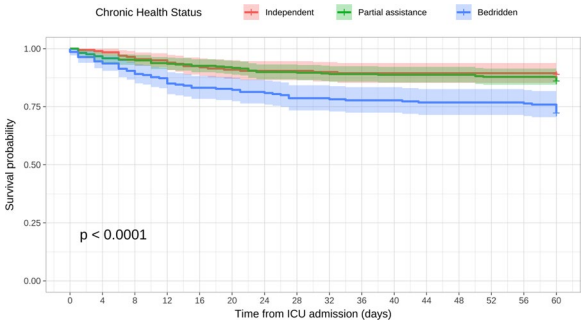


Fig. 1 (abstract 000350) Kaplan–Meier estimates of all-cause survival rate up to 60 days. Overall survival was significantly different in previously bedridden patients (blue) as compared to patients who were independent (red) or who required partial assistance (green) (logrank p < 0.0001)

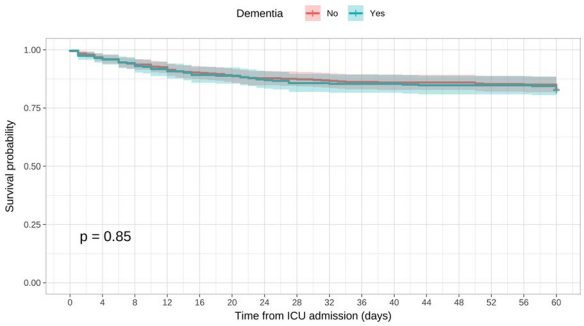


Fig. 2 (abstract 000350) Kaplan–Meier estimates of all-cause survival rate up to 60 days. Overall survival was not significantly different in patients previously diagnosed with dementia (blue) as compared to patients without dementia (red) (logrank p < 0.085)

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Topic: Health Services Research and Outcome

000352

Septic shock and IL-6: looking for a new mortality biomarker

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Intensive care Medicine Experimental 2025* 13(1):*000352.

Introduction: Interleukin-6 (IL-6) plays a key pro-inflammatory role in sepsis and has been consistently linked to patient outcomes. However, data on the phenotypic characterization of patients with extremely high hypercytokinemia, particularly those with refractory septic shock, remain scarce. Moreover, the plasma IL-6 concentration threshold associated with mortality has not been clearly established, limiting its potential role in guiding decision-making for cytokine hemoadsorption therapies.

Objectives: Analyze the relationship between IL-6 levels and mortality in patients with septic shock and severe sepsis, identifying plasma concentration thresholds above which the incidence of mortality becomes clinically relevant.
Methods: Single-center, observational, retrospective study. Inclusion criteria comprised patients diagnosed with septic shock or severe sepsis, in whom the Sepsis Code was activated at Vall d'Hebron University Hospital between July 2018 and December 2024. The diagnosis of sepsis was based on Sepsis-2 criteria.
Interleukin-6 (IL-6) levels were prospectively measured within the first 12 h after the onset of shock, using a peripheral blood sample and the ELLA platform (ProteinSimple, California, USA).
Statistical analysis included the chi-square test to assess the independence between categorical variables and the Shapiro–Wilk test to evaluate the normality of continuous variables. To estimate mortality probability, cumulative conditional relative frequencies were analyzed across increasing IL-6 levels. A reference threshold was identified at the IL-6 concentration above which the cumulative mortality frequency exceeded 50%. Mortality probability was defined based on the observed frequency percentage at each IL-6 interval.
A receiver operating characteristic (ROC) curve analysis was conducted to assess the sensitivity and specificity of the identified IL-6 cutoff. Additionally, the odds ratio (OR) was calculated to estimate the relative risk of mortality between groups stratified by this threshold.
All statistical analyses were conducted using R software (version 4.1.0). The study was approved by the Clinical Research Ethics Committee of our institution (PR(AG)336/2016).
Results: Included 1669 patients (Table 1) [SOFA 6 (6), APACHE II 20 (14), septic cardiomyopathy 193 (11.7%) mechanical ventilation 493 (29.5%)], of whom 1150 (69%) survived and 519 (31%) died. In living patients, the mean IL6 was 16,266 (53,219) pg/ml. In deceased patients, it was 75,978 (237,531) pg/ml. IL-6 analysis shows that a value of 14,930 (95% CI: 8640–22289) pg/ml is the cutoff point at which the probability of mortality exceeds that of survival in patients [E = 0.85, S = 0.35, OR 2.87 (95% CI: 2.15, 3.55)] (Fig. 1). For values above 74,238 (70,059–83708) pg/ml, the probability of mortality exceeds 60%. For valuesabove 178,693 (168,705–182355) pg/ml, the probability of mortality reaches 70%. From an IL-6 level ≥ 500,000 pg/ml, 100% of the patients studied were observed to die. When analyzing the 15,000 pg/mL quantiles, the greatest change in clinical outcomes was found when comparing patients with IL-6 levels < 15,000 pg/mL versus those with levels ≥ 15,000 pg/mL. Further stratification using 1,000 pg/mL intervals within the first 30 quantiles revealed the greatest change in the likelihood of mortality for IL-6 levels between 0.1 and 15,000 pg/mL (Fig. 2). Multivariate analysis shows that SOFA score (OR: 3.00, 95% CI: 2.28–4.04, sd: 0.146), baseline lactate (OR: 1.67, 95% CI: 1.32–2.14, sd: 0.123), presence of acute kidney injury (AKI) (OR: 3.89, 95% CI: 1.92–8.35) are factors related with mortality.
Conclusions: Patients with septic shock and multiorgan dysfunction, extremely high levels of IL-6 are associated with very high mortality. In our cohort of patients with septic shock and severe sepsis, a plasma IL-6 concentration of 14,930 pg/mL represents a critical cutoff point beyond which the probability of mortality exceeds that of survival.

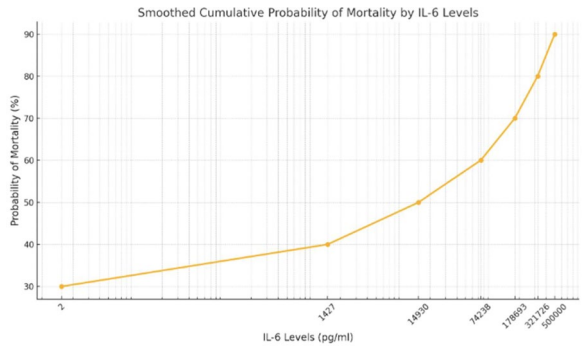


Fig. 1 (abstract 000352) Smoothed cumulative probability curve of mortality adjusted for the study population by interleukin-6 levels and aligned to the identified thresholds

Table 1 (abstract 000352) Characteristics of the study population. The data have been expressed as "n" (%) if they are categorical and as median (interquartile range) or mean (standard deviation) if they are quantitative. APACHE: Acute Physiology and Chronic Health Evaluation; COPD: chronic obstructive pulmonary disease; CKD: chronic kidney disease; CRP: C-reactive protein, CRRT: continuous renal replacement therapy; ICU: intensive care unit; Ig: immunoglobulin; IL: interleukin; IMV: invasive mechanical ventilation; PCT: procalcitonin; SOFA: sequential organ failure assessment; UTI: urinary tract infection

		N=1669
Age [years, m(ED)]		67 (23)
Gender [n(%)]	Female	632 (38)
	Male	1037 (62)
APACHE II m(ED)		20 (14)
SOFA md(IQR)		6 (4-10)
Severe sepsis [n(%)]	778 (47)	
	Mortality [n(%)]	163 (21)
Septic shock [n(%)]	891 (53)	
	Mortality [n(%)]	356 (40)
Septic cardiomiopathy [n(%)]		193 (12)
Acquisition of infection [n(%)]	Community acquired	1005 (61)
	Nosocomial	414 (25)
	Healthcare-associated	147 (9)
Positive Blood Culture [n(%)]		679 (41)
Infection Source [n(%)]	Respiratory	548 (33)
	Abdominal	460 (28)
	Urinary tract	377 (23)
	Soft tissue	98 (6)
	Primary bacteriemia	49 (3)
	Catheter-related bacteremia	46 (3)
	Central-nervous system	7 (0.4)
	Other	85 (5)
Analytic parameters	Leukocyte [(/mm3) md(IQR)]	11320 (470 - 17640)
	Neutrophile [(/mm3) md(IQR)]	9500 (4000 - 15200)
	PCT [(ng/ml) md(IQR)]	3.43 (0.64 - 19.7)
	IL-6 [(pg/ml) md(IQR)]	772 (164 - 8750)
	Lactate [(mg/dL) md(IQR)]	2.4 (1.5 - 4.3)
	Platelet count [(x10e9/L) m(ED)]	179000 (106000 - 269000)
	proADM md(IQR)	3.48 (1.81 -7.77)
	INR m(DE)	1.24 (1.1 - 1.46)
IL-6 [(pg/ml) m(ED)]	Alive	16266 (53219)
	Dead	75978 (237531)
Dobutamine [n(%)]		145 (9)
IMV [n(%)]		493 (30)
IMV days md(IQR)		2 (13)
CRRT [n(%)]		244 (15)
Hospital stay [days, m(SD)]		13 (33)
ICU admission [n(%)]		703 (43)
ICU mortality [n(%)]		247 (15)
Hospital mortality [n(%)]		519 (31%)

Topic: Sepsis

000354

Automated research notifications for trial participant identification: harnessing electronic medical records for time-sensitive research

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Intensive care Medicine Experimental 2025* 13(1)*:000354.

Introduction: Participant identification and enrolment in time-sensitive clinical trials in critical care can be challenging due to various factors, with potentially eligible participants missing out on the opportunity to participate in research. Previous studies have described criteria-based technologies to improve recruitment rates and time-to-identification [1–3]. We designed an easy-to-deploy software solution embedded in a widely used electronic patient record (EPR) with the aim of improving participant identification for time-sensitive interventions.
Methods: As part of a prospective observational cohort study, we developed an automated research notification (ARN) system embedded into the EPR (Epic Systems Corporation), which generates a real-time mobile alert for the research team when triggered by an event [4]. Patients were eligible if they were started on one of two antimicrobials and admitted to the intensive care unit with a severe respiratory infection. For each potentially eligible participant recorded on the screening log, we noted the time elapsed from ARN notification generation (time of antimicrobial prescription) to eligibility assessment by the principal investigator. We compared this strategy ('automated research notifications') with a simulated usual strategy using twice-daily static reports at 9.00 and 14.00 from Monday to Friday ('intermittent screening'), assessing the proportion of participants that could be recruited within one hour (i.e. time of first dose of antimicrobial). We calculated median times with interquartile ranges (IQR). Time-to-event analysis using Cox proportional hazards was undertaken to compare the two strategies. A Kaplan–Meier plot was generated, inverting the Y-axis to correlate with the direction of outcome. The clinical study received a favourable opinion from the Yorkshire & The Humber—Leeds East Research Ethics Committee and the Health Research Authority (23/YH/0203). Study registration: NCT05971979.
Results: Between 12 December 2023 and 21 June 2024, we identified 276 notifications, of which 166 were during regular working hours. Thirty-two notifications translated to study enrolment, resulting in an 11.6% enrolment rate. The most common reason for ineligibility was lack of laboratory capacity at time of assessment and a non-respiratory infection in 174 (69%) and 47 (19%) non-enrolled individuals, respectively. The median (IQR) time to eligibility assessment was 19 (9–48) min for enrolled participants (n = 32), and 32 (13–71) min for non-enrolled individuals (n = 244), with 199 (72%) assessed for eligibility within 1 h of antimicrobial prescription. Among the 166 regular working hour notifications used in the simulated comparison, median (IQR) times for assessment were 0.5 (0.2–1.2) hours and 4.6 (3.1–14.9) hours for 'ARN' and 'Intermittent screening', respectively (Fig. 1). Time-to-event analysis using the Cox proportional hazards model demonstrated a significant difference between ARN screening and simulated intermittent screening ($p < 0.001$). Time of day distributions of ARNs are presented in Fig. 2.
Conclusions: Automated research notifications lead to rapid identification of potentially eligible trial participants where eligibility criteria are tied to EPR events. ARN implementation is a simple, low-cost intervention. The high sensitivity requires continued input from the research team. Expansion of ARNs to studies with narrow eligibility windows may improve recruitment and present cost savings in investigator and research nurse time. Future research should investigate the real-world effectiveness of automated research notifications.

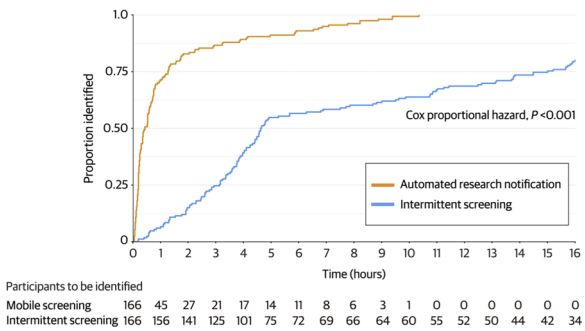


Fig. 1 (abstract 000354) Kaplan–Meier plot of time from antimicrobial prescription to screening (n = 166), comparing automated research notifications as assessed and recorded by the principal investigator (yellow line) and a simulated time assuming twice daily report generation used for screening (blue line). Time recorded is time from research notification to eligibility assessment. For the simulated comparison, the time from research notification generation to the next available report time (Monday to Friday 09:00 or 14:00) is calculated. Notifications generated between Friday 16:00 and the following Monday 08:00 were excluded from analysis

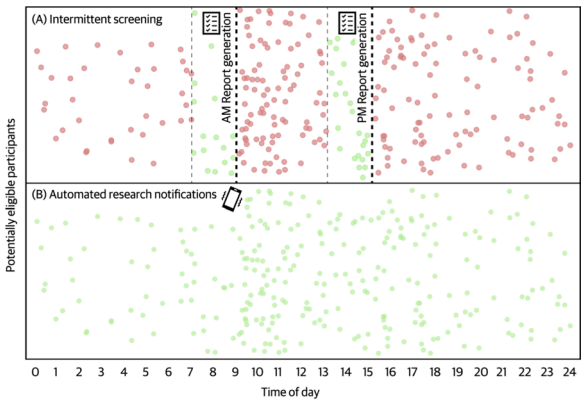


Fig. 2 (abstract 000354) Event-based participant discovery for time-sensitive trials. A comparison between the two workflows is demonstrated. A trial with a two-hour eligibility window (e.g. the participant needs to be enrolled within two hours of a given event that triggers a notification) is used as an example. Workflow A demonstrates intermittent screening, where reports are generated twice a day, listing all potentially eligible patients cross-sectionally at a given point in time. Workflow B represents automated research notifications (ARNs). Green dots represent participants identified within the 2-h window. Red dots represent identified participants who are outside of the 2-h eligibility window at the time of identification. Datapoints are participants identified as potentially eligible for recruitment in the study (n = 276) during the 6-month recruitment period using an automated research notification designed to alert at the time of prescription of piperacillin/tazobactam or meropenem for patients admitted to the intensive care unit. Notably, a large proportion of potentially eligible participants (n = 95, 34%) are missed between the two reporting times during normal working hours (9:00 to 13:00) in workflow A only. Other factors (e.g. time of day, staffing, availability of specialist equipment) will affect the real-world recruitment potential of a given potential participant

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Topic: Health Services Research and Outcome

000355

Biological sex in cerebrovascular pathophysiology of hypoxic ischemic brain injury

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Introduction: Consistently, females have shown worse outcomes and survival following cardiac arrest compared with age-matched males.1,2 Following cardiac arrest, many patients experience hypoxic ischemic brain injury (HIBI), a result of the global ischemia and reperfusion from arrest and resuscitation. Despite this knowledge, little is known about how biological sex influences the underlying pathophysiology that contributes to HIBI and the ensuing treatment, recovery, and survival.
Objectives: The aim of this study was to investigate how biological sex interacts with the cerebrovascular pathophysiology of HIBI.
Methods: We conducted a post hoc analysis of a prospective observational study in 43 HIBI patients with invasive neuromonitoring following cardiac arrest. Invasive multimodal neuromonitoring consisted of brain tissue oxygen tension (PbtO2), intracranial pressure (ICP), cerebral perfusion pressure (CPP), and jugular venous bulb oxygen saturation (SjvO2). Data were recorded in real time at 300 Hz into ICM + monitoring software (Cambridge University Enterprises) over 24 h following return of spontaneous circulation (ROSC). Demographics were compared with Mann–Whitney tests and physiological outcomes were explored with linear mixed models and adjusted for age and time to ROSC.
Results: There were no differences in age ($p = 0.433$) and time to ROSC ($p = 0.473$) between males and females (31 M/12F). ICP and CPP over the first 24 h following ROSC were not influenced by sex (ICP, $p = 0.891$; CPP, $p = 0.670$). PbtO2 was not associated with sex ($p = 0.517$). However, PbtO2 was related to survival ($p = 0.007$) and Cerebral Performance Category scores ($p = 0.004$). When stratified by sex, PbtO2 was related to survival in males ($p = 0.004$), but not females ($p = 0.389$). Similarly, PbtO2 and Cerebral Performance Category scores were associated in males ($p = 0.010$) but not females ($p = 0.269$). Finally, SjvO2 was not related to sex ($p = 0.675$; Fig. 3), but was related to age ($p = 0.004$) and time to ROSC ($p = 0.026$). When dichotomized by sex, these relationships only existed in females, but not males.
Conclusions: There are important interactions between sex, age, and outcomes with the underlying cerebrovascular physiology in HIBI patients. These findings suggest PbtO2 is related to survival and Cerebral Performance Category scores in males but not females. Thus, worsened outcomes in females appear to be related to mechanisms other than tissue oxygenation. These findings have important implications for bettering treatment of HIBI and improving outcomes.

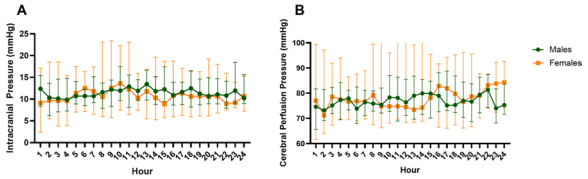


Fig.1 (abstract 000355) Intracranial (A) and cerebral perfusion (B) pressures in males and females in the first 24 h following return of spontaneous circulation after cardiac arrest

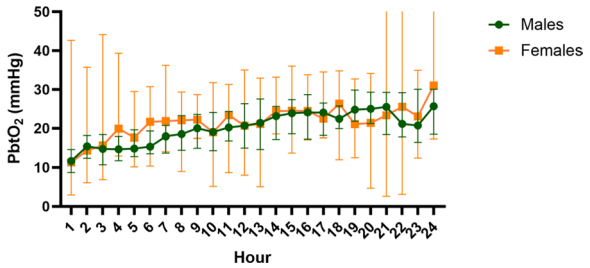


Fig. 2 (abstract 000355) Brain tissue oxygen tension in males and females in the first 24 h following return of spontaneous circulation after cardiac arrest

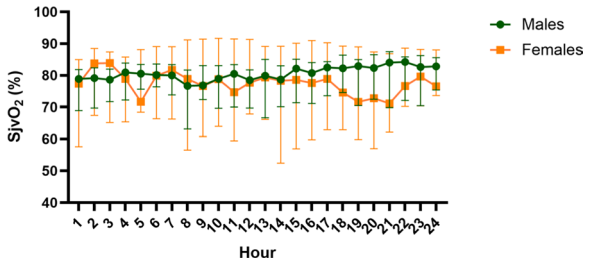


Fig. 3 (abstract 000355) Jugular venous bulb oxygen saturation in males and females in the first 24 h following return of spontaneous circulation after cardiac arrest

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3. Heart and Stroke Foundation of Canada GR027755

Topic: Cardiac arrest

000356

Extracorporeal membrane oxygenation (ECMO) for combat-related lung injuries

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Introduction: Extracorporeal membrane oxygenation (ECMO) is used in trauma cases with severe cardiopulmonary failure, showing survival rates of 66–70% (1–2). ECMO application in blast-related trauma, common in warfare and terrorist incidents, is scarcely documented. Such injuries, often from explosions and toxic inhalations, can rapidly lead to severe lung damage (3), with primary blast lung injury (PBLI)

occurring in up to 80% of fatalities in enclosed-space explosions (4). Limited medical resources in combat zones make early ECMO use challenging, with its deployment generally restricted to managing later-stage respiratory complications (5).

Objectives: This study assesses ECMO's role in combat-induced severe lung injuries.

Methods: A retrospective analysis was conducted on all combat trauma patients requiring ECMO support for respiratory failure from October 2023 to October 2024 across four trauma-level hospitals.

Results: Twenty-five patients (median age 20; IQR 20–24) were included, with injuries classified as blast injuries (n = 5), smoke/toxic inhalation (n = 9), other causes (n = 5), and multi-trauma-related ARDS (n = 6). No significant differences were observed among groups in age, evacuation method (airlifted vs. ground), or initial respiratory support (p = 0.29, p = 0.63, p = 0.42). The median Injury Severity Score (ISS) was 29 (IQR 25–50), highest in the blast injury group (50) and lowest in the inhalation injury group (25). The median Sequential Organ Failure Assessment (SOFA) score at admission was 6 (IQR 4–10).

All patients received veno-venous extracorporeal membrane oxygenation (VV-ECMO). Anticoagulation was administered to 13 patients (52%), including all inhalation injury patients, while only one patient (20%) in the blast injury group received anticoagulation due to a high prevalence of pulmonary hemorrhage. ECMO was initiated at a median of four days (IQR 3–5) in the multi-trauma group, whereas the blast and inhalation injury groups had a median initiation time of one day (IQR 0–4), often requiring ECMO within hours. The median ECMO duration was 13 days (IQR 6–15), with an overall survival rate of 85% (n = 20). Notably, all patients in the blast and inhalation injury groups survived.

Conclusions: ECMO support for combat trauma respiratory failure cases has survival rate that resembles non-combat related. Blast and smoke-related lung injury may necessitate a very early intervention, sometimes within hours post-injury, but when available is associated with high survival rates.

Table 1 (abstract 000356) Patient characteristics in combat-related lung injuries requiring ECMO

Characteristic	Overall, N = 25	Blast injury, N = 5	Smoke inhalation, N = 9	Traumatic ARDS, N = 6	Other, N = 5	p-value[1]
Age, Median (IQR)	20.0 (20.0 – 24.0)	20.0 (19.0 – 20.0)	23.0 (20.0 – 28.0)	20.0 (19.3 – 20.8)	21.0 (20.0 – 34.0)	0.29
Evacuation by helicopter, n (%)	23 (96)	5 (100)	9 (100)	5 (83)	4 (80)	0.63
Respiratory support on arrival, n (%)	11 (44)	3 (60)	3 (33)	4 (67)	1 (20)	0.42
ISS score, Median (IQR)	29 (25 – 50)	50 (38 – 63)	25 (8 – 26)	46 (29 – 55)	46 (37 – 52)	0.028
SOFA score, Median (IQR)	6.0 (4.0 – 10.0)	8.0 (6.0 – 9.0)	6.0 (3.0 – 10.0)	9.0 (7.3 – 10.8)	4.0 (3.0 – 6.0)	0.24
Ventilation days before ECMO, Median (IQR)	3 (1 – 7)	1 (0 – 4)	1 (1 – 5)	4 (3 – 5)	3 (2 – 12)	0.36
ECMO duration, Median (IQR)	13 (6 – 15)	13 (5 – 14)	12 (7 – 14)	7 (5 – 13)	21 (14 – 28)	0.38
Survived_ECMO, n (%)	20 (85)	5 (100)	8 (88.9)	4 (67)	3 (60)	0.15
Anticoagulation, n (%)	13 (52)	1 (20)	9 (100)	2 (33)	1 (20)	0.001
Other surgeries, n (%)	15 (60)	3 (60)	3 (33)	5 (83)	4 (80)	0.089

[1] Kruskal-Wallis rank sum test; Fisher's exact test

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Topic: Acute respiratory failure and mechanical ventilation

000357

Prognostic impact of hemoglobin and inflammatory markers on 28-day mortality in critically ill cancer patients: a prospective cohort study in a medical ICU

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Introduction: Critically ill patients with underlying malignancies are at high risk of early mortality due to complex pathophysiological processes, including anemia and systemic inflammation. Hemoglobin (Hb) and C-reactive protein (CRP) are routinely available biomarkers that may serve prognostic purposes.

Objectives: This study aimed to evaluate the association of Hb and CRP levels with 28-day mortality in cancer patients admitted to a medical intensive care unit (ICU).

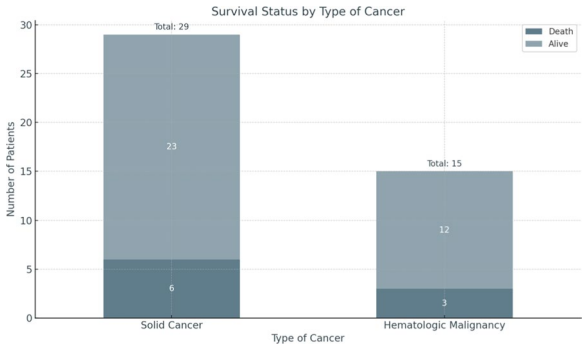
Methods: A prospective study was conducted in a single-center ICU between November 2023 and March 2024. Adult patients with active cancer requiring ICU admission were enrolled. Demographic characteristics, clinical diagnoses, laboratory parameters, and illness severity scores (APACHE II) were collected at admission. The primary outcome was 28-day all-cause mortality. Based on pre-study power analysis (α = 0.05, 80% power), 42 participants were required to detect a clinically significant difference in mortality between CRP-stratified groups. Univariate and multivariate logistic regression analyses were performed to identify independent predictors of mortality.

Results: A total of 44 critically ill cancer patients were enrolled, with a mean age of 60.1 ± 13.0 years, a mean APACHE II score of 25.98 ± 7.64, and an average ICU length of stay of 4.64 ± 3.97 days. Of these, 29 patients (65.9%) had solid tumors, while 15 patients (34.1%) had hematologic malignancies. The most frequent clinical conditions were neutropenic fever (63.6%), pneumonia (31.8%), and systemic inflammatory response syndrome (SIRS) (6.8%). The 28-day all-cause mortality rate was 20.45%.

Compared to survivors, non-survivors had lower mean hemoglobin levels (7.8 vs. 8.9 g/dL), higher APACHE II scores (28 vs. 24), and higher platelet counts (800,000 vs. 246,000 cells/μL); however, these differences did not reach statistical significance.

Multivariate logistic regression identified severe anemia (Hb < 7 g/dL) as an independent predictor of 28-day mortality (OR: 49.84; 95% CI: 1.63–1527.24; p = 0.025). Neither elevated C-reactive protein levels (> 75 mg/L) (OR: 0.28; p = 0.355) nor hemoglobin increase per 2 g/dL (OR: 1.64; p = 0.352) were significantly associated with mortality.

Conclusions: Severe anemia at ICU admission is significantly associated with increased 28-day mortality in critically ill cancer patients. This finding highlights the prognostic utility of Hb and the potential value of early correction of anemia. Although CRP did not emerge as a significant predictor in this cohort, further research is warranted to assess the broader role of inflammatory markers in this population. Larger multicenter studies are needed to validate these findings and guide targeted interventions.



Comparison of survival status among patients with solid cancer and hematologic malignancy.

Table 1 (abstract 000357) Baseline characteristic of cancer patient admitted medical ICU

Factor	Overall (N=44)	Alive (N=35)	Death (N=9)	p-value
Mean ± SD Age (yr)	60.11 ± 12.99	59.86 ± 13.18	61.66 ± 12.94	0.7708
Male sex, n (%)	***23 (52.27%)***	***21 (60.00%)***	***2 (22.22%)***	***0.043***
Diabetes Mellitus, n (%)	8 (18.18%)	8 (22.86%)	0 (0.00%)	0.113
Hypertension, n (%)	8 (18.18%)	7 (20.00%)	1 (11.11%)	0.537
Severe malnutrition, n (%)	28 (63.64%)	22 (62.85%)	6 (66.67%)	0.832
Atrial fibrillation, n (%)	11 (25.00%)	7 (20.00%)	4 (44.44%)	0.131
Mean ± SD APACHE II score	25.98 ± 7.64	24 ± 7.53	29 ± 8.13	0.3894
Mean ± SD White blood cell (cell/mm³)	20924.6 ± 49994.31	11130 ± 55966.2	10520 ± 9221.25	0.4236
Mean ± SD Hemoglobin (g/dL)	***8.91 ± 2.42***	***8.9 ± 2.10***	***7.8 ± 3.14***	***0.0782***
Mean ± SD Platelet count (cell/mm³)	250445.1 ± 154715.7	246000 ± 163627.5	80000 ± 116652.3	0.8614
Mean ± SD Prothrombin time (sec)	14.10 ± 3.48	13.7 ± 3.6	10.8 ± 3.04	0.2501
Mean ± SD Creatinine (mg/dL)	1.13 ± 1.43	0.73 ± 0.41	0.77 ± 3.03	0.4758
Mean ± SD Albumin (g/dL)	2.59 ± 0.59	2.5 ± 0.57	2.8 ± 0.67	0.9884
Mean ± SD AST (U/L)	119.89 ± 220.18	47 ± 186.6	59 ± 332.90	0.6206
Mean ± SD ALT (U/L)	47.66 ± 72.35	27 ± 74.04	18 ± 68.87	0.2156
Mean ± SD ALP (U/L)	173.52 ± 129.07	136 ± 134.37	98 ± 88.78	0.1195
Mean ± SD Sodium (mmol/L)	134.36 ± 7.47	134 ± 8.13	137 ± 4.22	0.6515
Mean ± SD Potassium (mmol/L)	3.77 ± 0.65	3.7 ± 0.69	3.8 ± 0.5	0.7706
Mean ± SD CO2 (mmol/L)	***21.86 ± 5.08***	***22 ± 4.84***	***19 ± 5.06***	***0.0286***
Mean ± SD Lactate (mmol/L)	***4.29 ± 4.35***	***2.98 ± 2.42***	***4.8 ± 7.90***	***0.0904***
Mean ± SD CRP (mg/L)	77.67 ± 79.56	57.1 ± 82.62	24.2 ± 61.69	0.125
Mean ± SD Procalcitonin (ng/mL)	3.28 ± 8.33	0.66 ± 9.3	0.26 ± 2.21	0.3903
Mean ± SD ICU Length of stay (days)	4.64 ± 5.20	3.5 ± 5.56	3.34 ± 3.39	0.6351
Mean ± SD Length of stay (days)	20.47 ± 17.51	15 ± 19.04	17 ± 7.71	0.7932

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Topic: Haematologic-oncologic issues in the ICU

000358

Utility of the nucleated red blood cell count (NRBC) in predicting inpatient cardiac arrest

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Intensive care Medicine Experimental 2025* 13(1)*:000358.

Introduction: In-hospital cardiac arrest (IHCA) carries a significant morbidity and mortality burden. Despite efforts such as rapid response teams and early warning systems, IHCA incidence continues to rise [1][2]. Identifying at-risk patients on general medical/surgical wards remains a challenge.
The nucleated red blood cell (NRBC) count, which measures circulating RBCs with nuclei [3] is considered abnormal when exceeding 1% and has been studied as a biomarker in critically ill patients [4], ARDS [5], and cardiac surgery [6]. However, its role in predicting IHCA and the timing of its elevation prior to IHCA have not been previously investigated.
Objectives: This study aimed to determine whether NRBCs could serve as a biomarker for predicting IHCA in adult general ward patients. A secondary objective was to assess the lead time between NRBC positivity and cardiac arrest to evaluate its potential as an early warning tool.
Methods: A five-year retrospective study (2019–2024) at a tertiary academic medical center reviewed all IHCA cases on general wards. Patients were identified via "Code Summary" notes and excluded if the IHCA occurred in ICUs, the OR, or the ED. IHCA was defined as time zero. NRBC values were assessed retrospectively across the hospitalization for time of first positive value (> 1%) and maximum level. Data collected included demographics, admission diagnosis, return of spontaneous circulation (ROSC), survival, and NRBC trends. A comparison group was made by data abstraction, analyzing all patients who were admitted to a non-critical care unit and did not have IHCA over the same time period; their charts were evaluated for NRBC presence.
Results: Among 231 general ward IHCA patients, 77 (33.3%) had a positive NRBC before arrest. In contrast, 1,461 of 44,403 non-IHCA patients (3.3%) had a positive NRBC. Sensitivity and specificity of NRBC for predicting IHCA were 33.3% and 96.7%, respectively. positive predictive value (PPV) was 5.0% and negative predictive value (NPV) was 99.6%. The positive likelihood ratio (LR +) was 10.0, indicating a ten-fold increased IHCA risk with a positive NRBC.
Among IHCA patients with positive NRBCs, the average maximum pre-arrest NRBC count was 7.6% (range: 1–63.7%). The median time from first NRBC positivity to IHCA was 20 h.
Conclusions: Among hospitalized patients who have a cardiac arrest, 33% have a positive NRBC count prior to their arrest. NRBC count is highly specific but insensitive for IHCA prediction. A negative NRBC does not rule out risk, however the presence of a positive NRBC warrants a close evaluation of the patient and consideration for escalation of care. With a median 20-h lead time, NRBC monitoring may help identify patients in decline who do not yet meet other ICU criteria. Further research is needed to explore relationships between NRBC trends, ROSC, survival, and patient subgroups most susceptible to NRBC elevation.

Table 1 (abstract 000358) Characteristics of patients with a positive NRBC count prior to cardiac arrest on the general wards

Variable	% (n)
Male	55.8% (43)
Female	44.1% (34)
Mean age	63 [26-93]
HTN	59% (46)
CAD	33% (26)
DM	28% (22)
COPD	13% (10)
ESRD	12% (9)
Malignancy	20% (16)

Table 2 (abstract 000358) Frequency of positive NRBC count and IHCA among patients admitted to the general wards

	Cardiac Arrest	No Cardiac Arrest	Total Patients
Positive NRBC	77 (TP)	1461 (FP)	1538
Negative NRBC	154 (FN)	42942 (TN)	43,096
Total patients	231	44,403	

Table 3 (abstract 000358) Test characteristics of the NRBC count in predicting IHCA among adult patients admitted to general wards

Sensitivity	33.3%
Specificity	96.7%
Positive Predictive Value	5.0%
Negative Predictive Value	99.6%
LR+	10.0
LR-	.68

Table 4 (abstract 000358) Features of NRBC results for patients who had a IHCA and positive NRBC

Mean NRBC % prior to cardiac arrest	7.6% [1-63.7%]
Median time of NRBC positivity prior to cardiac arrest	20 hours [1- >120 hours]

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[7] Not applicable

Topic: Cardiac arrest

000359

Serum cholinesterase: a revisited nutritional marker in ICU?

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Intensive Care Medicine Experimental**, **2025;** **13(1)**: **000359

Introduction: Critically ill patients are at risk of malnutrition, leading to muscle loss and prolonged weaning [1]. Various scores (e.g., NUTRIC-score) and biomarkers (e.g., prealbumin) are used to assess malnutrition, but their accuracy is limited. Serum cholinesterase (s-CHE) has recently been reconsidered as a malnutrition marker [2].
This retrospective study examines the correlation between NUTRIC-score and biomarkers with weaning and mortality in an ICU cohort.

Methods: Between 2020 and 2022, all medical records of patients admitted for acute respiratory failure (ARF), undergoing mechanical ventilation in the ICU of Città della Salute e della Scienza Hospital, Torino-Italy, were analyzed. Patients were divided into 3 groups: *Early-Weaning* (EW, weaning < 7 days, n = 12), *Prolonged-Weaning* (PW, weaning > 7 days, n = 75), and *Deceased* patients (D, n = 12) within the first 7 days of ICU admission. NUTRIC-score was computed at ICU admission, while albumin, prealbumin, and s-CHE levels were measured during the ICU stay. For the analysis, the first available biomarkers after admission were selected to assess their correlation with mortality and weaning.

Results: Albumin, prealbumin, s-CHE levels were higher in EW, respectively, 28, 0.19, 5969, compared to PW 26, 0.18, 3788 (Fig. 1). Group D has the lowest levels (24, 0.11, 3586). Only s-CHE reaches statistical significance in EW vs PW and EW vs D ($p < 0.05$). NUTRIC-score ranges from 4 to 5 across all groups, without any significant statistical difference.
We then analyzed mortality: non-survivors had lower levels of albumin, prealbumin ($p < 0.05$), s-CHE ($p < 0.001$), while NUTRIC-score was not significant.

Conclusions: In this population, s-CHE showed the strongest correlation with PW and mortality. This may be due to its short half-life compared to other plasma proteins, allowing a better correlation with patients' clinical course. These results suggest that more reliable markers for assessing malnutrition, and its complications are needed.

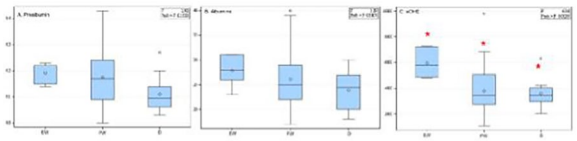


Fig. 1 (abstract 000359) Biomarker values for the study groups. Values are expressed as means and standard deviations (SD).*Panel A: prealbumin values (gr/dl) for each group EW 0.19(± 0.02), PW 0.18 (± 0.1), D11(± 0.1) **Panel B:** Albumin values [gr/dl] for each group EW 28(± 3), PW 26 (± 6), D 24(± 4) **Panel C:** s_CHE (serum cholinesterase) (U/l) for each group EW 5969(± 1084), PW 3788(± 1532), D 3586(± 3687) ***:** s-CHE reaches statistical significance in EW vs PW and EW vs D ($p < 0.05$). Values are expressed as means and SD. Definitions of abbreviations. EW early Weaning, PW: prolonged weaning, D: deceased patients.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000360

Descriptive analysis of potentially severe trauma patients in a tertiary care centre: ICU vs. non-ICU admissions after initial assessment

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000360

Introduction: Trauma remains a major cause of morbidity and mortality worldwide. Early identification of severely injured patients is crucial to guide optimal resource allocation, including ICU admission.
Objectives: To describe and compare potentially severe polytrauma patients treated in a tertiary care centre, differentiating between those requiring ICU admission and those who did not.
Methods: Descriptive analysis (January 2023 – April 2024), including patients identified as potentially severe trauma cases during the initial assessment, based on the American College of Surgeons criteria (physiological, anatomical, mechanism of injury, and comorbidities). Clinical and demographic data were collected. Quantitative variables were reported as medians (IQR), and categorical variables as absolute frequencies (%). Statistical comparisons using Student's T-test for continuous variables and odds ratios (ORs) with 95% confidence intervals for categorical variables.
Results: 200 patients were included; 100 required ICU admission, while 100 did not following initial assessment. No significant differences were observed in age [43.9 (39.6–48.2) vs. 45.2 (41.3–49.1) years] or male sex (66% vs. 60%). ICU-admitted patients had higher Injury Severity Scores [19 (17–20.9) vs. 7.4 (6–8.9); p < 0.001] and lower Revised Trauma Scores [7 (6.8–7.3) vs. 7.8 (7.7–7.9); p < 0.001]. Among mechanisms of injury, only falls from height were significantly associated with ICU admission (25% vs. 10%; OR 3.0, 95%CI: 1.4–6.6; p = 0.007). Falls from standing height showed a trend without statistical significance (19% vs. 10%; OR 2.1, 95%CI: 0.9–4.8; p = 0.075). Traffic accidents were not associated with increased ICU admission, with car accidents acting as a protective factor: motorcycle accidents (13% vs. 17%; OR 0.7, 95%CI: 0.3–1.6; p = 0.423) and car accidents (14% vs. 37%; OR 0.3, 95% CI 0.1–0.6; p < 0.001). ICU-admitted patients had longer hospital stays [17.5 (14.3–20.7) vs. 6.7 (0–14.1) days; p = 0.009] and higher in-hospital mortality (13% vs. 0%; p = 0.018).
Conclusions: Prognostic scoring systems proved useful in identifying severely injured trauma patients. Falls from height and from standing were associated with greater injury severity compared to traffic accidents. Overall, the assessment criteria employed allowed for accurate identification of patients who would benefit from ICU admission.

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Topic: Trauma

000361

Investigating the heterogeneity of the therapeutic effect of Xuebijing injection in sepsis treatment based on biomarker-driven sepsis subphenotypes

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Introduction: The mortality rate of sepsis remains unacceptably high [1], and the heterogeneity of the disease is closely related to the slow progress of research on treatments for this condition [2-4]. Studies have demonstrated that the multicomponent proprietary Chinese medicine Xuebijing injection effectively reduces the 28-day mortality rate in sepsis patients while ensuring clinical safety [5].
Objectives: We aimed to investigate the dynamic biological phenotypes of sepsis and the heterogeneity of the therapeutic effect of Xuebijing injection in patients with sepsis.
Methods: In this secondary analysis, we used a variety of clinical, organ function, blood, and biomarker variables from 193 patients with sepsis who were enrolled in the EXIT-SEP trial and explored longitudinal changes in biomarkers. The phenotype was established through latent profile analysis, and the heterogeneity of the therapeutic effect of Xuebijing injection was investigated. The ΔSOFA score [6], which was defined as the change in organ failure, served as the primary outcome (ΔSOFA score = [SOFA-D7] – [SOFA-D1]).
Results: Among 193 patients from the EXIT-SEP trial, the average participant age was 61 years, and the 28-day mortality rate was 10.9%. The ΔSOFA score in the Xuebijing group was greater than that in the control group (-3.6 [3.7] versus -2.0 [4.4]; $P < 0.01$). In the Xuebijing treatment group, there was a notable decrease in the serum VEGF level on Days 1, 4, and 7. A positive correlation was observed between the ΔSOFA score and the ΔVEGF level in sepsis patients ($P = 0.02$)(Fig. 1). Two phenotypes were identified. Phenotype 2 (n = 147, 76.2%) was characterized by low levels of inflammation, mild endothelial injury, and coagulation disorders, with mild organ damage (Fig. 2). For patients with phenotype 2, the ΔSOFA score in the Xuebijing group was significantly greater than that in the control group (-3.5 [3.6] versus -1.6 [4.5]; $P < 0.01$) (Fig. 3).
Conclusions: Evidence of hyper- and non-hyperinflammatory sepsis subphenotypes with significantly different degrees of organ dysfunction was identified. Patients with lower levels of inflammatory biomarkers and mild organ damage may benefit more from Xuebijing injection.

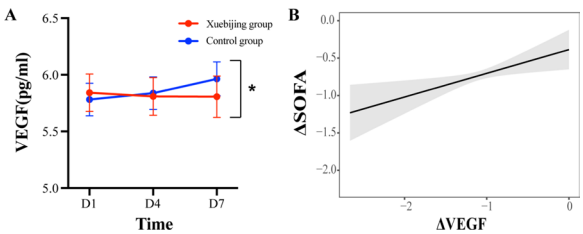


Fig. 1 (abstract 000361) VEGF levels and associations with organ function damage. **A**. The expression level of VEGF in serum of patients with sepsis in Xuebijing group and control group changed with time. *$P < 0.05$. **B**. Correlation between ΔVEGF and ΔSOFA

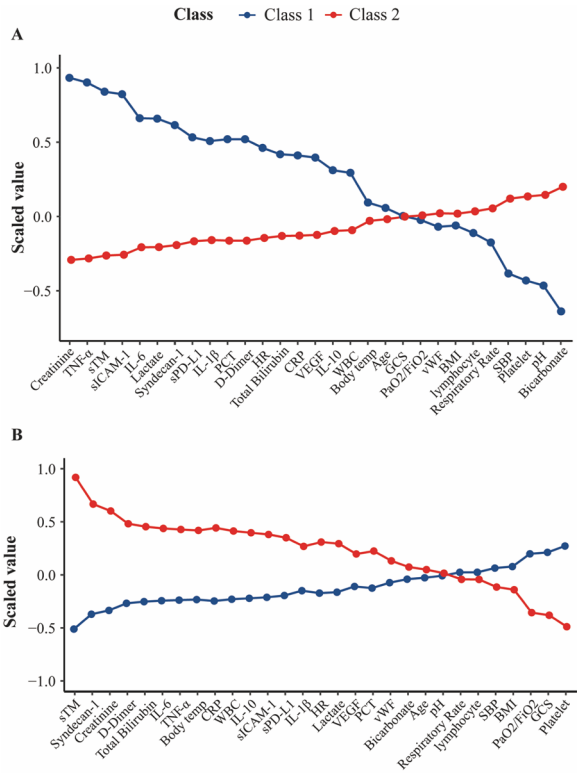


Fig. 2 (abstract 000361) Demographic and clinical characteristics of sepsis biological phenotypes established based on D1 data (A) and D7 data (B). BMI: body mass index; CRP: C-reactive x; SBP: systolic blood pressure; CRP: C-reactive protein; PCT: procalcitonin; WBC: white blood cells; HR: heart rate;

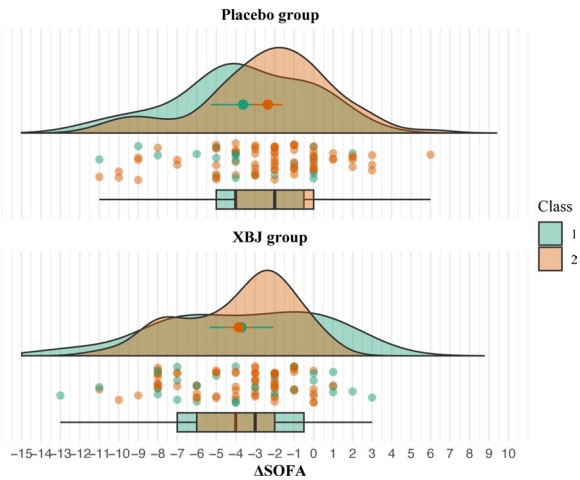


Fig. 3 (abstract 000361) The ΔSOFA values of Xuebijing group and control group in different phenotypes of sepsis were compared

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Topic: Sepsis

000362

APACHE mortality prediction in octagenarians: performance analysis by gender and clinical context

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Introduction: The Acute Physiology and Chronic Health Evaluation (APACHE) II scoring system is widely used for mortality prediction in intensive care units. Although it generally performs well for all patients, its performance in extreme age groups, specifically those over 80 years old, remains inadequately explored.
Objectives: To evaluate APACHE II score in patients aged ≥ 80 years, and to analyze its predictive value across genders and clinical context.
Methods: We conducted a retrospective analysis of all patients aged ≥ 80 years admitted to our ICU (01/2022-03/2025). Data collected included demographics, APACHE II scores, predicted mortality,

Charlson comorbidity index, and observed mortality. Performance was assessed using standardized mortality ratios (SMR), receiver operating characteristic (ROC) curves, Hosmer–Lemeshow goodness-of-fit tests, and logistic regression.
Results: We included 182 patients (54% male, 46% female; median age 84 years [IQR 81.75-86]) admitted as medical (27%), elective surgical (35%), and emergency surgical (38%) cases. Overall mortality was 34.6%, with no significant difference between gender. Median APACHE score was 16[IQR 12-21.25], with median predicted mortality of 23.5%[IQR 15-42.4%]. Median Charlson comorbidity index was 7[IQR 6-8]. The overall SMR was 1.053, indicating higher observed than predicted mortality. When stratified by gender, similar SMR values were observed. However, differences were revealed in medical (SMR = 1.30), emergency surgical (SMR = 1.34), and elective surgical (SMR = 0.21) cases. ROC analysis demonstrated optimal overall performance at a threshold of 17.8%, yielding high sensitivity (93.7%) but low specificity (52.9%). Gender-specific ROC analyses showed similar optimal thresholds. The Hosmer–Lemeshow test revealed poor calibration overall ($p = 0.037$), with significant gender differences (males: $p = 0.037$; females: $p = 0.007$). Calibration appeared acceptable in all case types. In gender-stratified analyses, predicted mortality was strongly predictive for males (OR = 1.051, $p < 0.001$) but marginally not significant for females (OR = 1.017, $p = 0.065$). APACHE showed strong predictive ability in emergency surgical cases (OR = 1.078, $p < 0.001$) but no significant value in medical or elective surgical cases. Multivariable logistic regression confirmed predicted mortality as an independent predictor of mortality (OR = 1.046, 95% CI: 1.017-1.076, $p = 0.002$) even after adjusting for gender and Charlson comorbidity index, neither of which showed significant associations. Case type was strongly associated with mortality ($p < 0.001$), with differences between elective surgical (4.7%), emergency surgical (40.6%), and medical cases (65.3%).
Conclusions: APACHE shows acceptable overall performance in the very elderly but with important gender differences and dramatic variations by clinical context, underpredicting mortality in medical and emergency surgical patients while overpredicting in elective surgical elderly patients.

Topic: Health Services Research and Outcome

000363

Impact of antibiotic treatment on the development of early ventilator-associated pneumonia (VAP) in critically ill patients with a low level of consciousness

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Introduction: Acute brain injury increases the risk of developing ventilator-associated pneumonia (VAP). It has been proposed that administering prophylactic antibiotic in patients with low level of consciousness at admission could reduce the incidence of early VAP.
Objectives: To evaluate the impact of antibiotic therapy within the first 24 h of admission on the development of early VAP in patients admitted to the ICU with a low level of consciousness, as well as the risk factors for early VAP in this population.
Methods: A retrospective observational study was conducted using real-life data automatically obtained from electronic medical records. All patients admitted between January 1, 2014, and December 1, 2024 with decreased level of consciousness or head injury (TBI) with/without other associated trauma, with a Glasgow Coma Score (GCS) of ≤ 8 and who required mechanical ventilation (MV) upon admission to the ICU for more than 48 h were included. Demographic variables, severity scores, clinical and laboratory variables, administration of antibiotic upon admission for other reasons than VAP prophylaxis, and incidence of early VAP were collected. Differences between groups were assessed using the Chi-square test or t-test, as appropriate. We used a propensity score matching analysis to reduce confounding factors. Cox proportional hazards were performed to assess the daily proportional risk of developing VAP. Factors associated with the development of early VAP were determined using a multiple logistic regression model. A p-value of < 0.05 was considered significant.
Results: We included 449 patients, 67.4% were men with a median age of 57.2 years. A total of 242 patients (53.8%) received antibiotic treatment at admission. There were no differences in the incidence of early VAP between patients with and without antibiotic treatment (8.2% vs 8.7%, $p = 0.99$). Table 1 shows the differences between these two populations. After propensity score matching, antibiotic treatment (HR 0.38, CI 95% 0.17-0.83) and procalcitonin (HR 0.89 CI 95% 0.80-0.98) were the only variables associated with early VAP in the Cox regression (Fig. 1). Antibiotic treatment showed a tendency to decrease the incidence of early VAP in multiple logistic regression, although these differences did not reach statistical significance (OR 0.45, CI 95% 0.18–1.1, $P = 0.08$).
Conclusions: Our real-life data suggest that receiving prophylactic antibiotic at admission could reduce the incidence of VAP. Studies with larger numbers of patients are needed to evaluate the impact of prophylactic antibiotic treatment in patients with a low level of consciousness

Table 1 Characteristics of the 449 patients included according to the receipt of antibiotics. IQR: interquartile range; GCS: Glasgow Coma Scale; VAP: ventilator-associated pneumonia; MV: mechanical ventilation; ICU: intensive care unit; LOS: length of stay; APACHE: acute physiology and chronic health evaluation; SAPS: simplified acute physiology score

Variables	Antibiotic no	Antibiotic yes	p-value
Age, median (IQR 25-75)	61.0 (52.0-72.0)	57.0 (45.0-68.8)	0.006
Male gender, n (%)	126 (60.9)	177 (73)	0.008
Head trauma, n (%)	39 (18.8)	125 (51.7)	<0.001
GCS at admission, median (IQR 25-75)	5 (3-7)	5 (3-7)	0.493
VAP, n (%)	17 (8.2)	21 (8.7)	0.995
Days of MV, median (IQR 25-75	7.9 (4-1-15.9)	11.3 (5.1-20.9)	0.004
ICU LOS, median (IQR 25-75)	10.7 (6.1-20.6)	15.0 (7.7 – 28.7)	0.002
APACHE II, median (IQR 25-75)	24 (17-30)	23 (17-27)	0.05
SAPS 2, median (CI 95%)	55 (45-66)	52 (42-66)	0.207
Leucocytes 10*6/µl, median (IQR 25-75)	12.7 (19.4 – 15.6)	14.0 (11.1 – 18.5)	<0.001
C-reactive protein mg/dl, median (IQR 25-75)	4.2 (2 – 6.9)	6.6 (3.6 – 10.1)	<0.001
Procalcitonine ng/ml, median (IQR 25-75)	3.8 (1.9 – 6.4)	4.1 (2.4 – 7.7)	0.203
Mortality, N (%)	86 (41.5)	72 (29.8)	0.012

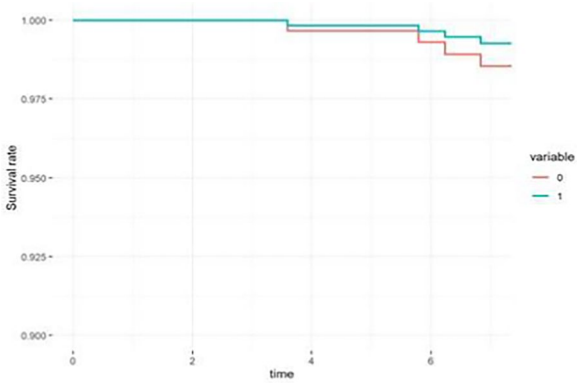


Fig. 1 (abstract 000362) Cox regression for antibiotic treatment

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Topic: Infections and prevention

000364

Pre-operative beta-blocker administration and new-onset atrial fibrillation following elective thoracic aorta surgery: a retrospective study

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000364

Introduction: Atrial fibrillation (AF) is a common complication following cardiothoracic surgery, occurring in approximately 30-40% of patients. Several risk factors for post-operative AF have been identified, but the preventive effect of pre-operative beta-blocker administration remains controversial.
Objectives: This study aimed to determine whether pre-operative beta-blocker administration reduces the incidence of new-onset atrial fibrillation following elective thoracic aortic surgery and to identify potential predisposing factors for post-operative AF occurrence.
Methods: We conducted a retrospective analysis of 250 patients who underwent elective thoracic aortic surgery at our institution from June 2012 to December 2022 Patients with pre-existing chronic atrial fibrillation were excluded. The primary outcome was new-onset post-operative atrial fibrillation. Potential predictors included pre-operative beta-blocker use, age, gender, EuroSCORE II, diabetes mellitus, dyslipidemia, hypertension, baseline ejection fraction (EF), cardiopulmonary bypass (CPB) time, and Bentall procedure. Secondary analysis examined mortality as an outcome. Univariate analyses (Mann–Whitney U tests for continuous variables and Chi-square tests for categorical variables) and multivariable logistic regression were performed to identify associations between clinical variables and outcomes.
Results: Of the 250 patients, 185 (74%) were male. Median age of all patients was 66 years [IQR: 55.75-72]. Pre-operative beta-blockers were administered to 137 patients (55%). Post-operative AF occurred in 79 (32%), and overall mortality was 4% (11 patients). In univariate analysis, none of the categorical variables showed significant association with post-operative AF. Among continuous variables, CPB time approached but did not reach statistical significance ($p = 0.062$). In multivariable logistic regression analysis, pre-operative beta-blocker administration was not significantly associated with post-operative AF (OR 0.685, 95% CI 0.383-1.228, $p = 0.204$). Similarly, age ($p = 0.498$), gender ($p = 0.812$), diabetes ($p = 0.343$), dyslipidemia ($p = 0.448$), hypertension ($p = 0.652$), EuroSCORE II ($p = 0.896$), baseline ejection fraction ($p = 0.234$), CPB time ($p = 0.238$), and Bentall procedure ($p = 0.605$) showed no significant association with post-operative AF. In the secondary analysis examining mortality, extended CPB time was the only significant predictor (OR 1.024, 95% CI 1.012-1.037, $p < 0.001$). Post-operative AF was not associated with increased mortality ($p = 0.700$).
Conclusions: Pre-operative beta-blocker administration did not significantly reduce the incidence of new-onset post-operative atrial fibrillation. Extended cardiopulmonary bypass time was the only independent predictor of mortality, with each additional minute of CPB increasing mortality risk by 2.4%. These findings suggest that the pathophysiology of post-operative AF is complex and likely multifactorial.

Topic: Perioperative care

000365

Learning the language of echocardiography: how does image interpretation and clinical decision-making change over time since Basic Critical Care Echo accreditation?

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000365

Introduction: Basic Critical Care Echo (CCE) has become increasingly recognised as a core competency for Intensivists (Cheng & Arntfield, 2024) and is essential for management of patients' haemodynamics (Flower et al., 2024; Vieillard-Baron et al., 2019). Basic CCE accreditations, such as Focused Ultrasound in Intensive Care (FUSIC) Heart, in the U.K. have gained significant popularity due to their comparative accessibility, however there is no established re-accreditation process. If basic CCE is relied upon for clinical management, how can we ensure competence is maintained and what factors influence this?
Objectives:-Validate a structured set of basic CCE cases as a tool to assess ongoing echo interpretation competence in accredited clinicians.
- Identify factors affecting competence following initial basic CCE accreditation.
- Explore the necessity for formal or informal revalidation processes for basic echo accreditation.
Methods: Five basic CCE cases were developed with a standard FUSIC Heart reporting form. Objective marks were assigned based upon recognition of key clinical findings and an overall pass or fail grade was separately allocated based on whether the primary key pathology was identified. The cases were validated by two different control groups; An "expert" group of advanced accredited echocardiographers to validate the image interpretation and second control group of critical care resident doctors without basic CCE accreditation. This was a proof of principle study in a single centre.
Results: 16 responders with basic CCE accreditations compared with 13 unaccredited controls. The average score per case was 7.25/10 (unaccredited control group 4.1/10) This can be seen in Fig. 1 plotting average scores for and Fig. 2 showing the Pass/Fail recognition of key clinical information for FUSIC, physiologist and control groups cohorts. There were 3 outliers who missed key information 3/5 times. They were all within 1 year of their FUSIC accreditation, reported 0 h of echo continued professional development (CPD) and had done between 10 and 50 scans in the last year. Selecting only those with greater than 2 years since accreditation (7 of 16), showed an improvement to 7.8/10 score and they recognised the key clinical information 98% of the time (4.9/5). This was replicated by selecting for those who reported completing echo CPD (7.6/10 score and 4.6/5 key clinical information from 11 of 16 responders).
Conclusions: A small single-centre study suggestive of a valid test of Basic CCE level competence, given the difference between the basic CCE accredited responses and the unaccredited control group. The data also suggest that although there is no formal accreditation process similar to advanced CCE, basic CCE skills improve with time and experience. Revalidation may not be needed formally if there is ongoing evidence of engagement with echo CPD and using basic CCE as part of their clinical practice. Is accreditation an introduction that is built upon in clinical practice? This area requires a larger study.

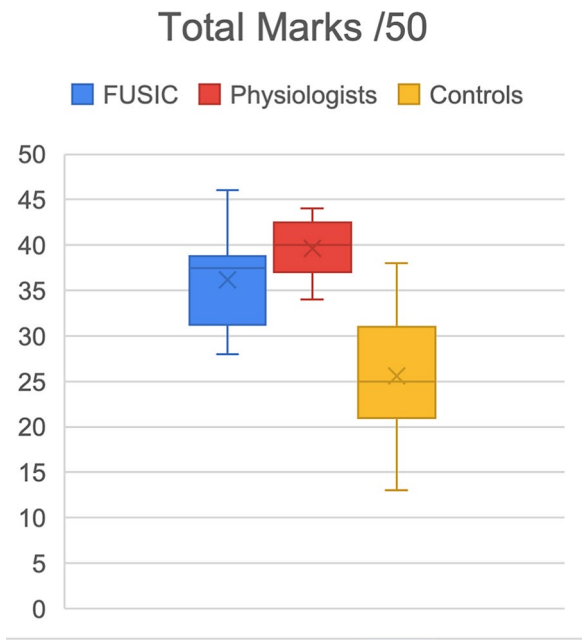


Fig. 1 (abstract 000364) Box and whisker plot showing total marks for each cohort out of 50 marks

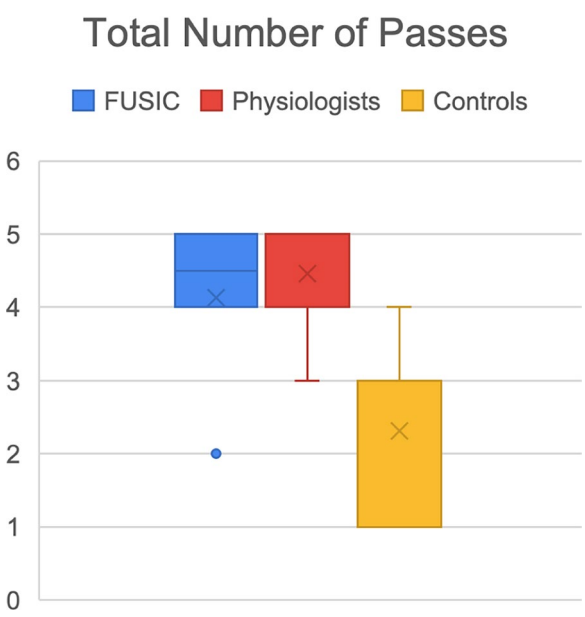


Fig. 2 (abstract 000364) Box and whisker plot showing pass rate for recognition of key clinical information across the cohorts.

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Topic: Cardiovascular issues in ICU

000366

The role of cenobamate in refractory status epilepticus in ICU patients: Are we witnessing a shift in management?

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Introduction: Cenobamate (CNB) is a novel antiseizure medication (ASM) initially approved for focal-onset seizures in adults. It has a dual mechanism of action, contributing to its unique pharmacological profile, which has led to improved seizure control. On the other hand, refractory status epilepticus (RSE) presents a significant therapeutic challenge, often requiring alternative strategies due to its high morbidity and mortality. The use of ASMs, such as CNB is increasingly being considered as a potential option in selected cases. CNB is administered exclusively oral, being given to these patients via a nasogastric tube.

Objectives: This study aims to evaluate the potential role of CNB in the management of RSE and super refractory status epilepticus (SRSE) by reviewing patients admitted to the intensive care unit (ICU) of a tertiary centre. We seek to describe the characteristics of RSE and SRSE patients who have been treated with CNB.

Methods: A retrospective review was conducted on patients diagnosed with, RSE or SRSE and admitted to the ICU of Vall d'Hebron Hospital between January 2022 and February 2025. Clinical records were analyzed to determine treatment strategies, focusing on patients who received CNB. Patients who were previously on CNB treatment were excluded from the analysis. Demographic data, treatment response, and outcomes were collected.

Results: A total of 95 patients were admitted in the ICU with a diagnosis of SE, RSE or SRSE. Among them, 2 patients in 2022, 1 patient in 2023, 8 patients in 2024, and 2 patients in the first two months of 2025 received CNB. All of those thirteen with a diagnosis of RSE or SRSE.

The cohort consisted of 13 patients. The mean age is 47.3 years (± SE 22.4). Eight were male and five were female. During their ICU stay, 8 out of 13 patients required invasive mechanical ventilation. The mean ICU stay was 26 days, (± SE 19), while the mean hospital stay was 52 days (± SE 53)

Two patients died during their ICU stay (one of the causes was limitation of therapeutic effort due to the neurological condition, and the other was disease progression in a patient with diffuse large B-cell lymphoma with central nervous system involvement). After six months of follow-up five additional patients had passed away, resulting in a six-month mortality rate of 53.8%. At the time of this publication, six patients remain under follow-up.

All patients received CNB as part of combination therapy, with it being at least the third drug used.

Conclusions: Cenobamate is not among the first-line anticonvulsant drugs for the treatment of SE but is used as part of combination therapy. Our preliminary findings suggest that it could play a role in the management of refractory status epilepticus (RSE) achieving improvements. However, further studies are necessary to confirm its efficacy and safety in this context

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5 No external funding was received for this study.

Topic: Neurointensive care

000367

Effects of nasal continuous positive airway pressure Compared with high-flow nasal cannula on the coordination between swallowing and breathing in post-extubation patients, a randomized crossover study

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Introduction: Effective coordination between swallowing and breathing is essential for preventing aspiration, with swallowing during expiration and resuming respiration with expiration being the most common and protective pattern [1,2]. High-flow nasal cannula (HFNC) and continuous positive airway pressure (CPAP) may influence swallowing-breathing patterns [3-6], but the difference in their effects on post-extubation patients remains unknown.
Objectives: The primary objective was to compare the effects of nasal CPAP and HFNC on swallowing-breathing coordination patterns in post-extubation patients. The secondary objective was to identify factors influencing the coordination between swallowing and breathing in this population.
Methods: This was a randomized, controlled, crossover trial involving post-extubation patients aged 18–80 years who were admitted to a medical intensive care unit or inpatient department, had received invasive mechanical ventilation for at least 48 h, and had been extubated within 48 h prior to enrollment. At the time of enrollment, patients underwent a modified water swallowing test and were excluded if they scored below 4, indicating dysphagia. Eligible patients were randomly assigned to one of two groups: Group A (nasal CPAP followed by HFNC) or Group B (HFNC followed by nasal CPAP). Each intervention was applied for 5 min, followed by three continuous water swallowing tests. The swallowing and respiratory phases were recorded using surface electromyography (EMG) and ECG-derived respiration. A 5-min washout period with low-flow nasal oxygen (1–5 L/min) was provided before the second intervention and swallowing assessments (Fig. 1). The coordination between swallowing and breathing was classified into four patterns: (1) E-E swallow: exhale-swallow-exhale, (2) I-E swallow: inhale-swallow-exhale, (3) E-I swallow: exhale-swallow-inhale, and (4) I-I swallow: inhale-swallow-inhale. The primary outcome was the percentage of E-E swallows. Secondary outcomes included the percentages of other swallowing-breathing coordination patterns, swallowing frequency, expiratory time within 1 min, and respiratory rate. All outcomes were averaged across three swallowing tests per device and analyzed using linear mixed-effects models to assess differences between treatments.
Results: Fourteen patients were enrolled. The primary outcome, the percentage of E-E swallows, was significantly higher with HFNC than with nasal CPAP, with estimated marginal means (EMMs) of 73.19% (95% CI: 68.79, 77.59) for HFNC and 65.58% (95% CI: 61.18, 69.99) for nasal CPAP, resulting in a mean difference of -7.61% (95% CI: -11.72, -3.50, p = 0.002) (Fig. 2). Among the secondary outcomes, HFNC resulted in significantly greater exhalation before swallowing (E-E + E-I swallows), with a mean difference of -5.40% (95% CI: -9.81, -1.00, $p = 0.020$) (Fig. 3). Other swallowing–respiration coordination patterns, swallowing frequency and respiratory rate did not differ significantly between treatments. Expiratory time was significantly longer with HFNC (mean difference: -2.45 s, 95% CI: -3.86, -1.05, $p = 0.002$). Carryover and period effects were evaluated and found to be non-significant for all outcomes. Sensitivity analyses indicated that a longer duration of mechanical ventilation was significantly associated with a lower proportion of E-E swallows (β = -0.717; p = 0.042), while age, APACHE II score, and BMI had no significant effect.
Conclusions: HFNC significantly increased the percentage of E-E swallows compared to nasal CPAP in post-extubation patients, along with a higher proportion of exhalation before swallowing and a longer expiratory time. These findings suggest that HFNC may be more effective than nasal CPAP in enhancing swallowing-breathing coordination.

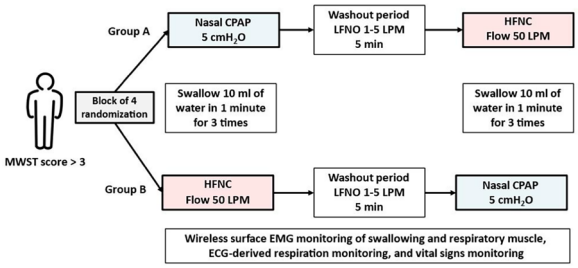


Fig 1 (abstract 000367) The study protocol. MWST, modified water swallowing test; EMG, electromyography; CPAP, continuous positive airway pressure; HFNC, high-flow nasal cannula; LFNO, low-flow nasal oxygen; ml, milliliters; min, minute; LPM, liters per minute

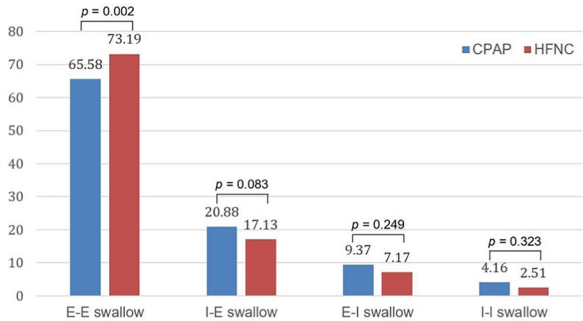


Fig. 2 (abstract 000367) Comparison of the percentage of each swallowing-breathing pattern relative to total swallows between nasal CPAP and HFNC periods.

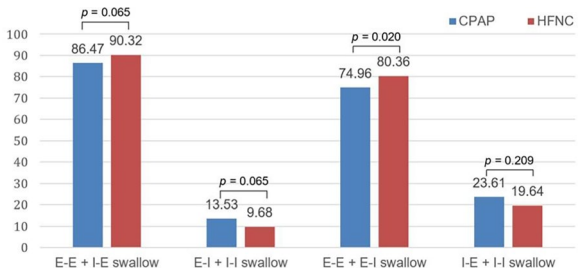


Fig. 3 (abstract 000367) Comparison of combined swallowing–breathing coordination patterns between nasal CPAP and HFNC periods

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Topic: Acute respiratory failure and mechanical ventilation

000369

Low-dose recombinant haemoglobin treatment of ischaemia–reperfusion injury induces a marked diuresis and natriuresis

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Introduction: We developed a recombinant human haemoglobin variant (pF48) from *E coli bacteria*, incorporating targeted mutations to modulate nitric oxide metabolism. We previously found that pF48 was safe in healthy rats [1] and, at low dose, reduced oxidative stress and improved haemodynamics and survival in a rat model of haemorrhage–reperfusion injury [2]. An unexpected observation was marked polyuria with pF48, with an average fivefold increase in urine output compared to controls.
Objectives: To explore the hypothesis that the pronounced diuresis observed following pF48 administration in the rat haemorrhage-reperfusion model relates to inhibition of renal Na^+/K^+-ATPase activity.
Methods: Anaesthetised Wistar rats (10 per group, weight 280–360 g) underwent vascular cannulation and bladder catheterisation. Urine was collected over 60 min (baseline). Following 90 min of ischaemia (withdrawal of 35% of circulating blood volume) animals were randomised to receive equal volume resuscitation of pF48 (8.33 mL/Kg) or placebo (Hartmann's solution). Urine and blood samples were collected at 60 and 240 min post-treatment for subsequent measurement of plasma urea and creatinine, and urinary electrolyte concentrations (Na^+, K^+, Cl–). Electrolyte content excreted was calculated as the product of urine volume and electrolyte concentration at each timepoint. Data were analysed using two-way RM-ANOVA with Sidak's post hoc test, log-rank and Mann–Whitney tests.
Results: The marked diuresis in the pF48-treated animals compared to IRI controls (Fig. 1A) resulted in a lower plasma urea level at 60 min (Fig. 1B) though haematocrit was unchanged (data not shown). pF48 treatment resulted in a higher urinary sodium concentration, lower potassium concentration, and unchanged chloride concentration (Fig. 1 D-F). In view of the large diuresis, total urinary excretion of sodium, potassium, and chloride were all significantly elevated ($p < 0.05$) in pF48-treated animals compared to controls for all (Fig. 1 G-I).
Conclusions: pF48-treated animals exhibited a significant diuresis with natriuresis, kaliuresis, and chloruresis. The reduction in renal tubular electrolyte reabsorption is likely mediated by inhibition of Na^+K^+-ATPase and/or the $Na^+K^+2Cl^-$ cotransporter systems.

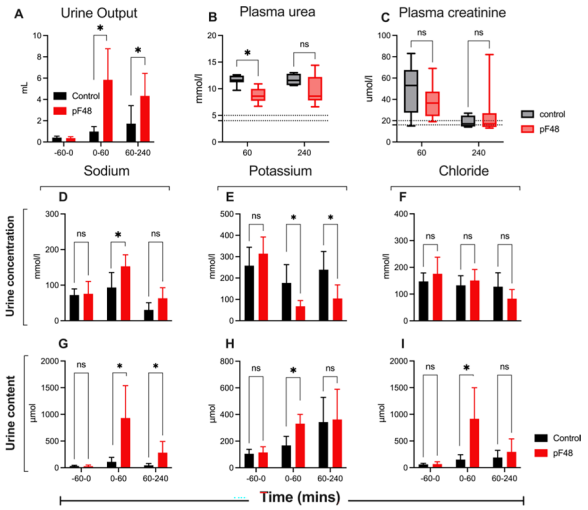


Fig. 1 (abstract 000369) Effects of pF48 on urine output, renal function, and urinary electrolytes in the haemorrhage–reperfusion model. **(A)** pF48 treatment resulted in a five-fold increase in urine output vs. placebo. **(B–C)** Plasma urea was significantly reduced at 60 min in the pF48 group; dotted lines represent normal ranges from sham animals. **(D–F)** Urinary Na + concentration was higher and K + lower at 60 min in the pF48 group while urinary chloride was unchanged. **(G–I)** Total urinary excretion of sodium, potassium, and chloride was elevated with pF48 ($p < 0.05$). Data are presented as mean ± SD.

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Topic: Translational biology

000370

Impact of sequential high-risk low-volume critical care procedural training on perceived proficiency, retention, and learning speed

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Introduction: Regular training in high-risk low-volume (HRLV) critical care procedures is challenging to achieve solely through clinical practice. The elevated complexity of these procedures, their performance under stress, and the lack of proficiency among clinicians contribute to increased morbidity and mortality rates (1). Cadaver-based training offers advantages such as recurrent practice and a high-fidelity experience. Therefore, a cadaver-based procedural training was repeated one year after an initial course (2) to assess self-perceived skill proficiency, retention, and the speed of improvement.
Objectives: This study aims to identify the impact of sequential HRLV Critical Care procedural training on ICU personnel perceived proficiency, retention and learning speed.

Methods: A 5-h cadaver-based HRLV procedural training course was developed after conducting a procedural needs assessment with attending physicians and advanced care practitioners (APPs) in the Intensive Care Unit (ICU). The course included procedures such as chest tube insertion, cricothyrotomy, difficult airway management (DAM), lung isolation, Minnesota tube insertion, pericardiocentesis, and temporary transvenous pacemaker insertion, utilizing a modified Peyton four-step approach. Identical pre- and post-course surveys were completed using a four-point Likert scale: 1. Novice, 2. Competent, 3. Proficient, 4. Expert. Data were analyzed and compared with the previous year's surveys using paired t-tests. Participants who considered themselves as experts before and after the course were excluded.
Results: Of the 39 course participants, 51.3% completed both pre- and post-course surveys. All procedures showed a statistically significant increase in self-perceived skill level (Table 1). Chest tube insertion, Minnesota tube insertion, and DAM exhibited the highest improvement (Fig. 1). Retention decayed 12 months after the first course for chest tube insertion and lung isolation, but skill level did not return to initial baseline (Fig. 2). Data for the speed of improvement after reiterative training were not statistically significant ($p > 0.05$).

Table 1. Course procedure results

Procedure	Delta mean	CI 95%	Participants reporting increased proficiency	p value
Chest tube insertion	0.83	0.55,1.12	70.50%	< 0.05
Cricothyrotomy	0.35	0.16,0.54	35%	< 0.05
Difficult airway management	0.50	0.22,0.78	56.25%	< 0.05
Lung isolation	0.39	0.14,0.64	30%	< 0.05
Minnesota tube insertion	0.58	0.34,0.82	57.89%	< 0.05
Pericardiocentesis	0.30	0.02,0.58	25%	< 0.05
Temporary transvenous pacemaker insertion	0.42	0.07,0.76	44.44%	< 0.05

Conclusions: Cadaver-based training in critical care HRLV procedures enhances self-perceived skill levels and provides an alternative for achieving regular proficiency. Periodic training more frequently than annually may minimize skill decay.

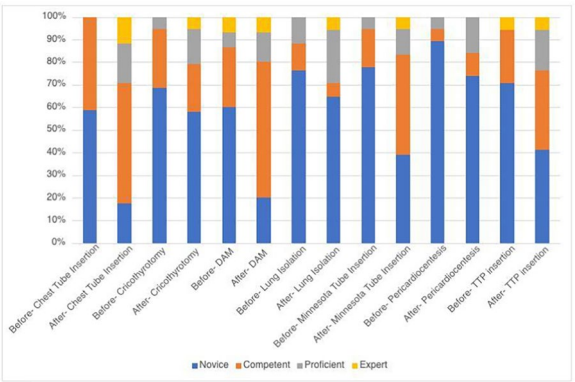


Fig. 1 (abstract 000370) Procedures' pre and post compared perceived proficiency. **DAM:** difficult airway management; **TTP:** temporary transvenous pacemaker

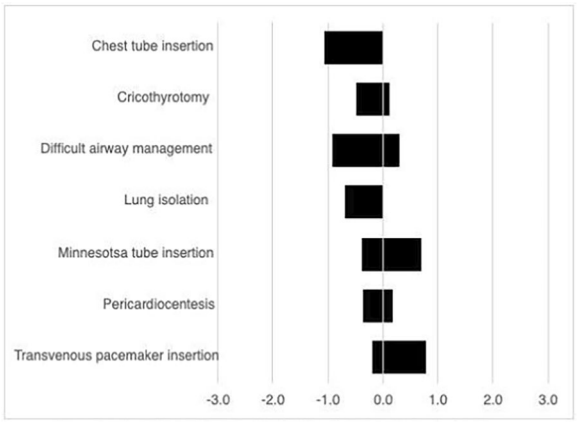


Fig. 2 (abstract 000370) Procedural skills retention after 1 year

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3 No grants for this project

Topic: Health Services Research and Outcome

000371

Eleven-year analysis of factors associated with disability and mortality after discharge from a neurotrauma ICU in patients with decompressive craniectomy

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Introduction: The second-line treatment of intracranial hypertension (ICH) proposed by the European Brain Trauma Foundation includes barbiturates, moderate hypothermia, and decompressive craniectomy (DC), but results are controversial. Our purpose was to evaluate factors associated with disability and mortality after ICU discharge in patients undergoing DC.
Objectives: To assess factors associated with disability and mortality after discharge from a neurotrauma ICU in patients in patients with DC.
Methods: Prospective study. Patients admitted from 1 January 2013 to 1 December 2024 who required DC, admitted to a 10-bed neurotrauma ICU of a tertiary hospital. DC was performed for intracranial hypertension (ICH) refractory to medical treatment. Variables analyzed: main diagnosis on admission; demographic data; neurological data; hypotension episodes; type of craniectomy and complications; GCS and motor response, Rankin scale and Glasgow outcome scale (GOS); preoperative serum lactate levels and number of hours with elevated intracranial pressure before DC; hypo- and hyperglycaemia; application of hyperosmolar treatment; leucocytes and platelets before DC and other related factors. Categorical variables are expressed as frequencies and percentages and continuous variables as mean and standard deviation (SD) when the data followed a normal distribution, or as median and interquartile range (IQR = 25th-75th

percentile) when the distribution deviated from normality. Percentages were compared, as appropriate, by the Chi-square test (χ^2) or Fisher's exact test, means by the t-test and medians by the Wilcoxon test for independent data. Univariate analysis of mortality and disability at ICU discharge and 6 months after ICU discharge was performed. Statistical significance was set at P < 0.05. Data were analysed using the R package version 4.2.1 (R Development Core Team, 2022).

Results: Sixty-six patients with DC were analyzed. The majority were TBI: 29 (43.9%) and SAH (spontaneous and traumatic) were also 29 (43.9%). Cerebral vascular accidents with malignant cerebral artery requiring DC were 13 (19.7%). The most common complications were hydrocephalus in 25 patients (38.5%) and need for reoperation in 17 patients (27.4%). 18 patients (27.7%) died in the ICU, and a total of 26 patients died within 6 months of discharge. Seven patients with spontaneous SAH died at ICU discharge. Of the 29 patients with TBI, 13 died 6 months after ICU discharge, including 8 (ICU mortality 27.58%) in ICU. Median Rankin at ICU discharge was 5 (4; 5.8) and GOS was 3 (1.2; 3). At 6 months after ICU discharge, Rankin was 5.0 (4; 6) and GOS was 3 (1; 4) (Table 1). In the analysis of disability after ICU discharge and at 6 months after discharge, no statistically associated factors were found. However, in the analysis of mortality at 6 months after ICU discharge in patients with DC, both reactive pupils were statistically significant (lower mortality) (Table 2).

Conclusions: Rankin and GOS reflect moderate disability in our DC patients at ICU discharge and 6 months later. The ICU mortality of patients with DC was 27.7%. However, TBI patients with DC had an ICU mortality of 27.58%. Mortality at 6 months after ICU discharge in DC patients was significantly associated with both reactive pupils.

Table 1 Univariate analysis DC disability at ICU discharge 11 years

	Rankin scale		
	< 3 N = 10	≥ 3 N = 56	*P*-value
Age (years)	42 (36; 55)	50 (38; 60)	0.373
Sex female	4 (40.0)	20 (35.7)	1
APACHE-II	23.5 (21; 26.2)	22 (18; 25)	0.409
Diabetes mellitus	1 (10.0)	6 (10.7)	1
Arterial hypertension	3 (30.0)	12 (21.4)	0.683
Dislypemia	2 (20.0)	8 (14.3)	0.641
Tumor	1 (11.1)	3 (5.4)	0.458
SAH (spontaneous and traumatics)	5 (50.0)	24 (42.9)	0.738
Hydrocephalus	2 (22.2)	23 (41.1)	0.463
Reoperation for complications	1 (12.5)	16 (29.6)	0.427
Stroke Malignant middle cerebral artery	1 (10.0)	12 (21.4)	0.672
Acute subdural hematoma	3 (33.3)	21 (37.5)	1
Obliteration of base cisterns	2 (22.2)	21 (37.5)	0.474
Hematoma no evacuado	3 (33.3)	10 (17.9)	0.368
Focal contusion with edema and expansivity	5 (55.6)	24 (42.9)	0.497
Evacuated Injury	2 (22.2)	12 (21.4)	1
TBI	5 (50.0)	24 (42.9)	0.738
OTI previous hospital admission	4 (40.0)	16 (28.6)	0.476
OTI Emergency	2 (20.0)	24 (42.9)	0.293
OTI on Surgery	3 (30.0)	10 (17.9)	0.399
Transfusion prior to DC	1 (11.1)	12 (22.2)	0.671
Pre-craniectomy seizures	1 (11.1)	9 (16.4)	1
Bilateral arreactive mydriasis prior to DC	0	5 (9.1)	1
Both reactive pupils prior to DC	7 (87.5)	38 (67.9)	0.418
One reactive pupil prior to DC	0	9 (16.1)	0.58
None-reactive pupils prior to DC	1 (12.5)	6 (10.7)	1
ICU-Deaths	0	18 (32.1)	0.053
Six months after ICU discharge	0	26 (46.4)	0.005
Midline shift on CT at admission	2 (0; 10)	5 (0.5; 9.5)	0.703
GCS on admission	10.5 (5.8; 12.8)	8 (5; 14)	0.769
GCS at ICU admission	4 (3; 9.5)	3 (3; 6.5)	0.254
Number of platelets prior to DC	263 (249; 291)	213 (169; 264)	0.069
Rankin ICU discharge	1 (1; 1)	5 (4; 6)	< 0.001
Rankin 6 months after discharge	1 (1; 1)	5 (4; 6)	< 0.001
GOS ICU discharge	5 (4.2; 5)	2 (1; 3)	< 0.001
GOS 6 months after ICU discharge	5 (5; 5)	3 (1; 3)	< 0.001

Data are means and medians (IQR) and frequences (%). SAH: subarachnoid hemorrhage; TBI:trauma brain injury; OTI: orotracheal intubation; DC: decompressive craniectomy.

Table 2 Univariate analysis of DC mortality 6 months after ICU discharge

	Overall N = 66	Survivors N = 40	Non-survivors N = 26	*P*
Age (years)	47 (37; 60)	49 (34; 59)	47 (38; 62)	0.535
Sex female	24 (36.4)	13 (32.5)	11 (42.3)	0.418
APACHE-II	21.4 ± 5.7	20.5 ± 5.8	23.1 ± 5.1	0.102
Diabetes mellitus	7 (10.6)	4 (10.0)	3 (11.5)	1
Arterial hypertension	15 (22.7)	8 (20.0)	7 (26.9)	0.512
Dislypemia	10 (15.2)	7 (17.5)	3 (11.5)	0.728
Tumor	4 (6.2)	2 (5.1)	2 (7.7)	1
SAH (spontaneous and traumatics)	29 (43.9)	20 (50.0)	9 (34.6)	0.219
Stroke Malignant middle cerebral artery	13 (19.7)	7 (17.5)	6 (23.1)	0.578
Acute subdural hematoma	24 (36.9)	14 (35.9)	10 (38.5)	0.834
Hydrocephalus	25 (38.5)	13 (33.3)	12 (46.1)	0.298
Reoperation for complications	17 (27.4)	11 (29.7)	6 (24.0)	0.62
Obliteration of base cisterns	23 (35.4)	14 (35.9)	9 (34.6)	0.916
Focal contusion with edema and expansivity	29 (44.6)	18 (46.1)	11 (42.3)	0.76
Evacuated Injury	14 (21.5)	7 (17.9)	7 (26.9)	0.389
TBI	29 (43.9)	16 (40.0)	13 (50.0)	0.424
OTI previous hospital admission	20 (30.3)	12 (30.0)	8 (30.8)	0.947
OTI Emergency	26 (39.4)	13 (32.5)	13 (50.0)	0.155
OTI on Surgery	13 (19.7)	10 (25.0)	3 (11.5)	0.179
Transfusion prior to DC	13 (20.6)	8 (20.5)	5 (20.8)	1
Pre-craniectomy seizures	10 (15.6)	6 (15.4)	4 (16.0)	1
Bilateral arreactive mydriasis prior to DC	5 (7.8)	2 (5.1)	3 (12.0)	0.371
Both reactive pupils prior to DC	45 (70.3)	31 (81.6)	14 (53.9)	0.017
One reactive pupil prior to DC	9 (14.3)	3 (8.1)	6 (23.1)	0.144
None-reactive pupils prior to DC	7 (10.9)	3 (7.9)	4 (15.4)	0.428
ICU Deaths	18 (27.7)	0	18 (69.2)	< 0.001
Six months after ICU discharge Deaths	26 (39.4)	0	26 (100)	< 0.001
Midline shift on CT at admission	5 (0; 10)	5 (0; 9)	7 (1; 10)	0.568
GCS on admission	8 (5; 13.5)	9 (5; 14.8)	7 (5; 12)	0.245
GCS at ICU admission	3 (3; 7)	3 (3; 7.8)	3 (3; 3.8)	0.189
Number of Platelets prior to DC	224 (182; 269)	224 (182; 268)	220 (180; 270)	0.931
Rankin ICU discharge	5 (4; 5)	4 (2.8; 5)	6 (5; 6)	< 0.001
Rankin Hospital discharge	5 (4; 6)	4 (1; 5)	6 (6; 6)	< 0.001
GOS ICU discharge	3 (1.2; 3)	3 (3; 4)	1 (1; 2)	< 0.001
GOS months after ICU discharge	3 (1; 4)	4 (3; 4.5)	1 (1; 1)	< 0.001

Data are means and medians (IQR) and frequences (%). SAH: subarachnoid hemorrhage; TBI: trauma brain trauma injury; OTI: orotracheal intubation; DC: decompressive craniectomy.

Topic: Neurointensive care

000372

Are local microbiological samples useful in intra-abdominal infections in critically ill patients?

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000372

Introduction: Intra-abdominal infections (IAI) involve a complex mix of pathogens. Intraperitoneal specimens for microbiological evaluation from the site of infection are always recommended in hospital or community acquired IAI in patients at risk for resistant pathogens, particularly in critically ill patients to guide antimicrobial therapy1,2.

Objectives: This study aims to analyze the utility of microbiologic samples in guiding antimicrobial treatment in critically ill patients with IAI.

Methods: Retrospective cohort study including all patients with IAI, under empiric antibiotic therapy, admitted to an ICU of a secondary care hospital between April 1, 2021, and December 31, 2023.

Results: There were 128 patients enrolled in the study. Patients with microbiological documentation had a higher rate of antibiotic modification when compared with those without, 45% (n = 33) vs. 21% (n = 9), p < 0.001. Similar results were observed if we consider only identification in local products, 48% (n = 23) vs. 24% (n = 19), p = 0.004. There was a low prevalence of MDR pathogens.

Table 1 (abstract 000372) Characteristics of the patients included

Variable		Location of intra-abdominal infection			
		All (n = 128)	Hepato-bilio-pancreatic (n = 67)	Gastro-entero-colic (n = 39)	Peritonitis due to perforation (n = 33)
Age, median (IQR)		71 (61–78)	73 (63–80)	70 (61–79)	68 (55–75)
Male, n (%)		63 (49)	27 (40)	14 (48)	22 (67)
SAPS, mean ± SD		42 ± 19	41 ± 16	43 ± 20	43 ± 22
Risk factors for drug-resistant pathogens, n (%)		95 (74)	46 (69)	19 (65)	30(91)
Collection of local products for microbiology, n (%)		80 (62)	38 (57)	17 (59)	25 (76)
Positive local products cultures, n (%)		48 (60)	25 (66)	4 (24)	19 (76)
Blood cultures collected, n (%)		122 (95)	64 (96)	27 (93)	31 (94)
Positive BC, n (%)		41 (33)	32 (50)	1 (4)	8 (26)
Identification of causal microorganism, n (%)		73 (57)	44 (66)	6 (21)	23 (70)
Type of microorganism, n (%)	Gram negative	58 (45)	39 (58)	5 (17)	14 (42)
	Gram positive	26 (20)	12 (18)	2 (7)	12 (36)
	Fungus	4 (3)	0 (0)	0 (0)	4 (12)
	Polymicrobial	33 (26)	18 (27)	3 (10)	12 (36)
Multidrug resistance		10 (8)	5 (8)	1 (3)	4 (12)
Antibiotic change, n (%)		42 (33)	23 (34)	6 (21)	19 (39)
Antibiotic de-escalation, n (%)		20 (53)	17 (71)	1 (20)	2 (22)
Antibiotic Escalation, n (%)		23 (18)	6 (9)	6 (21)	11 (33)
ICU LOS, median (IQR)		3 (2–4)	3 (2–4)	2 (1–4)	4 (2–6)
ICU mortality, n (%)		21 (16)	9 (13)	8 (28)	4 (12)
Hospital mortality, n (%)		31 (24)	11 (16)	9 (31)	11 (33)

IQR—inter-quartile range; SD—standard deviation; BC—blood cultures; LOS—length of stay

Conclusions: Our study shows a high usefulness of blood cultures and local products collection for microbiology analyzes in IAI, measured by a significant proportion of patients in whom it was necessary to adjust antimicrobial therapy according to the results obtained, in this population with low prevalence of MDR pathogens.

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Topic: Infections and prevention

000373

Physiological phenotypes in response to neuromuscular blockade in mechanically ventilated ICU patients and their impact on mortality

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000373

Introduction: Neuromuscular blocking agents (NMBAs) are commonly used in critically ill patients requiring invasive mechanical ventilation (MV) to facilitate lung-protective MV and improve oxygenation (1). Randomized controlled trials provided equivocal results regarding their effects on mortality (2-3). It is yet unclear whether responses in key determinants of lung-protective MV, most importantly driving pressure (ΔP) (4), following NMBA administration predict NMBA-associated risk of mortality (5).

Objectives: To investigate whether ΔP changes in response to NMBA administration were associated with differential risks of mortality.

Methods: 1,168 critically ill patients undergoing invasive MV in an intensive care unit (ICU) at Beth Israel Deaconess Medical Center, Boston, MA and receiving NMBAs for indications other than intubation between 2010 and 2023 were included in this retrospective cohort. The primary exposure was the change in ΔP within six hours before and after NMBA administration. First, 28-day mortality was analyzed depending on the change in ΔP after NMBA administration. Then, to determine NMBA-associated mortality, a separate cohort was created using 1:1 matching of 996 mechanically ventilated, non-CMO, non-surgical ICU patients with baseline S/F ratios ≤ 300 with and without NMBA initiation in the first 48 h of invasive MV. Multivariable logistic regression, adjusted for patient demographics, comorbidities, and ICU-specific markers of baseline case severity was applied.

Results: Across 1,420 NMBA administrations, an increase in ΔP followed 695 (48.9%) NMBA administrations, and 582 (41.0%) NMBA administrations were followed by a decrease in ΔP (**Table 1** and Fig. 1). An increase in ΔP after NMBA administration was associated with a higher risk of 28-day mortality (ORadj 1.32 per 5 cmH2O increase in ΔP, 95%CI 1.08-1.62, p = 0.007) and more likely pronounced when baseline ΔP was low (ORadj per every -1 cmH2O baseline ΔP 1.24, 95%CI 1.18-1.30, p < 0.001; 58.8% (n = 514/874) among a subset of patients with baseline ΔP ≤ 13). In the matched cohort, 41.6% (n = 207/498) of patients who received NMBAs died within 28 days, compared to 36.1% (n = 180/498) of patients who did not receive NMBAs. Across all patients, NMBA administration was associated with a higher risk of mortality (ORadj 1.64, 95%CI 1.19-2.26, p = 0.003), while this association was not observed in patients with a high baseline ΔP (> 13 cmH2O, n = 234, ORadj 0.87, 95%CI 0.45-1.71, p = 0.70, p-for-interaction = 0.017) nor in patients with a baseline S/F ratio ≤ 100 (n = 190, ORadj 0.51, 95%CI 0.22-1.16, p = 0.11, p-for-interaction = 0.003; **Fig. 2)**.
Conclusions: An increase in ΔP following NMBA administration is associated with a pronounced risk of 28-day mortality. Patients with low ΔP prior to NMBA administration are more likely to respond with an increase, and are at higher risk of NMBA-associated mortality. These findings support incorporating patients baseline ΔP and oxygenation into decisions on administration of NMBA in critically ill patients.

	Increase in ΔP	No change in ΔP	Decrease in ΔP	Max. abs. SD
	N=695	N=143	N=582	
Patient characteristics				
Age, years	60 (48 - 68)	58 (48 - 68)	58 (46 - 68)	0.098
Sex, female	249 (35.8%)	57 (39.9%)	204 (35.1%)	0.099
Body mass index, kg/m^2	30.1 (25.8 - 35.7)	29.7 (24.8 - 34.7)	30.0 (25.8 - 36.1)	0.077
Patient comorbidities				
Elixhauser comorbidity index	19 (12 - 28)	18 (10 - 30)	19 (10 - 30)	0.037
Obstructive lung disease	192 (27.6%)	37 (25.9%)	167 (28.7%)	0.063
Restrictive lung disease	63 (9.1%)	8 (5.6%)	40 (6.9%)	0.133
Circulatory lung disease	143 (20.6%)	22 (15.4%)	112 (19.2%)	0.135
Pneumonia	358 (51.5%)	73 (51.0%)	277 (47.6%)	0.078
Tobacco abuse	299 (43.0%)	55 (38.5%)	222 (38.1%)	0.099
Coronary artery disease	216 (31.1%)	50 (35.0%)	173 (29.7%)	0.112
Congestive heart failure	214 (30.8%)	38 (26.6%)	177 (30.4%)	0.093
Cardiac arrest	378 (54.4%)	67 (46.9%)	299 (51.4%)	0.151
Drug abuse	64 (9.2%)	14 (9.8%)	51 (8.8%)	0.035
Anemia	70 (10.1%)	16 (11.2%)	58 (10.0%)	0.040
Case severity prior to NMBA administration				
Mechanical ventilation prior to NMBA administration, h	23.6 (5.9 - 118.4)	23.1 (5.2 - 87.4)	19.2 (5.8 - 78.9)	0.179
Baseline respiratory system compliance, ml/cmH$_2$O	36.3 (29.0 - 48.0)	36.1 (27.9 - 46.7)	32.9 (25.9 - 42.1)	0.344
Trend in S/F ratio				0.280
Decreasing S/F ratio	297 (42.7%)	43 (30.1%)	245 (42.1%)	
Constant S/F ratio	111 (16.0%)	33 (23.1%)	88 (15.1%)	
Increasing S/F ratio	287 (41.3%)	67 (46.9%)	249 (42.8%)	
Trend in ΔP				0.396
Decreasing ΔP	303 (43.6%)	36 (25.2%)	166 (28.5%)	
Constant ΔP	219 (31.5%)	61 (42.7%)	175 (30.1%)	
Increasing ΔP	173 (24.9%)	46 (32.2%)	241 (41.4%)	
Baseline SOFA score	12 (10 - 14)	12 (9 - 15)	12 (9 - 15)	0.065
Type of ICU admission, surgical	107 (15.4%)	27 (18.9%)	96 (16.5%)	0.093
Cumulative medication, 6 h prior to NMBA administration				
Opioids, mg OME	168.0 (58.5 - 305.1)	150.3 (42.5 - 300.6)	150.3 (47.2 - 300.6)	0.094
Propofol, g	0.7 (0.1 - 1.3)	0.6 (0.0 - 1.4)	0.6 (0.0 - 1.3)	0.088

Fig. 1 (abstract 000373) Physiological phenotypes exhibiting differential responses to neuromuscular blockade. Interrupted time series analysis (ITSA) 12 h post versus 12 h prior to NMBA initiation, grouped by physiological phenotype defined based on ΔP response to NMBAs. Regression lines are presented for significant p for slope. Abbreviations: NMBA—neuromuscular blocking agent, ΔP—driving pressure, Vt—tidal volume, PBW—predicted body weight, Crs—respiratory system compliance

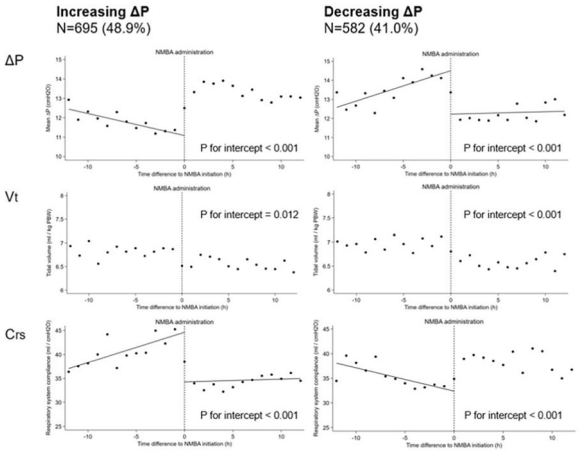


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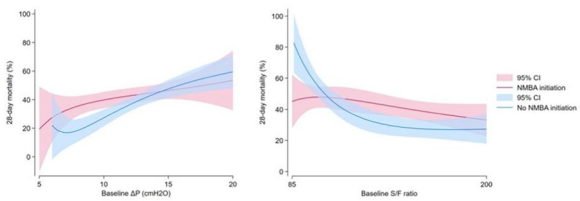


Fig. 2 (abstract 000373) Differential effects of NMBA initiation on 28-day mortality by clinical phenotype. Effect modification by baseline ΔP (**Fig. 2a**) and baseline S/F ratio (**Fig. 2b**). Fractional polynomial model, 28-day mortality for NMBA (in red) versus non-NMBA (in blue) receiving patients. Abbreviations: NMBA—neuromuscular blocking agent, ΔP—driving pressure, S/F ratio—SpO2 oxygen saturation / FiO2, CI—confidence interval

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Topic: Acute respiratory failure and mechanical ventilation

000374

Association between admission high-sensitivity cardiac troponin T and major adverse cardiovascular events in burn patients

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Introduction: Initial value of high-sensitivity cardiac troponin T (hs-cTnT) is increased in myocardial injury and is associated with adverse outcomes in critically ill patients. Its prognostic value for major adverse cardiovascular events (MACE) in burn patients, however, remains unknown.
Objectives: To investigate the association between hs-cTnT levels measured within 24 h after burn injury and MACE.
Methods: This retrospective observational monocentric study was approved by an ethics committee (IRB 00010254—2024 – 030). Burn patients admitted between January 2012 and December 2022 were included if they underwent at least one hs-cTnT measurement on the day of the burn injury. Primary outcome was MACE defined as the occurrence of acute coronary syndrome, stroke, acute heart failure, and/or all-cause death during an ICU stay.
Logistic regression models assessed associations between hs-cTnT levels and outcomes. Sub-group analyses were also conducted while receiver operating characteristic (ROC) curves evaluated predictive performance.
Results: Among 495 burned patients admitted, 43% (n = 212) exhibited elevated hs-cTnT levels (> 14 ng/L). Most of the patients were males (n = 342, 69%). The median age was 50 years (IQR 33–65). A total of 60 patients (12%) had a history of cardiovascular disease (CV history).
MACE occurred in 23% of patients (n = 115) and those who experienced MACE had significantly higher initial hs-cTnT levels (median 27 ng/L [0, 74]) compared to those who did not (median 0 ng/L [0, 19]). We found a significant association between MACE and initial hs-cTnT levels (OR 1.07 per 10 ng/L, 95% CI 1.03–1.11; p < 0.001). This association persisted across various subgroup analyses (Fig. 1).
A multivariable analysis including Simplified Acute Physiology Score II, body mass index, Charlson comorbidity index, initial lactatemia, sex, thermal nature of burns, smoke inhalation and initial hs-cTnT value only retained hs-cTnT (OR 1.01 per 10 ng/L, p = 0.035) and smoke inhalation (OR 4.69, p < 0.001) as independent predictors of MACE.
ROC analysis for hs-cTnT identified an optimal cutoff value of 14.5 ng/L for predicting MACE during the ICU stay, with a sensitivity of 0.72, specificity of 0.68, and an AUC of 0.73 (95% CI 0.68–0.78). Combining hs-cTnT with initial lactatemia values enhanced predictive performance, achieving an AUC of 0.80 (95% CI 0.75-0.84). However, the DeLong test (p = 0.063) indicated that this improvement was not statistically significant. Both were compared with the Abbreviated Burn Severity Index (ABSI), which demonstrated an AUC of 0.84 (95% CI 0.80–0.88) (Fig. 2).
Conclusions: Elevated hs-cTnT levels are associated with MACE in burn patients regardless of burn severity or CV history and exhibit moderate predictive accuracy. Combining hs-cTnT with lactatemia enhances predictive performance. This association aligns with the already established links between burns and cardiac dysfunction, although the underlying mechanisms remain incompletely understood.

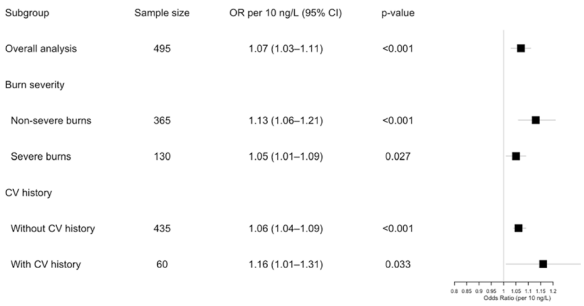


Fig. 1 (abstract 000374) Forest plot: univariate regression analysis of the association between hs-cTnT increase per 10 ng/L and MACE in the overall cohort and specific subgroups

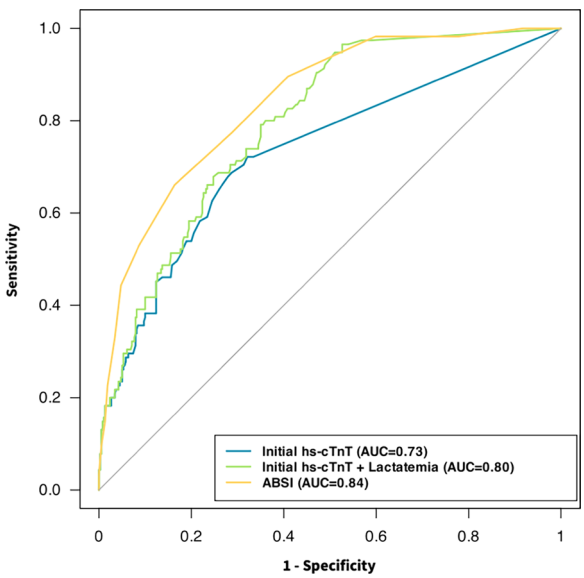


Fig. 2 (abstract 000374) ROC: prediction of MACE using initial hs-cTnT, initial hs-cTnT + lactatemia and ABSI

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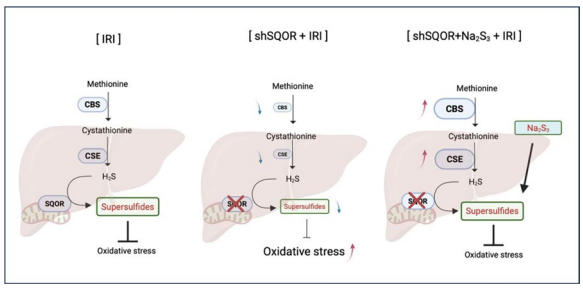
Topic: Cardiovascular issues in ICU

000375

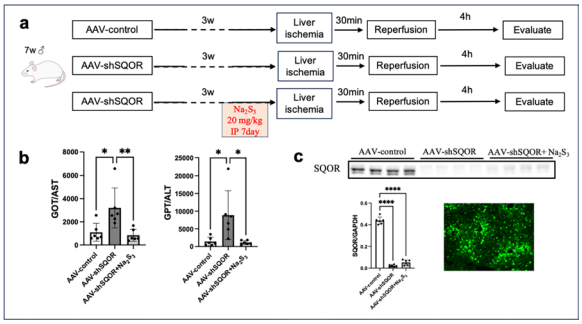
The role of sulfide-quinone oxidoreductase (SQOR) in hepatic Ischemic reperfusion injury

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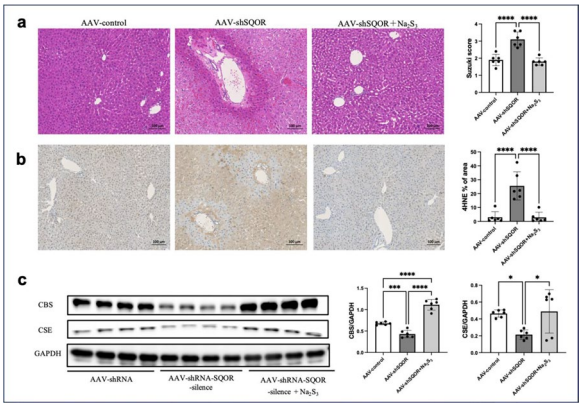
Introduction: Previous studies have indicated a relationship between hydrogen sulfide (H_2S) and ischemia-induced organ injury (1). In the H_2S metabolic pathway, sulfide-quinone oxidoreductase (SQOR)—located in the inner mitochondrial membrane-functions as the primary enzyme in the rate-limiting step (2). In this study, we assessed the role of SQOR in hepatic ischemia–reperfusion injury (IRI).
Methods: All procedures were approved by the Kyushu University Animal Ethics Committee (A24-396-0; July 23, 2024). We inhibited SQOR expression using a short hairpin (sh) RNA targeting mouse SQOR (shSQOR). We compared biochemical analysis, histopathological assessment, 4-hydroxy-2-nonenal (4HNE: as an assessment of oxidative stress and antioxidant capacity), and alterations in metabolic enzymes after IRI between mice injected with adeno-associated virus vector shSQOR (AAV-shSQOR group, n = 6) and controls (AAV-control group, n = 6). Additionally, sodium trisulfide (Na_2S_3) (H2S metabolite donor) was administered daily for seven days before IRI in shSQOR-knockdown mice to assess the effects of H_2S metabolites (AAV-shSQOR + Na2S3 group, n = 6). Hepatic IRI was induced 30 min after the onset of ischemia.
Results: SQOR knockdown exacerbated liver injury in hepatic IRI, as indicated by further increases in aspartate aminotransferase (AST) (AAV-control vs. AAV-shSQOR: 1096 ± 774 IU/L vs. 3201 ± 1720 IU/L, $p < 0.01$), alanine aminotransferase(ALT) (1434 ± 1191 IU/L vs. 8874 ± 6881 IU/L, $p < 0.01$), and Suzuki scores for liver injury (1.9 ± 0.33 vs. 3.1 ± 0.43, $p < 0.01$). Quantitative analysis demonstrated a significantly larger positive area for 4HNE in the AAV-shSQOR group than that in the AAV-control group (2.92 ± 4.03% vs. 25.5 ± 10.2%, $p < 0.01$). Na_2S_3 administration in the AAV-shSQOR group mitigated liver damage, restoring AST (840 ± 524 IU/L), ALT (1159 ± 576 IU/L), and 4HNE (2.88 ± 3.71%) levels and Suzuki scores (1.8 ± 0.22) to those in the control group. Cystathionine β-synthase (CBS) and cystathionine γ-lyase (CSE) expression was reduced in the AAV-shSQOR group than that in the AAV-control group (CBS: 0.68 ± 0.03 vs. 0.43 ± 0.09, $p < 0.01$, CSE: 0.46 ± 0.04 vs. 0.21 ± 0.06, $p < 0.01$). Na_2S_3 administration significantly increased the expression levels of CBS and CSE compared to both the AAV-control and AAV-shSQOR groups (CBS: 1.11 ± 0.13 and CSE: 0.49 ± 0.26).
Conclusions: This study demonstrates the crucial role of SQOR in hepatic IRI. The SQOR-mediated maintenance of H_2S metabolite production may protect against ischemia through antioxidant effects. Na_2S_3 administration is a potential treatment for mitochondrial dysfunction.



Mechanism of hydrogen sulfide metabolism



Experimental protocol and serum AST and ALT levels



Histological and immunohistochemical findings, and results of Western blot analysis

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Topic: Translational biology

000376

Adjunctive dobutamine in patients with septic cardiomyopathy and tissue hypoperfusion: a blinded randomized controlled multi-center trial

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000376

Introduction: Sepsis-induced left ventricular dysfunction participates in cardiovascular compromise and associated organ failure in patients with septic shock. The tested hypothesis is that dobutamine will reduce tissue hypoperfusion and secondary organ dysfunction in increasing oxygen delivery in fluid-filled patients with septic shock and associated symptomatic septic cardiomyopathy with documented low flow state.
Objectives: To assess the effects of adjunctive dobutamine infusion vs. placebo on organ failure during the first three days after randomization in septic shock patients who received adequate fluid resuscitation and have stabilized mean blood pressure under vasopressor support, and with symptomatic septic cardiomyopathy depicted by echocardiography.
Methods: ADAPT is a blinded, two parallel group, add-on, multicenter (23 ICUs in France), randomized 1:1, placebo-controlled trial. Patients will be included if hospitalized in the intensive care unit with septic shock (Sepsis-3 definition) and septic cardiomyopathy identified using echocardiography (left ventricular ejection fraction $\leq$ 40% and left ventricular outflow tract velocity–time integral < 14 $\pm$ 1.5 cm). Non-inclusion criteria will include ventricular rate > 130 bpm, severe ventricular arrhythmia, obstructive cardiomyopathy, severe aortic stenosis, ongoing acute coronary syndrome, and indication for extracorporeal life support. Patients will receive either dobutamine (incremental steps of 2.5 µg/kg/min up to a maximal dose of 10 µg/kg/min) at the discretion of the investigators according to both efficacy and cardiovascular tolerance, or a placebo (5% Dextrose). Primary outcome will be the evolution of a modified SOFA score (excluding the neurologic system) during the initial ICU stay encompassing screening (before randomization), and Day 1 to 3 after randomization. Randomization will be stratified on participating centers and previously documented heart failure (ejection fraction $\leq$ 40%). The use of open-labelled dobutamine as a rescue therapy will be allowed in refractory shock based on strict clinical requirements. The use of alternative inotropes will not be allowed. Considering a 2-point difference in the SOFA score at Day 3 and a standard deviation of 5.0 at baseline (personal data; conservative approach), the required number of patients would be 266 (133 per group; 90% power); taking into account the repeated measurement of SOFA score, the total number of patients is reduced to 118; when considering that 12.5% of patients would die before Day 3, the required number of patients finally reaches 136 (68 per group) instead of 270.
Results: Between September 2020 and April 2025, 136 out of 136 patients were studied. The last patient was included on April 4th, 2025. First results will be shared at the time of LIVES 2025.
Conclusions: Since no evidence-based recommendation yet exists for the therapeutic management of septic cardiomyopathy, this trial promises to address a current gap of knowledge in determining the value of adding dobutamine to standards of care in the subset of patients with septic shock and symptomatic septic cardiomyopathy.

Reference

1 French PHRC-N 2018

Topic: Cardiovascular issues in ICU

000377

Quantifying blood-based neurologic biomarkers during the dying process until circulatory arrest in humans

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000377

Introduction: Global cerebral ischemia stemming from circulatory arrest underpins the first phase of hypoxic–ischemic brain injury (HIBI) in post-cardiac arrest patients (1). However, this phase remains poorly understood in humans. Recently, blood-based neurologic biomarkers have emerged as a promising tool for prognostication, however, their utility for the diagnosis of HIBI severity and insights into pathophysiology are limited.
Objectives: We aimed to investigate the impact of global cerebral ischemia on tissue injury by quantifying blood-based neurologic biomarkers during the dying process until circulatory arrest after withdrawal of life-sustaining measures (WLSM) in humans.
Methods: We conducted a single-center prospective observational study to investigate the cerebrovascular and cardiovascular physiology of the dying process, with corresponding blood neurologic biomarkers. Serum and plasma samples were obtained from the radial artery and jugular venous bulb immediately prior to WLSM and once systolic blood pressure (SBP) reached < 60 mmHg. Serum glial fibrillary acidic protein (GFAP), neurofilament-light (Nf-L), total tau, and ubiquitin carboxyl hydrolase L-1 (UCH-L1) were quantified using the Neurology-4-Plex-B Advantage Kit on the Quanterix HD-X platform using Simoa technology. Arterial, venous, and cerebral arterio-venous differences were assessed for differences in biomarker concentrations during the dying process.
Results: Plasma and serum biomarkers were collected before WLSM and just prior to death from 29 (91%) study participants. The median time between SBP < 60 mmHg and death determination was 249 [135, 669] seconds, thereby having blood sampling within close proximity to death determination. Arterial, venous, and cerebral arterial–venous gradients for serum GFAP, Nf-L, Tau, and UCH-L1) did not change during the dying process in critically ill patients, save for an increase in arterial Nf-L concentration ($N = 28$, $r = 0.54$, $P = 0.0032$). There was no relationship between hypotensive (area under MAP < 65 mmHg) or hypoxemic burden (area under SpO2 < 90 mmHg) and changes in arterio-venous biomarker concentration during the dying process.
Conclusions: There were no differences in the cerebral arterio-venous gradients of blood-based neurologic biomarkers during the dying process, nor when indexed for severity of hypoperfusion or hypoxemia. Although the ischemic phase is intuitively critical to HIBI pathophysiology, the lack of biomarker release during the dying process suggest that the reperfusion phase may be especially impactful to HIBI pathophysiology.

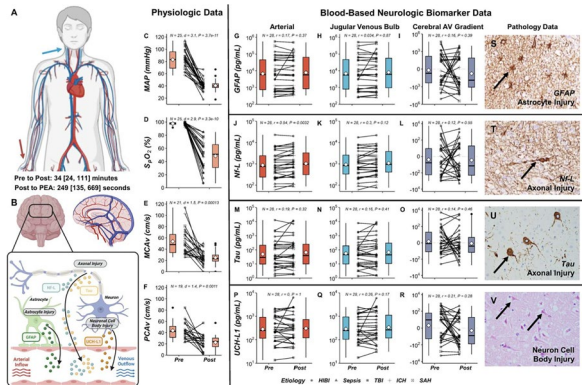


Fig. 1 (abstract 000377) Comparison of blood-based neurologic biomarkers taken prior to withdrawal of life-sustaining measures and during the dying process. Blood-based neurologic biomarkers were taken from the radial artery and internal jugular vein to allow for arteriovenous (i.e., a-v) gradient analysis across the cerebral circulation (A). Biospecimens were collected prior to withdrawal of life-sustaining measures (pre) and from when systolic blood pressure < 60 mmHg (post). Biomarkers were analyzed for common markers of astrocyte, axonal, and neuron cell body injury (B). Physiologic data from the time of biospecimen collection in the critically ill patient cohort was used to contextualize changes in hypotension and hypoxemia elicited by the dying process (C-F). Physiologic data were compared using a two-way paired t-test with Cohen's d for effect size (C-F). The white diamond on top of each boxplot represents each group mean. Arterial, jugular venous, and cerebral a-v gradients (G-R) were pairwise compared using Wilcoxon signed-ranks tests and Wilcoxon effect size (r). These data are presented on a log10 scale (G-R). Only arterial Nf-L was elevated following ischemia of the dying process (J). Subsequent post-mortem analysis of the brain confirmed presence of astrocyte (S), axonal (T, U), and neuron cell body (V) injury. Many brain autopsies had significant amounts of neurons with eosinophilic cytoplasm and shrunken nuclei typical of cases with ischemic brain injury (V).

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Topic: Neurointensive care

000378

Impact of early hemodynamic assessment by echocardiography on organ dysfunction and outcome of patients admitted to the Emergency Department with sepsis or septic shock: protocol of a multicenter randomized controlled trial (GENESIS)

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000378

Introduction: Acute circulatory failure plays a major role in the development of sepsis-related organ dysfunction. Current "bundles" of the *Surviving Sepsis Campaign* (SSC) include the administration of a fluid loading of 30 mL/kg in the presence of hypotension within the first hour of sepsis identification. The impact of hemodynamic assessment using echocardiography at the early phase of management of septic patients in the Emergency Department (ED) on patient-centered outcome is unknown.
Objectives: The main objective of the trial is to determine the impact of early hemodynamic assessment using echocardiography coupled with a predefined therapeutic algorithm on the course of organ dysfunction in patients admitted to the ED with sepsis, when compared to standard of care based on current SSC guidelines.
Methods: GENESIS is a two-parallel arm, randomized trial with blinded assessment comparing early hemodynamic assessment using transthoracic echocardiography aimed at guiding therapeutic management to standard of care according to current SSC recommendations in septic patients during initial management in 13 French EDs. Patients with suspected or documented infection and a qualifying qSOFA score (hemodynamic criterion required: systolic blood pressure ≤ 100 mmHg) were randomized at a 1:1 ratio after 500 mL of fluid loading initiation. In the intervention group, echocardiography allowed identifying the hemodynamic profile at the origin of sepsis-induced circulatory failure and monitoring the efficacy and tolerance of fluid resuscitation, or of any other therapeutic intervention according to a predefined therapeutic algorithm. The control group received conventional 30 mL/kg fluid resuscitation (unless pulmonary venous congestion) according to SSC recommendations. Primary outcome was the course of organ dysfunction assessed by the crude change in the modified SOFA score between baseline and 24 h after randomization. Secondary outcomes were the nature of therapeutic interventions resulting from echocardiography (fluid loading, early initiate vasopressor support or inotrope), the prevalence of the different hemodynamic profiles, the evolution of lactatemia, the safety of the initial therapeutic, the proportion of patients who develop septic shock secondarily, the orientation of patients after ED discharge and both day-7 and in-hospital mortality. We planned to randomize 312 patients.
Results: Between July 2021 and April 2025, 312 out of 312 patients have been enrolled, with the last patient included on April 7th 2025. First results will be shared at the time of the 2025 LIVES.
Conclusions: Overall, this clinical trial promises to optimize therapeutic management of septic patients in the ED using early echocardiography assessment, and ultimately to significantly reduce organ dysfunction at the initial phase of sepsis and associated short-term mortality, when compared to current standard of care.

Reference

1 French Hospital Program of Clinical Research (Programme Hospitalier de Recherche Clinique Inter-régional) 2019

Topic: Sepsis

000379

Systematic review and meta-analysis on the effect of peripheral vasopressor protocols and extravasation rates

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000379

Introduction: The central venous catheter (CVC) is considered the preferred route of administration for vasopressor infusions based on historical data suggesting the increased risk of extravasation with

peripheral venous catheter (PVC) use [1]. However, there is a growing interest in peripheral vasopressor use for two reasons: 1) to expedite vasopressor initiation in patients with refractory shock and 2) to avoid CVC placement and its potential complications [2]. Several single-center observational studies have suggested that the extravasation rate has decreased with advances in peripheral venous access [3]. Furthermore, the use of peripheral vasopressors resulted in avoidance of CVC placement in almost 50% of patients [4]. While anatomical location and PVC gauge have been the focus of previous systematic reviews, the question of whether implementing standardized peripheral vasopressor protocols reduces extravasations has never been explored.

Objectives: To determine whether a peripheral vasopressor protocol decreases extravasation rates.

Methods: Following PRISMA guidelines [5], a comprehensive search was employed to identify published studies from 2000 to 2025 describing the use of peripheral vasopressors in the Emergency Department and Intensive Care Unit. An extensive search was developed in MEDLINE (Ovid) and adapted for Embase (Ovid), Cochrane Central Register of Controlled Trials (Ovid), and PubMed. A meta-analysis was performed using a random effects model for one-sample binary data for pooled estimates of extravasation rate and CVC conversion (STATA 18 software).

Results: A total of 19 observational studies were selected, which included 5397 patients receiving peripheral vasopressors. The average extravasation rate amongst all studies was 3%. A meta-analysis, which had substantial heterogeneity (I2 = 74.98%), showed no difference between extravasation rates for the presence or absence of the following: peripheral vasopressor protocol (2.6% vs 4.8%, p = 0.27), protocol for peripheral venous catheter (2.6% vs 4.8%, p = 0.27) and extravasation protocol (2.3% vs 4.6%, p = 0.53). The number of patients converted to CVC with the presence or absence of peripheral vasopressor protocol was 31.8% and 40.8%, respectively, which was not statistically significant (p = 0.24).

Conclusions: This systematic review and meta-analysis demonstrated that specific peripheral vasopressor administration protocols did not statistically decrease extravasation rates in patients receiving peripheral vasopressors. The average extravasation rate of peripheral vasopressor use amongst all studies was 3%, which is comparable to the 2.1% extravasation rate of vasopressors through a CVC reported in a recent systematic review [1]. Furthermore, the conversion to CVC placement was the same regardless of a peripheral vasopressor protocol. However, high-quality evidence is needed to evaluate these outcomes further, as all the papers included in this study are observational.

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Topic: Health Services Research and Outcome

000381

Pulmonary myeloperoxidase as a diagnostic biomarker in the management of critically ill ventilated patients

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000381

Introduction: The diagnostic criteria for ventilator-associated respiratory tract infections (VAP/VAT) are nonspecific and lack accuracy. Therefore, we designed an exploratory study to investigate the utility of myeloperoxidase (MPO) as a diagnostic tool for VAP/VAT.

Methods: Prospective study conducted from March to December 2023. We included patients who had been mechanically ventilated for more than 48 h and collected serial bronchoaspirate samples while they remained intubated. Quantitative cultures and MPO measurements were performed. To analyze the evolution of MPO levels over time, patients with VAP/VAT who had at least four samples collected were matched with control patients who had a similar duration of mechanical ventilation.

Statistical analysis performed using GraphPad Prism v8.0.2. We used T-test/ Mann–Whitney test for differences in MPO levels. Performance for VAP/VAT diagnosis was analysed with a ROC curve and Youden index was used to establish a MPO threshold.

Results: We studied 30 patients: 12 men and 18 women, mean age 68 (± 10.8) years. A total of 117 samples were collected and 64.1% had positive cultures. Seven patients developed VAP/VAT.

Patients with high bacterial load (> 10^5 CFU/mL) had significantly higher MPO levels than those with low bacterial load (< 10^5 CFU/mL), with NPV 95.6% and PPV 29.7% (p0.0133). Among patients with high bacterial load, those who developed VAP/VAT had lower MPO levels than those with bacterial colonization, with a ROC (AUC) of 0.82 (p = 0.0097) and a discrimination threshold for MPO of < 2.12 ng/mL.

In the case–control analysis, baseline MPO levels were significantly higher in the control group than in the VAP/VAT group (p < 0.01). Additionally, in infected patients, MPO levels increased at the onset of the clinical episode in 3 out of 5 VAP cases.

Conclusions: MPO has a high NPV for excluding bacterial growth in respiratory samples and a moderate predictive value for VAP/VAT. Patients who developed VAP/VAT had lower MPO levels, suggesting a form of immune paralysis associated with infection development.

Topic: Infections and prevention

000382

Assessment of the carbon footprint of a medical intensive care unit and mitigating strategies

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000382

Introduction: Climate change and its impact on our healthcare system becomes more and more manifest [1]. Paradoxically, while being impacted by negative effects of climate change, the healthcare sector itself has been identified as a major contributor with up to 4–5% of greenhouse gas emissions (GHG) worldwide [2]. Hospitals in particular are major emitters within this sector, with intensive care units (ICUs) playing a substantial role due to their high resource consumption [2].

Objectives: This study employed a bottom-up life cycle assessment to quantify the carbon footprint of an internal medicine ICU in a tertiary care center in Germany, focusing on emissions from consumable items and electricity consumption.
Methods: The top 15 most frequently purchased products by sales unit and the top 15 most frequently purchased products by expenditure were selected from a list of 321 medical consumable items used over the time-course of one year. Their composition, weight, and transportation from the manufacturing site were assessed (see Fig. 1). For electricity, annual consumption of all electrical machines used on the ward and their carbon dioxide equivalent (CO2eq) were assessed (see Fig. 2).
Results: The results revealed a carbon footprint of 5.9-ton CO2eq per patient in one year of ICU patient care, equivalent to 16.2 kg CO2eq per patient per day. Consumable items were found to be the dominant contributor (57%), followed by electricity (43%). Key contributors to emissions included patient monitors, ventilators, medicine and fluid administrators, special patient monitors (for pulse contour cardiac output (PICCO)) and continuous renal-replacement therapy, disposable blankets, gloves, wet wipes, gowns, syringes of an infusion pump, and waste bins.
Conclusions: These findings underscore the need for a multifaceted approach to reduce the environmental impact of ICUs, encompassing both technological and behavioral changes. As consumable items and CO2-emissions due to their transportation from manufacturing site are the dominant contributors, the selection of the manufacturer and production facility can contribute significantly to the carbon footprint of ICUs. By implementing these strategies, healthcare providers can contribute considerably to a more sustainable healthcare system.

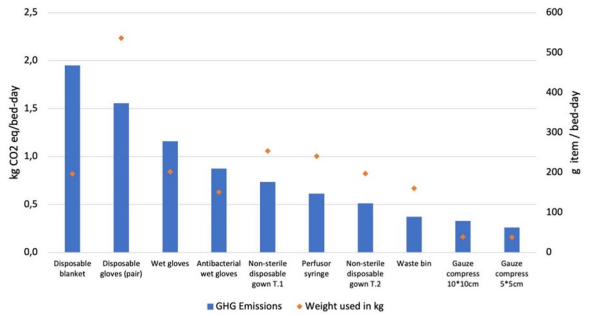


Fig. 1 (abstract 000382) Greenhouse gas emissions (GHG) vs. weight used per bed in kilogram (kg) of the top 10 items in both categories

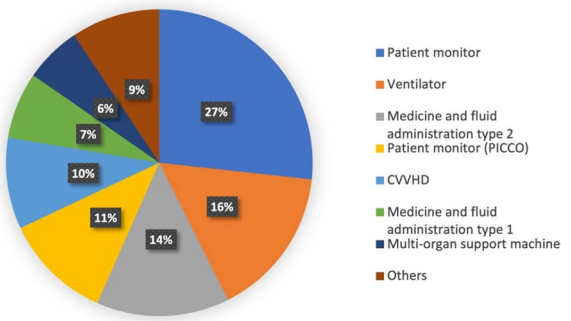


Fig. 1 (abstract 000382) Electricity consumption share distribution by machine model. PICCO: pulse contour cardiac output, CVVHD: continuous veno-venous hemodialysis

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3 Not applicable

Topic: Information systems and Data Science

000387

Association between changes in arterial partial pressure of carbon dioxide and physical functional outcomes in severe ARDS patients requiring VV ECMO management: a registry-based retrospective study

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000387

Introduction: Veno-venous extracorporeal membrane oxygenation (VV ECMO) is used for severe acute respiratory distress syndrome (ARDS). Rapid changes in arterial partial pressure of carbon dioxide (PaCO2) during ECMO initiation have been linked to neurological complications, but effects on physical function remain unclear.
Objectives: To investigate the association between PaCO2 changes at ECMO initiation and physical functional outcomes (Barthel Index (BI)) at discharge in severe ARDS patients.
Methods: We analyzed data from the Japan Chest CT of ARDS requiring V-V ECMO registry (2012-2022). Adult ARDS patients on VV ECMO were included. PaCO2 change ratio ((post-ECMO PaCO2 – pre-ECMO PaCO2)/pre-ECMO PaCO2) was categorized into five groups as follows: large decrease (< -30%), mild decrease (-30% to -10%), mild change (−10% to + 10%), mild increase (+ 10% to + 30%), and large increase (> + 30%). Multivariate logistic regression, adjusted for previously described confounders, was performed to evaluate the association between potential predictors and functional outcomes at discharge.
Results: Of 697 eligible patients, 555 were analyzed. Demographics and severity scores were similar across groups. The large decrease group had lower pre-ECMO tidal volumes, with a significant linear relationship with PaCO2 changes. Intracranial bleeding occurred in one patient. Multivariate analysis identified a large PaCO2 decrease as an independent predictor of unfavorable functional outcome (BI less than 75) (OR 0.49 (95% CI: 0.26-0.91)) and higher hospital mortality (OR 0.55, 95% CI: 0.31-0.95). Spline curve analysis revealed a non-linear relationship between PaCO2 changes and functional outcomes. While the maximum odds ratio of 1.44 for achieving a BI 75 or more occurs at a PaCO2 change ratio of 0.244, PaCO2 reductions demonstrated a dose-dependent decline in favorable outcome probability. The Murray lung injury score was not useful for outcome prediction in our cohort.
Conclusions: Large PaCO2 decrease was an independent predictor of unfavorable functional outcome in severe ARDS patients requiring VV ECMO. The non-linear relationship in our analysis indicates both large PaCO2 decreases and increases during ECMO initiation may negatively impact functional recovery, highlighting the importance of careful PaCO2 management during ECMO initiation. Conventional prognostic score was not predictive in our cohort, reflecting the changing patient demographics resulting from widespread adoption of lung-protective ventilation strategies and advancements in ECMO management techniques. This suggests new prognostic tools are needed that account for current ECMO practices and patient selection criteria.

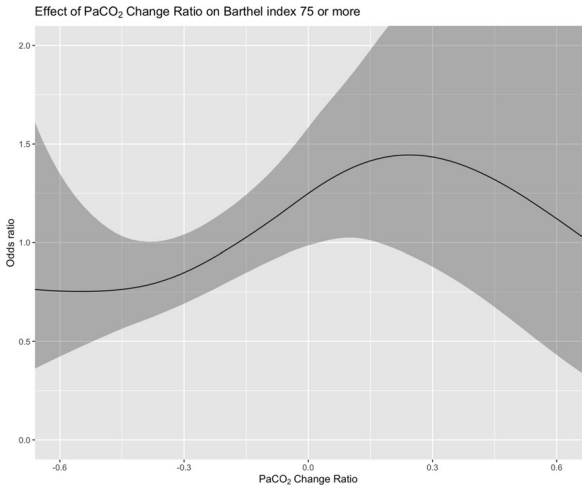


Figure (abstract 000387) Effect of $PaCO_2$ change ratio on Barthel index ≥ 75. The solid line represents the estimated odds ratio for achieving a Barthel index ≥ 75 across different $PaCO_2$ change ratios. The gray-shaded area represents the 95% confidence interval. A non-linear relationship is observed with maximum odds ratio of 1.44 at $PaCO_2$ change ratio of 0.24.

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3 This research was conducted as part of the Japan Chest CT of ARDS requiring V-V ECMO (J-CARVE) registry project.

Topic: Acute respiratory failure and mechanical ventilation

000388

Delirium care-related stress in intensive care unit nurses: focusing on violence experience and self-compassion

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000388

Introduction: ICU nurses often experience heightened anxiety and stress due to the aggression and violence associated with delirium. These emotional challenges can lead to unstable emotions of nurses, such as anger and fear, which may affect their ability to provide high-quality care. Self-compassion, which involves treating oneself with kindness in difficult times, has emerged as a potential protective factor against stress and violence. In this context, the role of self-compassion in reducing stress among ICU nurses caring for delirium patients will be explored.
Objectives: This study aims to identify ICU nurses' experiences of violence from patients with delirium, assess their levels of self-compassion, and examine how these factors influence delirium care-related stress. These findings are intended to contribute to a comprehensive understanding of the delirium care process.
Methods: A descriptive correlational design was used. Surveys were administered to 160 ICU nurses at a tertiary general hospital in Seoul, collecting data on general characteristics, violence experiences, the Strain of Caring for Delirium Index (SCDI), and the Self-Compassion Scale (SCS). Data were analyzed using descriptive statistics, correlation analysis, and hierarchical regression.
Results: The violence experience score of the study participants was 15.669 ± 9.838, with physical threats having the highest score. Participants' SCS score was 3.325 ± 0.564. The subscales of SCS were as follows: self-kindness 2.736 ± 0.725, self-judgment 2.248 ± 0.860, common humanity 3.014 ± 0.717, isolation 2.084 ± 0.873, mindfulness 3.084 ± 0.744, and over-identification 2.533 ± 0.848. The SCDI of the participants was 3.609 ± 0.542. The item "The patient tries to remove invasive devices" had the highest score (mean = 4.694, SD = 0.59). Significant correlations were found between physical threats and increased stress (r = .172, p = .029), and self-compassion and reduced stress (r = -.216, p = .006).

Table 1.(abstract 000388) Summary of significant correlations between violence experience, self-compassion, and strain of caring delirium

Variable	Strain of caring delirium
Physical threats	r = .172, p = .029
Self-Compassion	r = -.216, p = .006
(1) Self-kindness	r = -.228, p = .004
(2) Common humanity	r = -.162, p = .040
(3) Mindfulness	r = = .189, p = .017

Self-compassion explained 3.2% of the variance in delirium care-related stress (F = 5.616, p = .019) (Table 2). Additionally, as shown in Fig. 1, the moderation analysis showed that the stress-reducing effect of self-compassion was weakened in nurses with higher levels of physical threat experience (β = .047, p = .011).

Table 2. (abstract 000388) Influencing factors of strain of delirium care

Variables	B	β	p
Violence experience	.005	.100	.214
Self-compassion	-.180	-.185	.019

*Note: R^2(adjusted R^2) = .159(.119), p < .001. $\triangle R^2$ = .032 (F = 5.616, p = .019). Durbin–Watson statistics = 1.968

Conclusions. This study highlights the potential of self-compassion as a protective factor in reducing delirium care-related stress among ICU nurses, while also underscoring the detrimental impact of physical threat experiences. To ensure high-quality delirium care, it is critical to recognize and manage the stress faced by ICU nurses. Efforts should include the development of targeted interventions, such as training programs and organizational measures, aimed at strengthening self-compassion and minimizing nurses' exposure to violence from delirium patients.



Fig. 1 (abstract 000388) Moderating effect of violence experience

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1 This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors
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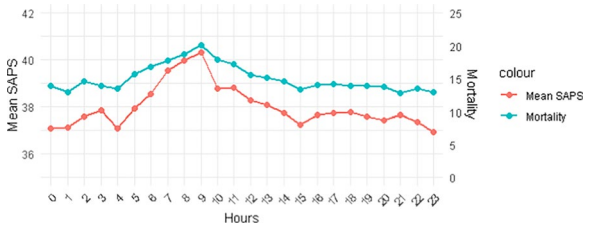
Topic: Nursing care and physiotherapy

000389

Patients admitted to the ICU during morning hours have an increased risk of death

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Introduction. Intensive care units (ICU) provide life-saving treatment 24 h a day. Delayed ICU admission is associated with worse prognosis1. Recognition of critical illness and referral to intensive care should not depend on time of day. We reasoned that the mean severity of illness at ICU admission should remain unaffected by admission time, if the time of day does not affect identification of the need for intensive care and admission policies.
Objectives: To investigate if severity of illness and corresponding mortality are associated with time of ICU admission.
Methods: Utilising the national ICU registry, the Finnish Intensive Care Consortium database, we analysed data on admissions to ICUs between 2005 and 2022. We excluded, children, readmissions, elective (non-emergency) admissions, and patients admitted for the purpose of organ donation. We explored the severity of illness, as quantified with the Simplified Acute Physiology Score II (SAPS II) score, and in-hospital mortality according to different admission hours.
Results: The study population consisted of 135,275 ICU patients. The mean (± SD) SAPS II score on admission was 37.9 ± 17.4, and in-hospital mortality was 14.7%. Figure 1 presents the mean SAPS II score and the corresponding mortality for each admission hour. The mean SAPS II score was 39.0 ± 17.9 during morning admissions (6-12 a.m.) and 37.5 ± 17.2 during the rest of the day ($p < 0.001$). The corresponding in-hospital mortalities were 17.5% and 13.9%, respectively. ($p < 0.001$). Higher severity of illness and mortality of patients admitted during morning hours was observed for admissions from the emergency department or ward, but not for admissions from the operating theatre or intermediate-care units.
Conclusions. Patients admitted in the morning hours were more severely ill and experienced higher mortality compared to those admitted during the rest of the day. This phenomenon seems to affect hospital wards and emergency departments.



(abstract 000389) Mean Simplified Acute Physiology Score II (SAPS II) and in-hospital mortality as percentages by admission hours

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2 The study was supported by State Research Funding in Eastern Finland's Collaborative Area and a grant from the Finnish Society of Anaesthesiologists.

Topic: Health Services Research and Outcome

000390

Use of virtual reality to enhance rehabilitation engagement in critically ill patients

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Introduction: The aim of this project was to evaluate the inclusion of virtual reality (VR) during cycling-based rehabilitation sessions in critically ill patients in an intensive care unit (ICU). The study objectives included assessing patient engagement, safety, acceptability, and feasibility. A diverse cohort of patients was selected, including surgical, medical, mechanically ventilated, and self-ventilating patients.
Methods: This quality improvement project utilised a VR headset from Meta, funded by SPARK Innovation Funding 2023. Approval for evaluation was granted by the St James's Hospital Research Innovation Hub. The software used was VZfit, an interactive game that allows patients to cycle through various cities worldwide. A cadence sensor was integrated into the software, enabling the patient's effort to correspond with their virtual avatar.
Patients were selected by the treating physiotherapist based on predefined inclusion criteria (capacity to actively engage, no visual or auditory dysfunction, no musculoskeletal impairments, and no cognitive impairment). Once deemed eligible, patients provided consent for VR-assisted cycling evaluation.
Pre and post-intervention vital signs were documented, and continuous monitoring was performed throughout the sessions. Feedback was collected using verbal responses or implied gestures (nodding for yes, shaking head for no). Closed-ended questions were used to assist patients who could not verbally respond, including: "Do you want to continue?", "Is it enjoyable?", and "Do you feel unwell?". The session was discontinued if the patient requested to stop or if adverse effects occurred, such as excessive discomfort, dizziness, or significant changes in vital signs (SpO2 drop > 4%, MAP < / > 20% of baseline, HR < / > 20% of baseline). Standardised feedback tools included, the

Client Satisfaction Questionnaire-8 (CSQ-8), Simulator Sickness Questionnaire (SSQ), and System Usability Scale (SUS). No patient identifying information was collected.
Results: Fourteen VR-assisted cycling sessions were conducted, with none discontinued due to adverse events or patient discomfort. The duration of cycling ranged from 5 to 25 min, while the VR setup and disassembly required approximately 10 min each. All patients rated their experience as good or excellent on the CSQ-8. Regarding simulator sickness, minor issues reported included fatigue (N = 5/14) and increased salivation (N = 6/14). Additionally, general discomfort (N = 3/14), sweating (N = 3/14), and difficulty focusing (N = 4/14) were reported, but most were categorised as slight in severity. Usability assessment using the SUS yielded a median score of 82%, which is classified as "excellent" (> 80.3%) according to usability standards, suggesting this device was easy to use.
Conclusions: Our findings suggest that VR assisted cycling rehabilitation is both feasible and well-tolerated in critically ill patients, enhancing their overall rehabilitation experience. While mild simulator-related sickness, was noted, it did not negatively impact engagement. Although intensity was not formally measured, anecdotally, patients demonstrated increased effort when using VR. Future studies should explore the potential functional gains VR may facilitate in critically ill patients undergoing rehabilitation.



Physiotherapy led VR cycling session with a tracheostomised patient

Reference
1 Funded by SPARK Innovation Funding 2023

Topic: Nursing care and physiotherapy

000394

Oxidized albumin postoperatively in liver transplant patients

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000394

Introduction: Patients with liver failure exhibit significantly reduced albumin levels due to compromised hepatic synthetic capabilities. Albumin, a multifunctional protein, is crucial in regulating osmotic pressure, transporting various substances, and scavenging oxidative stress. Oxidative stress leads to albumin oxidation, impairing its binding capacity to metal ions, metabolites, and drugs. Chronic liver failure is associated with higher proportions of oxidized albumin, correlating with reduced binding capacity, disease severity, and outcomes (1). Notably, hospital-supplied human albumin for supplementation contains approximately 75% oxidized albumin, with unclear implications for patient outcomes.
Objectives: The objective of this study is to describe the oxidative state of albumin following liver transplantation and relate this to preoperative clinical status and perioperative albumin infusions.
Methods: We included 152 liver transplant patients at Karolinska University Hospital from 2018 to 2020 listed for liver transplantation. Blood samples were collected on postoperative days 1 (POD1), 3-6 (POD3), and 7-10 (POD7). For this retrospective analysis, complete data were available for 109 patients. Oxidized albumin levels were quantified using high-performance liquid chromatography (HPLC), focusing on human mercaptalbumin (HMA, reduced), human non-mercaptalbumin 1 (HNA1, reversibly oxidized), and HNA2 (irreversibly oxidized). Mixed models were used for analysing postoperative albumin. Single and multiple regression analyses were performed correlating clinical parameters and oxidized albumin levels (Prism Graphpad 10).
Results: HNA1 levels were approximately normal post-transplantation, with slight increases over time (Fig. 1). HNA2 levels were high post-transplantation but decreased slightly in subsequent days (Fig. 1). HNA1 levels were unrelated to preoperative liver failure status or perioperative albumin infusion. Conversely, HNA2 levels were related to low preoperative albumin and perioperative albumin administration later during the postoperative period (POD3-10).
Conclusions: Post-liver transplant HNA 2 levels are high, whereas HNA 1 are in general in the normal range. However, only during the later postoperative period (after day 3) the high HNA 2 levels were related to the infused albumin, which means that other factors should explain the high levels immediately after transplantation.

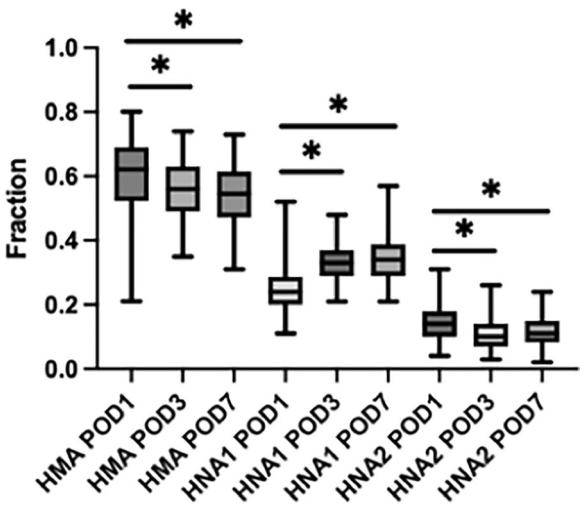


Fig. 1. (abstract 000394) Fractions of human mercaptalbumin (HMA, reduced), human non-mercaptalbumin 1 (HNA1, reversibly oxidized), and HNA2 (irreversibly oxidized) in plasma on postoperative days 1 (POD1), 3-6 (POD3) and 7-10 (POD7). *: significantly different from POD1.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000395

Complications of femoral artery sheath insertion in non-fluoroscopic resuscitation: a single-center observational study

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000395

Introduction: Femoral artery sheath insertion is a common resuscitation procedure frequently performed in the emergency room and intensive care unit in emergency and intensive care medicine; however, most research on complications has focused on cardiovascular medicine. In cardiovascular medicine, complications associated with femoral artery sheath insertion have been reported to be approximately 1.5–9.0%, but no studies have examined sheath insertion complications in emergency and intensive care settings where fluoroscopy is unavailable. This study investigated complication rate and risks of femoral artery sheath insertion under non-fluoroscopic resuscitation in emergency and intensive care medicine.
Methods: This retrospective, single-center observational study included patients who underwent femoral artery sheath insertion for resuscitation under non-fluoroscopic conditions between April 2014 and August 2024 and subsequently underwent computed tomography (CT). We defined the conditions requiring resuscitation as shock, cardiac arrest (CA), and post-CA. Patients were categorized into the non-complication and complication groups (Fig. 1). Vascular insertion positions were measured using CT, and these were classified as above, upper 1/3, middle, lower 1/3, or below the femoral head, or as unmeasurable (Fig. 2). Based on previous research, a vascular puncture at femoral head height was defined as a safety zone puncture. Vascular insertion positions, patient backgrounds were compared between the two groups.
Results: The study included 127 patients in the non-complication group and 40 in the complication group. The complication rate was 24.0%. In the patient backgrounds, complication group had only a significantly higher body mass index ($p = 0.045$). A significant difference was observed in vascular sheath insertion position ($p < 0.001$). The proportion of sheath insertions at the middle of the femoral head was higher in the non-complication group (34.6% vs. 10.0%), whereas insertions below the femoral head were more frequent in the complication group (18.1% vs. 52.5%). Safety-zone punctures were more frequent in the non-complication group (80.0% vs. 40.0%, $p < 0.001$) (Fig. 3), whereas superficial femoral artery or deep femoral artery punctures were more common in the complication group (12.6% vs. 32.5%, $p = 0.007$).
Conclusions: The complication rate for femoral artery sheath insertion for resuscitation without fluoroscopy was 24.0%. Vascular puncture below the femoral head was more frequent in the complication group than in the non-complication group. These findings highlight the need for improved techniques to minimize complications associated with non-fluoroscopic vascular access. Future studies should evaluate ultrasound guidance and operator experience. Multicenter research is needed to enhance generalizability of the risk factors identified in this study, and standardized protocols may help optimize patient safety and outcomes.

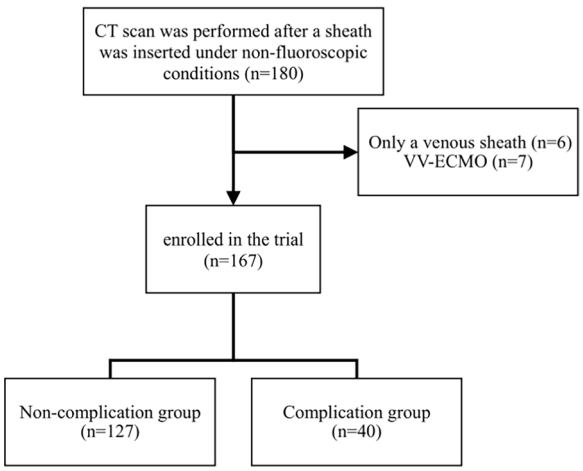


Fig. 1 (abstract 000395) Flowchart describing patient enrollment and exclusion. CT, computed tomography; VV-ECMO, venovenous extracorporeal membrane oxygenation

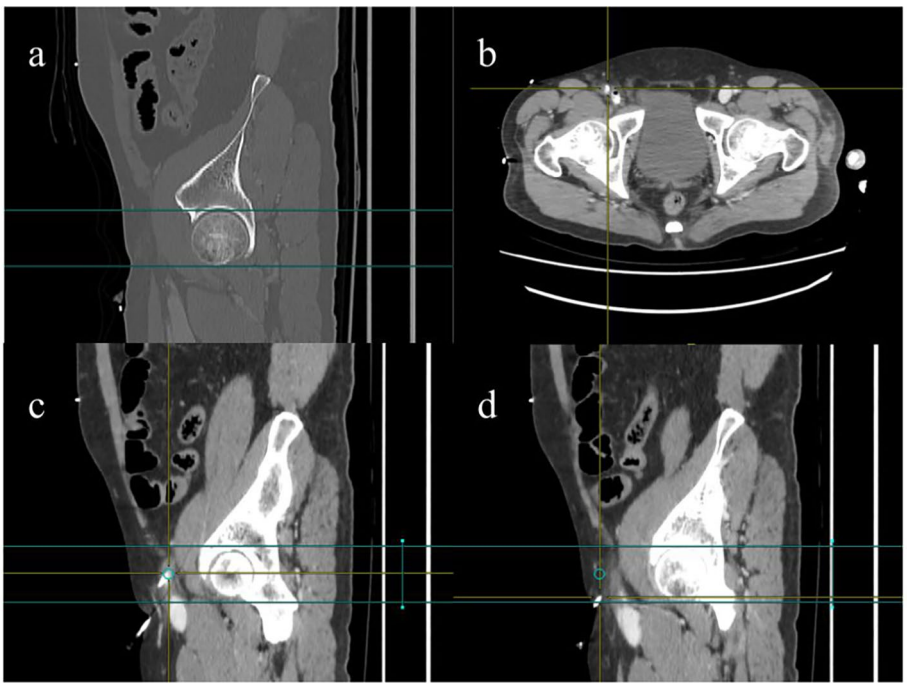


Fig. 2 (abstract 000395) CT image evaluation protocol. a: Mark the height of the femoral head in the sagittal plane (between blue lines). b: On the horizontal plane, mark the position of the sheath insertion into the femoral artery. c: Check the marked height on the sagittal plane (yellow line). d: Check the position of the skin puncture on the sagittal plane. CT, computed tomography

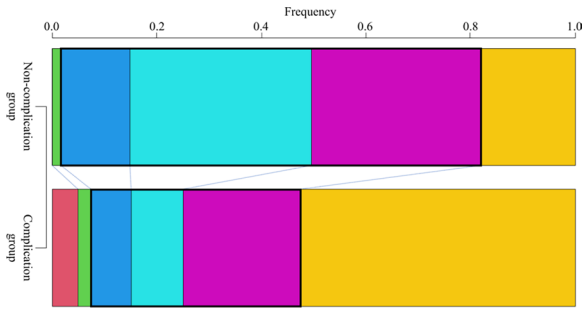


Fig. 3 (abstract 000395) Band graph of vascular puncture positions. Red: Measurement cannot. Green: above the femoral head. Blue: upper third of the femoral head. Light blue: middle of the femoral head. Purple: lower third of the femoral head. Yellow: below the femoral head. Black border: safety zone puncture

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Topic: Cardiac arrest

000396

Individual and combined effects of chemical and mechanical power on postoperative pulmonary complications—secondary analysis of REPEAT

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000396***

Introduction: Mechanical ventilation and supplemental oxygen expose lung tissue to potentially injurious energy, quantified as mechanical power (MP) and chemical power (CP), respectively. Both MP and CP are independently associated with lung injury and postoperative complications. Despite this, clinical guidelines recommend high intraoperative oxygen fractions to enhance airway safety and reduce infection risk. Preclinical data suggest MP and CP may synergistically worsen lung injury, though clinical evidence remains unclear.
Objectives: We used the REPEAT database, which harmonizes data from three randomized trials, to evaluate whether intraoperative MP and CP are associated with postoperative pulmonary complications

(PPC). We hypothesized that each independently contributes to PPC risk, and that their combination further increases risk through interaction.

Methods: This secondary analysis of REPEAT did not require supplemental IRB approval in addition to the approval granted to each individual trial. Our study protocol was attached to the clinicaltrials.gov entry for REPEAT (NCT03937375). CP and MP were defined as their intraoperative time-weighted average, calculated as the area-under-the CP or MP time-curve divided by hours of exposure. PPCs were defined as those that occurred within seven days postoperatively, as per the original trials' definition. Confounders were determined a priori and adjusted for in all analyses. Patients missing data for any confounder, who had a surgery shorter than two hours, or MP > 30 J/min were excluded from the analysis. We assessed the association between CP and MP on PPCs using multivariable logistic regression, and standardized coefficients to estimate the effect of a 1 J/min change in CP or MP. We tested the synergistic harm of CP and MP using an interaction term.

Results: Of 3,837 patients, 2,492 were included in the analysis (Fig. 1). Intraoperative average time weighted CP and MP were 10.2 ± 3.9 J/min and 10.5 ± 4.4 J/min, respectively. An increase of 1 J/min in CP was associated with 8% higher odds of PPCs (OR 1.08 [95%CI 1.05 to 1.10]; P < 0.001), while the same increase in MP raised odds by 5% (OR 1.05 [95%CI 1.02 to 1.08]; P = 0.003; Fig. 2). The absence of a significant interaction between CP and MP (P = 0.40) suggests additive rather than synergistic effect on PPC risk (Fig. 3).

Conclusions: Both intraoperative CP and MP are independently associated with PPCs. Their effects are additive, rather than synergistic.

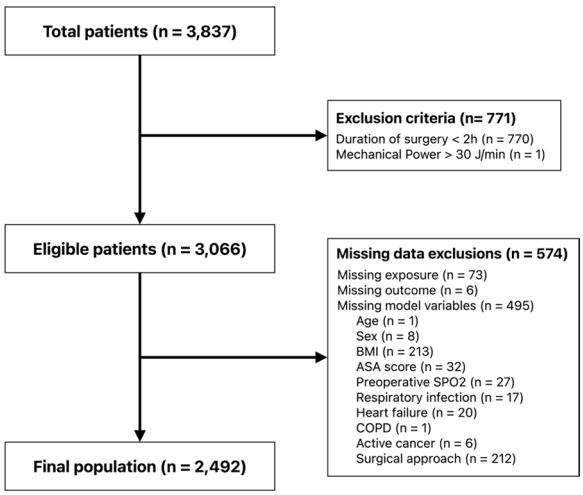


Fig. 1 (abstract 000396) Patient flowchart

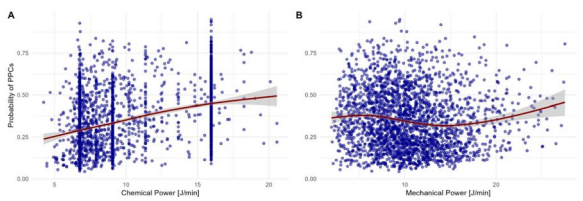


Fig. 2 (abstract 000396) Probability of postoperative pulmonary complications (PPCs) over the ranges of chemical (A) and mechanical (B) power

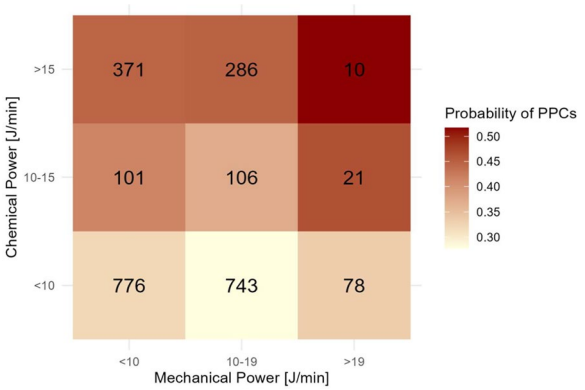


Fig. 3 (abstract 000396) Probability of postoperative pulmonary complications (PPCs) associated with chemical and mechanical power

Reference

1 Lukas M. Müller–Wirtz was supported by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) – 466,655,093.

Topic: Acute respiratory failure and mechanical ventilation

000398

Early sepsis detection: combining a novel and standard biomarker to improve diagnostic performance

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Introduction: The diagnosis of sepsis remains a major challenge and early and accurate diagnosis are central to improving outcomes. No single biomarker fully captures this syndrome's complexity. Pancreatic stone protein (PSP), C-reactive protein (CRP), and procalcitonin (PCT) each reflect different aspects of the host response to infection. We hypothesized that a combination of biomarkers would prove complementary in enhancing the accurate diagnosis of sepsis.

Objectives: To assess the potential of various combinations of PSP, CRP, and PCT for both the diagnosis and exclusion of sepsis, laying the groundwork for optimized biomarker-based diagnostic algorithms.

Methods: A pooled post hoc analysis was conducted using data from two large ICU clinical studies that followed similar protocols. Sepsis-3 definition was used. The first study (EU) had an adjudicated sepsis prevalence of 21.8% while the second (U.S.) had 48.5%. The pooled cohort included 688 patients. The diagnostic performance of PSP, CRP, and PCT was analyzed individually and in combination.

- For ruling in sepsis, a logical OR method was used, considering a test positive if at least one biomarker exceeded its threshold.
- For ruling out sepsis, a logical AND method was used, considering a test negative only if all combined biomarkers were below

their thresholds. Receiver operating characteristic (ROC) analysis was used to evaluate sepsis detection and exclusion.

Results: PSP demonstrated strong diagnostic performance for sepsis detection, with an AUC of 74.9% (CI95: 71.2%-78.7%). The logical OR combination of PSP with CRP improved the diagnostic accuracy for identifying sepsis, while reliance on PCT added little to either PSP alone or PSP/CRP:

- PSP + CRP: 80.2% (CI95: 76.8%-83.7%)
- PSP + PCT: 78.8% (CI95: 75.3%-82.3%)
- PSP + CRP + PCT: 80.8% (CI95: 77.4%-84.2%)

For sepsis exclusion, PSP alone had an AUC of 75.0% (CI95: 71.5%-78.5%). The logical AND combination of PSP AND CRP led to the highest accuracy for ruling out sepsis while employing PCT in and form of combination did not statistically increase accuracy:

- PSP + CRP: 80.2% (CI95: 77.0%-83.3%)
- PSP + PCT: 78.7% (CI95: 75.4%-82.0%)
- PSP + CRP + PCT: 76.6% (CI95: 73.2%-80.0%)

The ROC curves illustrate the improved diagnostic accuracy achieved when combining PSP with CRP and PCT (Fig. 1).
Conclusions: These findings suggest that the combination of PSP and CRP offers the best diagnostic performance for both identifying and excluding sepsis. PSP + CRP (OR) showed high accuracy for ruling in sepsis, while PSP + CRP (AND) performed best for ruling out sepsis. These results support a biomarker-driven approach using tailored algorithms to improve sepsis diagnosis.

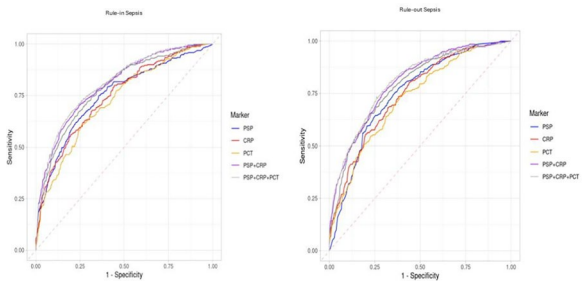


Fig 1 (abstract 000398) ROC curves illustrating the individual and combined diagnostic performance of PSP, CRP, and PCT for ruling in and out sepsis. The left panel shows ROC curves for sepsis detection using the OR combination, while the right panel shows performance for sepsis exclusion using the AND combination

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Topic: Sepsis

000401

Mortality and functional outcome of acute ischemic stroke patients with ASPECT ≤ 7 treated with mechanical thrombectomy and admitted to ICU

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000401

Introduction..
Objectives: To compare ICU, in-hospital and 6-month mortalities as well as functional outcome (as per modified Rankin scale scores at 6 months), of acute ischemic stroke patients with ASPECTS ≤ 7 on computed tomography and treated with mechanical thrombectomy (MT) versus patients with ASPECT > 7.
Methods: Retrospective study (January 2015-May 2024) that includes all patients who underwent MT and were admitted to the ICU of a tertiary university hospital. Collected variables: age, gender, risk factors (hypertension, diabetes, dyslipidemia, smoking/alcohol consumption, atrial fibrillation, antiplatelet/anticoagulant therapy), Rankin score at admission, NIHSS at diagnosis, symptoms-to-hospital and symptom-to-recanalization times, IV fibrinolysis, ICU and hospital lengths of stays and ICU, in-hospital, and 6-month mortalities. Functional dependence was defined as an mRankin score > 3 at 6 months. Quantitative variables: mean ± SD, median (IQR 25–75). Categorical variables: absolute value (%). Statistical analysis: Chi-square, Fisher's test, Wilcoxon test, and logistic regression as appropriate. Statistical significance: $p < 0.05$.
Results: A total of 395 patients were included, of which 120 (30.4%) had ASPECTS ≤ 7. When comparing ASPECTS ≤ 7 vs. ASPECTS > 7, no differences were found in: age (69 ± 14 vs. 72 ± 13 years), gender [male: 57 (48%) vs. 135 (50%)], risk factors, Rankin at admission [0 (0–1) vs. 0 (0–1)], symptoms-to-hospital (3 ± 3 vs. 3 ± 3 h), and symptoms-to-recanalization [5 ± 2 (30% wake-up stroke) vs. 5 ± 2 h (20% wake-up stroke)] times, IV fibrinolysis [30 (25%) vs. 95 (35%)], and hospital length of stay [12 (6–23.5) vs. 11 (7–19.5) days].Differences were found in: NIHSS at diagnosis (18 ± 5 vs. 15 ± 6 points); ICU stay [1 (1–4.25) vs. 1 (1–2) days]; ICU [22 (18.3%) vs. 22 (8%)], in-hospital [39 (32.5%) vs. 49 (17.8%)] and 6-month [48 (40%) vs. 58 (21%)] mortalities; and mRankin > 3 at 6 months [85 (70.8%) vs. 123 (44.7%)]. After adjusting by NIHSS, ASPECTS ≤ 7 was independently associated with: ICU [OR 2.22 (1.15–4.30)], in-hospital [OR 1.71 (1.02–2.86)] and 6-month [OR 1.85 (1.13–3.04)] mortalities as well as with mRankin > 3 at 6 months [OR 2.95 (1.19–7.54)].
Conclusions: A careful evaluation of patients with ASPECTS ≤ 7 who are being considered for MT is essential. The use of complementary tests, such as perfusion CT, in the decision-making algorithm may help improve the identification of those who are most likely to benefit from mechanical thrombectomy while minimizing its associated risks.

Topic: Neurointensive care.

000402

Impact of individualized vs. standardized inspiratory muscle training on diaphragmatic function in patients with tracheostomy due to prolonged mechanical ventilation: preliminary results

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Introduction: Prolonged mechanical ventilation (PMV) deteriorates diaphragmatic function, leading to dysfunction (DD) and difficult weaning from MV. Between 13 and 35% of these patients require a tracheostomy (TQT). Although TQT eases disconnection, it may have complications. Inspiratory muscle training (IMT) can reverse DD and reduce TQT duration. This study assesses whether a 2-week individualized IMT protocol combining strength and endurance improves DD in patients with TQT due to PMV compared to a standardized protocol.

Methods: Patients ≥ 18 years old on MV via TQT, with a Glasgow Coma Scale (GCS) score > 11 and S5Q Scale > 3, were included. Informed consent was obtained (Ethics No. 263, CEC Hospital San Juan de Dios). Twenty-four hours after TQT placement (baseline), subjects were randomized into either a control group (CG), receiving strength-based IMT (50% of maximal inspiratory pressure, MIP) once daily, or an intervention group (IG), following an individualized IMT protocol combining strength (60% of MIP) and endurance training (30% MIP) twice a day (Fig. 1). At baseline and on day 15, MIP, maximal expiratory pressure (MEP), and quality of life (EQ-5D) were assessed. DD was evaluated via ultrasound, measuring diaphragm thickening fraction (DTF) and diaphragmatic excursion (DE). Additionally, TQT duration, ICU length of stay, and total hospital length of stay were analyzed.
Results: To date, 34 patients have been recruited, with 13 randomized to CG and 21 to IG. MIP significantly increased in both groups after the training period, from 33.1 ± 10 to 46.6 ± 16 in CG (p = 0,0002) and from 33.3 ± 12 to 49.0 ± 14 in the IG (p < 0,0001). MEP also increased, from 40.9 ± 27 to 60.4 ± 34 in the CG (p = 0,0002) and from 34.6 ± 16 to 48.5 ± 23 in the IG (p = 0,0006). Diaphragmatic thickness increased significantly in the intervention group (from 26.4 ± 12 to 37.7 ± 10, p = 0.0001), whereas in the control group, a trend toward an increase was observed, from 30.7 ± 14 to 44.6 ± 18, with a p-value of 0.0583. However, no significant changes were observed in diaphragmatic excursion in both groups (Fig. 2 and 3). When analyzing the EQ-5D, a significant decrease in the score was observed in the intervention group by day 15 post-intervention (p = 0.0333), indicating an improvement in the patients' quality of life. This finding was not observed in the control group. Finally, there were no differences between groups in tracheostomy days, ICU stay, and hospital length of stay.
Conclusions: An individualized inspiratory muscle training protocol combining strength and endurance significantly improved inspiratory and expiratory muscle strength, diaphragmatic thickness, and quality of life in patients with tracheostomy due to prolonged mechanical ventilation. These findings suggest that a tailored IMT approach may be beneficial in reversing diaphragmatic dysfunction, although further research is needed to assess its impact on clinical outcomes such as ICU and hospital length of stay.

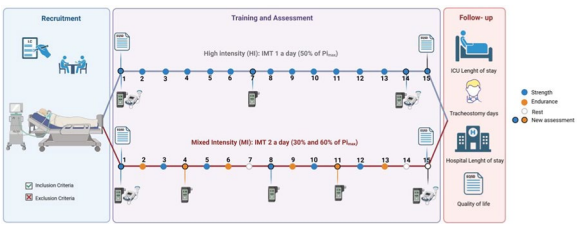


Fig. 1 (abstract 000402) Project methodology. IMT: inspiratory muscle training

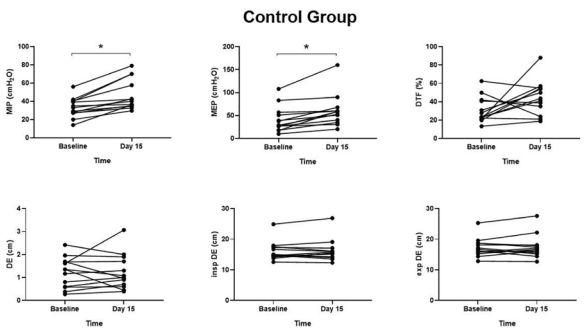


Fig. 2 (abstract 000402) Changes in MIP, MEP, DTF, DE, inspiratory DE and expiratory DE, after the 15 days training period in the control group

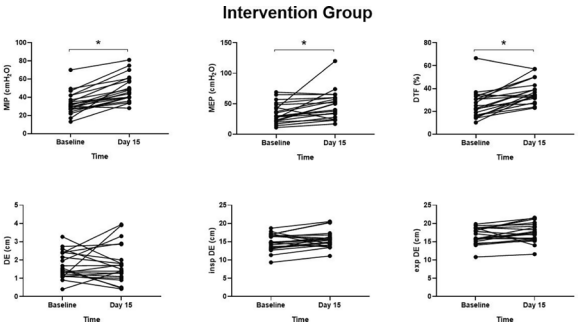


Fig. 3 (abstract 000402) Changes in MIP, MEP, DTF, DE, inspiratory DE and expiratory DE, after the 15 days training period in the intervention group

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Topic: Nursing care and physiotherapy.

000403

Assessing the workload of a Critical Care Outreach team

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***Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000403*.**

Introduction: Critical Care Outreach Teams (CCOTs) facilitate the management of deteriorating patients on the wards, participate in treatment escalation planning, but also provide staff education and support post-ICU discharge [1, 2]. Over time, CCOTs have expanded their role integrating advanced technologies like ultrasound and echocardiography, further enhancing their capabilities [3]. Nonetheless, the optimal composition of CCOTs, the appropriate activation triggers and their exact role remain under-searched [1].
Objectives: We aimed to quantify the distribution of CCOT time between direct and indirect care (see below), and identify any differences between tasks undertaken by physicians and nurses.
Methods: This observational study was conducted at a large London teaching hospital (950 beds). The CCOT is comprised of a consultant, two senior doctors-in-training and three senior ICU nurses/ day shift, reducing to two nurses/night shift. Independent observers recorded CCOT activities using anonymised standardised documentation. Direct patient care comprised of face-to-face interaction between the clinician and the patient. Indirect care encompassed other patient-relevant activities but not performed in their presence. Observers tracked workflow interruptions, delays, and interdepartmental interactions.

Results: A total of 62.5 h of observation were documented, 28,5hs and 35 h following doctors and nurses, respectively (Fig. 1). Seventeen hours (31%) of CCOT time was dedicated to direct patient care, while 69% (39 h) was spent on indirect tasks. An additional 12% (6.5 h) involved unexpected activities, such as debriefing ward teams after cardiac arrest (13 min), checking bed spaces for equipment (12 min) and waiting with intubated patients for transfer (32 min). The CCOT doctors spent 94% of time (374 min) on clinical examination and 6% on cardiopulmonary resuscitation. In contrast, CCOT nurses spent 66% of their time on clinical examination, 29% (182 min) on resuscitation, and 6% on treatment initiation (setting up high flow oxygen, preparing arterial lines), emphasising their active role in interventions. Documentation occupied the majority of indirect care time, followed by interdepartmental communication (Table 1).
Conclusions: CCOT clinicians spend a disproportionate amount of time on administrative tasks, limiting direct patient care. Nurses play a hands-on role, engaging in both assessments and interventions, while doctors focus primarily on documentation and communication. Understanding the tasks holding the attention of outreach teams may facilitate forward planning around their recruitment and education. It may also promote investment on digital documentation, task delegation, and enhanced coordination to improve efficiency and even patient outcomes. Our work provides valuable insight in the everyday workload of CCOT and can be used for streamlining the team's workflow processes, aiming to enhance its overall effectiveness.

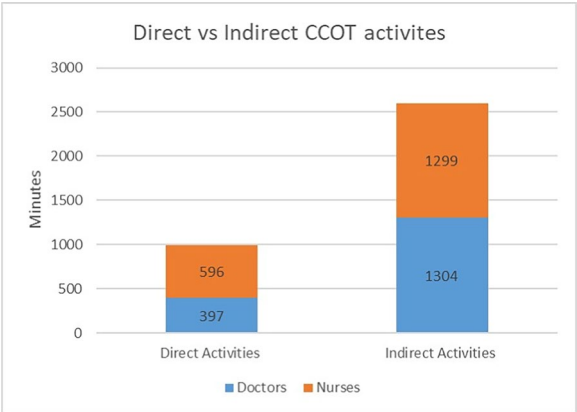


Fig. 1 (abstract 000403) Overview of direct vs Indirect CCOT activities

Table 1 Breakdown of direct and indirect activities for CCOT doctors and nurses

Direct Activity (mins)	**Doctor (%)**	**Nurse (%)**
Clinical Examination	374 (94)	414 (66)
CPR	23 (6)	182 (29)
Total Direct Activities	**397**	**596**
Indirect Activity (mins)	**Doctor (%)**	**Nurse (%)**
Documentation	493 (45)	518 (42)
Professional communication	434 (40)	453 (37)
Assisting Ward Clinicians	45 (4)	102 (8)
Managing Supplies	127 (12)	99 (8)
Review Patient Records	205 (16)	127 (9)
Total Indirect Activities	1304	1299

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Topic: Health Services Research and Outcome.

000404

Impact of red blood cell storage duration on transfusion efficacy and mortality in ICU patients: a retrospective analysis

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000404.

Introduction: Anemia is a common condition in intensive care units (ICUs), often present upon admission or developing during hospitalization, primarily due to blood loss from frequent sampling. Thirty-seven (37) to 44% of patients are transfused during their ICU stay (1). While transfusions are essential in cases of severe hemorrhage with hypovolemia, their benefits in anemia without significant blood loss remain uncertain. Several studies have reported increased morbidity and mortality due to "storage lesions" of older blood leading to structural, biochemical and metabolic changes (2–4). Moreover, transfusion of 'older' RBCs has been associated by some with an increase in morbidity and mortality in surgical and polytrauma patients (5).
Objectives: This study investigates the impact of RBC storage duration on transfusion outcomes and compares the efficacy of older versus newer blood.
Methods: This is a retrospective descriptive study of patients admitted between January 2014 and January 2021 who received RBC transfusion in a Tunisian ICU.
Data were collected from medical and transfusion records including clinical status, pre-transfusion assessments, transfusion indications, RBC storage duration, and post-transfusion outcomes. Age of the transfused packed RBC was recorded in the transfusion registry. Transfusion yield per episode was expressed as the change in hemoglobin. Statistical analysis was conducted using SPSS software.
Results: Six hundred nine (609) patients were admitted during the study period. Eighty (80) received RBC transfusion. One hundred fifty (150) transfusion episodes were recorded, with a total of 236 packed RBCs. The mean patient age was 57.1 ± 18.5 years.
Acute respiratory failure was the leading cause of ICU admission (65%). The APACHE II score was 20.4 ± 9.4. The mean hemoglobin level at admission was 9 ± 2,7 g/dl, and the mean pre-transfusion hemoglobin level was 6.9 ± 1.1 g/dl. RBC storage duration ranged from 1 to 5 days (14%), 6 to 10 days (30.7%), and 11 to 19 days (39.3%).
The overall transfusion yield per transfusion episode was 2.6 g/dl in the group where the storage duration of red blood cells was less than 5 days. In contrast, when RBCs were 20 days old or more, the yield was 0.8 g/dl ($P = 0.0001$). The average yield per packed RBC was also higher for shorter storage durations (2.23 g/dl vs. 1.6 g/dl, $P = 0.029$).
The ICU length of stay ranged from 1 to 208 days. The overall mortality rate was 47.5%, The main cause was refractory septic shock (63.2%). There was no statistically significant association between RBC storage duration and mortality. Multivariate analysis identified hemodynamic instability as significant predictor of mortality.
Conclusions: RBC transfusions are associated with improved hemoglobin levels, especially for RBCs with shorter storage durations. Age of transfused blood did not significantly impact mortality.

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Topic: Transfusion and haemostasis disorders.

000407

Assessing myocardial stunning during continuous renal replacement therapy in critically ill patients: a prospective observational study.

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***Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000407*.**

Introduction: Myocardial stunning, a transient impairment of cardiac contractility without irreversible damage, is well-documented in chronic hemodialysis but underexplored during continuous renal replacement therapy (CRRT) in critically ill patients. This study aims to evaluate the incidence of myocardial stunning during CRRT and its association with clinical outcomes.
Objectives: This study aimed to evaluate the prevalence of myocardial stunning in ICU patients undergoing CRRT, describe its echocardiographic characteristics and temporal evolution, and assess its impact on clinical outcomes, including mortality, ICU/hospital length of stay, and vasopressor needs.
Methods: A prospective observational study was conducted over 11 months (August 2023 – June 2024) in the ICU at Mohammed V University Hospital, Oujda, Morocco. Inclusion criteria: adult ICU patients with acute kidney injury (AKI) requiring CRRT. Exclusion criteria: pre-existing severe LV dysfunction, significant valvular disease, arrhythmias, poor echogenicity, and age < 18.
CRRT was delivered as continuous veno-venous hemodiafiltration (CVVHDF). Echocardiographic evaluations (with speckle-tracking) were performed at baseline (H0), 8h (H8), and 24h (H24) post-CRRT initiation. Parameters included LVEF (Simpson's method), GLS, and segmental longitudinal strain. Myocardial stunning was defined as a > 20% reduction in segmental strain per ASE guidelines.
Clinical and laboratory data were collected pre- and post-CRRT. Vasopressor doses, SOFA scores, MAP, and PCO_2 gap were recorded. Statistical analyses included paired tests, logistic regression, correlation analyses, and Kaplan–Meier survival curves. Significance: $p < 0.05$.
Results: Thirty-eight patients were included in the final analysis (mean age: 48 years; 57.9% male). Myocardial stunning occurred in 60.5% of patients and was associated with significantly higher mortality (47.8% vs. 6.7%, $p < 0.001$), increased vasopressor requirements (Δdose $p < 0.001$), and prolonged ICU (median 10 vs. 5 days) and hospital stays (median 14 vs. 8 days). Declines in LVEF and GLS were statistically significant over time. Septic shock, higher SOFA scores, prior stroke, and chronic kidney disease were predictive factors for myocardial stunning.
Despite CRRT's reputation for hemodynamic stability, myocardial stunning was frequent and clinically significant. The underlying mechanisms appear multifactorial, involving ischemia–reperfusion injury, vasopressor-induced oxygen demand/supply mismatch, and systemic inflammation, particularly in septic shock. These findings challenge the assumption that CRRT protects against cardiac stress and highlight the need for targeted cardiac monitoring. The strong correlation between stunning and adverse outcomes underscores its potential as a prognostic marker and therapeutic target.
Conclusions: Myocardial stunning is highly prevalent during CRRT in critically ill patients and is associated with worse clinical outcomes. These findings underscore the need for early identification, optimized hemodynamic management, and potential preventive strategies to mitigate cardiac injury during CRRT.

Table 1 Breakdown of direct and indirect activities for CCOT doctors and nurses

Patient ID	age	sex	BMI	Baseline comorbidities	Admission diagnosis	SOFA	Survival outcome
1	24	Female	23,1	Diabetes	Septic shock	5	Alive, off RRT
2	19	Female	22,1	diabetes	Septic shock	9	Alive, off RRT
3	21	Male	23,8	Diabetes	Septic shock	7	Alive, off RRT
4	35	Female	29,4	Hypertension, diabetes, dyslipidaemia	Septic shock	11	Alive, on RRT
5	20	Male	26,5	diabetes	Septic shock	10	Alive, off RRT
6	64	Female	31,5	Hypertension, diabetes, dyslipidaemia	Septic shock	13	Died in the ICU
7	84	Male	28,4	Hypertension, diabetes, dyslipidaemia, stroke, chronic kidney disease	Septic shock	12	Died in the ICU
8	77	Male	23,1	diabetes	Haemorrhagic shock	11	Died in the ICU
9	62	Male	32,4	Hypertension, diabetes, dyslipidaemia, stroke, chronic kidney disease	Septic shock	12	Alive, on RRT
10	85	Male	26,8	Hypertension, diabetes, dyslipidaemia, stroke	Haemorrhagic stroke	6	Died in the ICU
11	54	Female	31,1	Hypertension, dyslipidaemia	toxicoderma	9	Alive, off RRT
12	30	Female	21,5	Chronic kidney disease	Septic shock	10	Died in the ICU
13	55	Male	29,4	Diabetes, dyslipidaemia	Septic shock	8	Alive, on RRT
14	50	Male	35,1	Hypertension, diabetes, dyslipidaemia	Septic shock	12	Died in the ICU
15	75	Male	26,5	Hypertension ; diabetes, dyslipidaemia, chronic kidney disease, COPD	Septic shock	10	Alive, off RRT
16	19	Female	21,5	diabetes	Septic shock	8	Alive, off RRT
17	25	Female	22,3	Diabetes	Septic shock	7	Alive, off RRT
18	35	Female	28,4	Hypertension, dyslipidaemia	eclampsia	6	Alive, on RRT
19	26	Male	23,5	No comorbidities	poisoning	12	Alive, on RRT
20	84	Male	31,5	Hypertension, diabetes, dyslipidaemia, chronic kidney disease	Septic shock	14	Alive, on RRT
21	75	Female	32,5	Hypertension, diabetes, dyslipidaemia, stroke, chronic kidney disease	Septic shock	14	Died in the ICU
22	20	Female	26,4	diabetes	Septic shock	6	Alive, off RRT
23	19	Male	21,6	Diabetes, chronic kidney disease	Septic shock	12	Alive, on RRT
24	91	Male	23,1	Hypertension, diabetes, stroke, dyslipidaemia, chronic kidney disease	Haemorrhage stroke	8	Alive, on RRT
25	50	Male	29,8	Hypertension, diabetes, dyslipidaemia	toxicoderma	10	Alive, off RRT
26	35	Male	24,5	No comorbidities	Viper envenomation	12	Died in the ICU
27	29	Female	23,5	Hypertension	Acute fatty liver of pregnancy	10	Alive, on RRT
28	65	Male	32,5	Hypertension, diabetes, dyslipidaemia, stroke	Septic shock	12	Alive, on RRT
29	80	Female	28,4	Hypertension, diabetes, dyslipidaemia, chronic kidney disease, COPD	Septic shock	14	Died in the ICU
30	24	Male	23,5	No comorbidities	poisoning	11	Alive, off RRT
31	45	Female	32,4	Hypertension, diabetes, dyslipidaemia, chronic kidney disease	Septic shock	9	Alive, off RRT
32	29	Female	23,7	No comorbidities	poisoning	12	Died in the ICU
33	66	Male	28,4	Diabetes, dyslipidaemia, chronic kidney disease, COPD	Septic shock	11	Alive, on RRT
34	30	Male	24,1	No comorbidities	Viper envenomation	9	Alive, off RRT
35	73	Male	31,4	Hypertension, diabetes, dyslipidaemia, stroke, chronic kidney disease	Haemorrhage stroke	6	Died in the ICU
36	28	Female	23,2	No comorbidities	Severe pre-eclampsia	8	Alive, off RRT
37	43	Male	29,1	Hypertension, diabetes, dyslipidaemia, chronic kidney disease	Septic shock	6	Alive, on RRT
38	79	Male	26,4	Hypertension, diabetes, dyslipidaemia, stroke, chronic kidney disease	Haemorrhage stroke	12	Died in the ICU

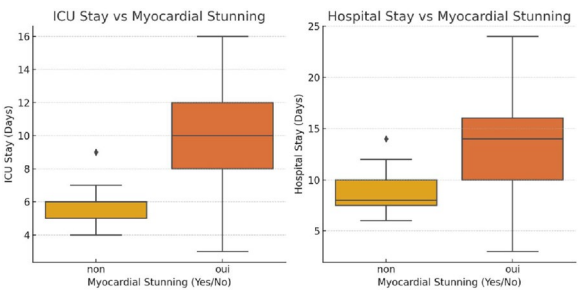


Figure 5 (abstract 000407) Baseline patient characteristics, admission diagnoses, and clinical outcomes

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7 We thank the ICU staff of Mohammed V University Hospital for their valuable support during the study period.

Topic: Cardiovascular issues in ICU.

000408

Hemoglobin trends during HIPEC cases—spontaneous recovery

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000408.

Introduction: During cytoreductive surgery with hyperthermic intraperitoneal chemotherapy (HIPEC), heated chemotherapeutic agents are infused into the peritoneal cavity, leading to thermal stress, fluid/electrolyte shifts, and hemodynamic changes. (1) Although the HIPEC phase typically involves minimal blood loss, patients often experience a decline in hemoglobin (Hgb) level. (2, 3) Our clinical impression is that a spontaneous post-HIPEC Hgb recovery occurs postoperatively. This study examines perioperative Hgb changes in our HIPEC practice.
Methods: Medical records of patients undergoing HIPEC surgeries from 2018 to 2023 were reviewed for perioperative Hgb values, surgical timings, demographics, intraoperative fluid administration, and perioperative transfusions. First intraoperative Hgb, pre-HIPEC, HIPEC nadir, intraoperative nadir, and first postoperative Hgb values were extracted. Patients with intraoperative transfusion, transfusion before first postoperative Hgb, missing HIPEC timestamps, or missing Hgb values were excluded. Hgb features were analyzed univariately and adjusted for baseline Hgb, demographics, fluids, surgery duration, and intra-individual correlation using a mixed effects multivariable linear regression model. Model fit was evaluated by examining the residuals and comparing the results with a residual-outlier-reduced model due to mildly heavy tails on QQ analysis, which did not change results meaningfully.
Results: 191 HIPEC surgeries from 154 patients were analyzed. Median age was 58.7 years, procedure duration 5.3 h, and intraoperative crystalloid use 4.3 L. After adjusting for potential confounders and controlling for baseline Hgb and intra-individual correlation, the mean Hgb change was -1.24 g/dl (95% CI: -1.12 to -1.35; $P < 0.001$) from pre-HIPEC to HIPEC nadir, 0.56 g/dl (0.47 to 0.64; $P < 0.001$) from HIPEC nadir to postoperatively, and 0.76 g/dl (0.62 to 0.90; $P < 0.001$) from intraoperative nadir to postoperatively. Each model fit well and was robust to outliers. The attached figure illustrates the distribution of Hgb features and change in Hgb. Baseline Hgb and surgery duration significantly impacted hemoglobin trends.
Conclusions: We observed spontaneous hemoglobin recovery from intraoperative nadir to postoperative levels after adjusting for confounders. This may be due to hemodilution from fluid administration and perfusate absorption, with hyperthermic HIPEC increasing fluid shifts. Postoperative redistribution likely contributes to hemoconcentration and Hgb normalization. This supports restrictive transfusion practices and has the potential to improve perioperative fluid management, optimize transfusion strategies, and enhance overall patient safety during HIPEC procedures. Further research is needed to fully characterize these fluid shifts and their clinical implications.

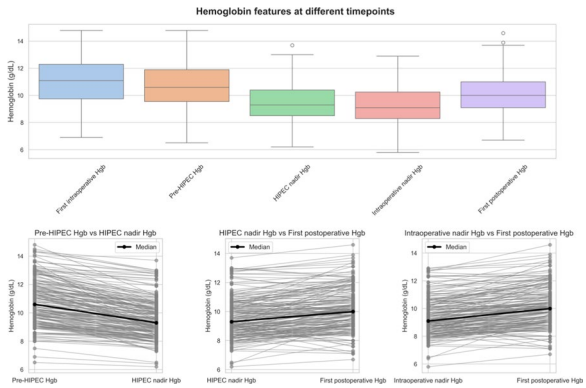


Figure (abstract 000408) Distribution of hemoglobin features and change in hemoglobin

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Topic: Perioperative care.

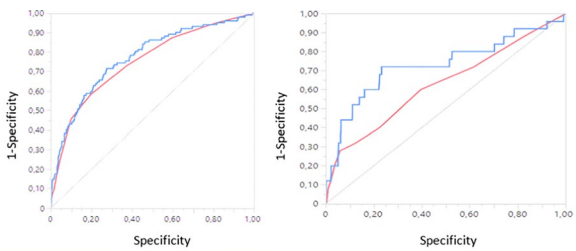
000409

Cardiopulmonary bypass time and hemolysis index as predictors of cardiac surgery-associated acute kidney injury

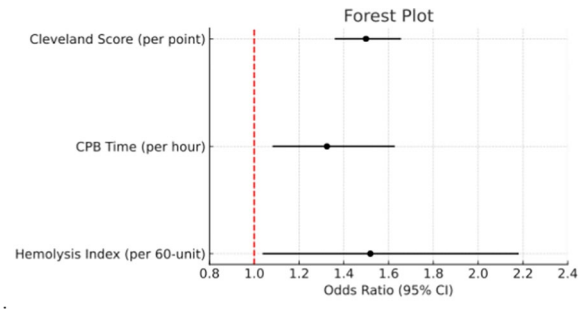
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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000409.

Introduction: Acute kidney injury is a common and serious complication of cardiac surgery, often linked to the use and duration of cardiopulmonary bypass (CPB). While novel biomarkers show promise for early detection, their complexity limits routine use. The hemolysis index (HI), a low-cost and widely available parameter, has been proposed as a surrogate marker of hemolysis and a potential predictor of cardiac surgery-associated AKI (CS-AKI).
Objectives: The aim of this study is to retrospectively evaluate the role of the hemolysis index and CPB time as predictive markers for acute kidney injury (AKI) in patients undergoing cardiac surgery.
Methods: This retrospective cohort study included patients admitted to the Cardiothoracic ICU of the University Hospital IRCCS San Gerardo dei Tintori following cardiac surgery between 2019 and 2023. The hemolysis index (HI) was measured at ICU admission. CS-AKI and its severity were defined using KDIGO creatinine-based criteria. Logistic regression, multivariable modeling, and ROC curve analysis were used to assess the association of HI and cardiopulmonary bypass (CPB) time

with CS-AKI. The Cleveland Score, a validated preoperative risk assessment tool that estimates the likelihood of developing acute kidney injury (AKI) after cardiac surgery, was included in multivariable models to adjust for baseline AKI risk.
Results: A total of 1,195 patients were included. Median CPB time was 110 [IQR 80–140] minutes, whereas median HI at ICU admission was 25 [IQR 15–42]. HI was significantly associated with CPB use (27 [16–44] vs. 10 [5–16] in off-pump surgery, $p < 0.001$) and CPB duration (Pearson $r = 0.367$, $p < 0.001$). CS-AKI developed in 102 patients (9%). When integrated into a multivariate model HI and CPB time resulted as significantly associated with a higher risk of CS-AKI (OR per HI 60-unit increase: 1.52, 95% CI 1.04–2.18, $p = 0.027$; OR per hour increase of CPB time 1.32, 95% CI 1.08–1.63, $p < 0.001$). ROC analysis demonstrated limited ability of HI or CPB duration to determine the overall risk of CS-AKI (AUC = 0.55 and 0.63 for HI and CPB, respectively) but improved performance for moderate–severe AKI (AUC = 0.67 for HI and 0.65 for CPB). Adding HI and CPB duration to the Cleveland Score marginally improved AKI prediction (AUC increase from 0.75 to 0.77, $p = 0.09$) but significantly enhanced severe AKI prediction (AUC increase from 0.62 to 0.72, $p = 0.019$).
Conclusions: Both hemolysis index (HI) and cardiopulmonary bypass (CPB) time emerged as independent predictors of cardiac surgery-associated AKI. These findings support further evaluation of CPB time and HI as accessible, perioperative markers for early risk stratification and targeted AKI prevention strategies. Integrating HI and CPB with established risk scores may enhance AKI risk stratification, guiding early interventions and improving patient outcomes.



ROC curves for the prediction of cardiac surgery-associated acute kidney injury (CS-AKI—Panel A) and moderate-to-severe CS-AKI (Panel B). Roc curves of Cleveland Score alone (red line) and the extended model including CPB time and hemolysis index (HI) (blue line) are displayed.



Forest plot of factors associated with the development of CS-AKI. This forest plot displays the odds ratios (OR) and 95% confidence intervals (CI) for each variable included in the multivariable regression model. Abbreviations: CPB, cardiopulmonary bypass.

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Topic: Acute Kidney Injury and haemofiltration.

000410

Lower mean arterial pressure vs usual care in older patients with vasodilatory shock: OVATION-65 randomised trial

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Intensive Care Medicine Experimental, ***2025;*13(1)**: ***000410.***

Introduction: Vasodilation-induced hypotension is a frequent cause of ICU admission and commonly treated with intravenous vasopressors, which may increase cardiac arrhythmias and demand-related ischemia.
Objectives: The primary objective was to assess whether a MAP target of 60–65 mmHg (MAP 60–65), compared to usual care, resulted in lower values of high-sensitivity cardiac troponin T (hsTnT) at day 3 in patients receiving vasopressors for vasodilatory hypotension. Secondary objectives were to assess the effects of MAP 60–65 on other biomarkers and clinical outcomes.
Methods: This was a multi-centre, parallel-group, allocation-concealed trial (7 Canadian ICUs, February 2018–February 2020). Eligible patients aged ≥ 65 years receiving vasopressors for ≤ 12 h for vasodilatory hypotension and expected to need them for ≥ 6 more hours were randomized 1:1 to target MAP 60–65 or usual care. Exclusion criteria included acute brain/spine injury and bleeding. A protocol deviation in the MAP 60–65 group was defined as 3 consecutive hourly MAP values > 65 mmHg without reducing vasopressor dose. The primary outcome was day 3 hsTnT, adjusted for the day 1 value. Secondary outcomes included day 7 hsTnT, other biomarkers (NT-proBNP, lactate, NSE, ALT, FABP2, CKM), SOFA scores, healthcare utilization, adverse

events, mortality, and cognition among 6-month survivors (assessed using Telephone Interview for Cognitive Status [TICS]).

Results: The DSMC recommended early termination based on the contemporaneous 65 trial. 604 patients were screened, with 159 randomized and 157 analyzed (n = 76, MAP 60–65 mmHg; n = 81, usual care). Baseline characteristics were similar. MAP was higher in the usual care arm (Fig. 1), but norepinephrine daily dose was similar (Fig. 2). 24 patients (31.6%) in the MAP 60–65 group had a protocol deviation. There was no difference in day 3 hsTnT adjusted for day 1 values (MAP 60–65: median 45.8 [IQR 29.0–90.0] ng/L; usual care: 47.6 [22.7–90.0] ng/L; p = 0.91) [Fig. 3] or adjusted for (p = 0.91). Level of NT-proBNP, lactate, ALT, FABP2, and CKM were similar. Day 3 NSE was higher in the MAP 60–65 group (3.1 [2.2–4.9] vs 2.4 [1.8–4.0] ng/mL; p = 0.049) but similar at day 7 (2.9 [2.1–4.8] vs. 2.8 [2.1–4.1] ng/mL; p = 0.66). SOFA scores, arrhythmias, myocardial ischemia, acute kidney injury, mechanical ventilation, dialysis, and hospital stay were comparable (p > 0.05). ICU stay was similar (MAP 60–65: mean 6.8 days [SD 6.0] vs usual care: 8.2 [SD 11.3; p = 0.10). 90-day mortality (MAP 60–65: 24/76, 31.6%; usual care: 30/81, 37.0%; p = 0.43) was similar. TICS among 6-month survivors was similar (p = 0.76).

Conclusions. In this trial of patients with vasodilatory hypotension, levels of hsTnT did not differ between target MAP 60–65 mmHg and usual care. However, the trial was stopped early and separation between norepinephrine doses was inadequate. Given contemporaneous evidence that lower MAP targets improve survival, further mechanistic studies are required.

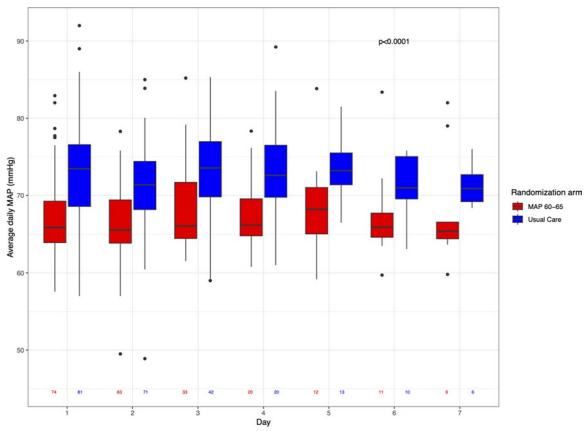


Fig. 1 (abstract 000410) Average daily mean arterial pressure (mmHg) over the first week

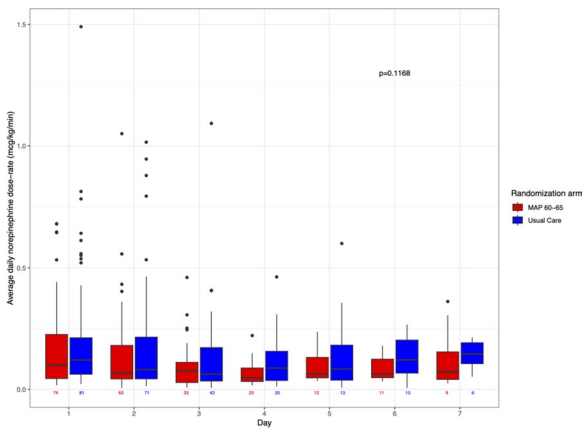


Fig. 2 (abstract 000410) Average norepinephrine dose over the first week

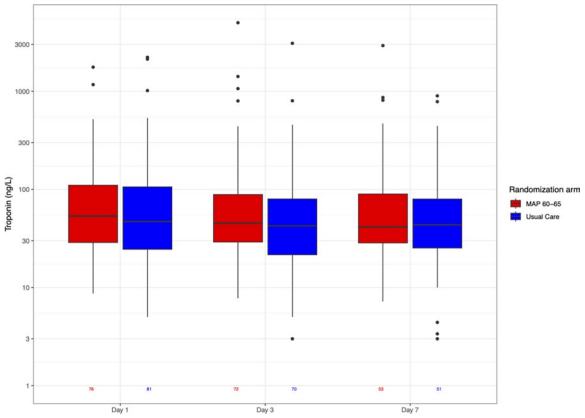


Fig. 3 (abstract 000410) Troponin values at Day 1, 3, and 7 on a logarithmic scale

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Topic: Cardiovascular issues in ICU.

000411

Impact of initial cardiac rhythm on neurological outcome in a multi-ethnic Asian in-hospital cardiac arrest cohort

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000411.

Introduction: Initial shockable cardiac rhythms have been linked to favorable neurological outcomes and survival [1,2,3]. However, there is a limited body of research on neurological outcomes following in-hospital cardiac arrest (IHCA) in Asian populations.
Objectives: To evaluate the effect of initial shockable rhythm on neurological outcome following in-hospital cardiac arrest in a multi-ethnic Asian cohort.
Methods: This retrospective cohort study initially identified 581 patients with an IHCA at Singapore General Hospital (SGH), a tertiary academic centre, from October 2018 to November 2021. Patients who were < 18 years old, with a do not resuscitate status, did not achieve return of spontaneous circulation for > 20 min, as well as those with IHCA in operating theatres, intensive care units and the Emergency Department, were excluded [4]. In the final cohort (n = 352), demographics, hospital location, length of resuscitation and comorbidities including sepsis, renal insufficiency (serum creatinine > 176.8 mmol/L (≤ 24 h post-IHCA)) malignancy and hypotension (systolic blood pressure < 90 mmHg or mean arterial pressure < 65 mmHg (≤ 24 h post-IHCA)) were collected and compared against initial cardiac rhythm. Cerebral Performance Category (CPC) scores were collected at discharge, with good neurological outcomes defined as CPC 1 or 2 [5].
Results: Shockable rhythms represented 14.2% of IHCA. In the univariate analysis, male gender (OR 2.110; 95% CI 1.06–4.18) and shockable rhythm (OR 11.197; 95% CI 5.57–22.53) were significant prognostic factors for favorable neurological outcomes. Poor prognostic factors were admission into a non-monitored unit (OR 0.424; 95% CI 0.22–0.83), hypotension (OR 0.270; 95% CI 0.11–0.65), renal insufficiency (OR 0.447; 95% CI 0.24–0.85), sepsis (OR 0.304; 95% CI 0.13–0.70), prolonged resuscitation of 10–14 min (OR 0.241; 95% CI 0.08–0.74), 15–20 min (OR 0.157; CI 95% 0.05—0.49), and > 20 min (OR 0.063; 95% CI 0.02–0.19).
In the multivariate analysis, shockable rhythms remained significantly associated with favorable neurological outcomes (adjusted OR 9.845; 95% CI 3.98–24.34) while hypotension (OR 0.223; 95% CI 0.07–0.70), and prolonged resuscitation durations (10–15 min: OR 0.178; 95% CI 0.04–0.80, > 20 min: OR 0.074; 95% CI 0.02–0.30) were less likely to have favorable outcomes. Renal insufficiency and location of arrest (non-monitored vs. monitored) were no longer statistically significant in the multivariate analysis. However, the point estimate for renal insufficiency in the multivariate analysis was 0.488 with a 95% CI of 0.21 to 1.11, suggesting that renal insufficiency may serve as a signal for poor neurological outcomes.
Conclusions: While most IHCA are non-shockable, favorable neurological outcomes were associated with initial shockable rhythms. Poor neurological outcomes were also associated with recent hypotension and prolonged resuscitation. The association between renal insufficiency and poor neurological outcomes warrants further investigation.

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Topic: Cardiac arrest.

000412

Comparison of hemodynamic stability during anesthesia using remimazolam and sevoflurane in patients undergoing minimally invasive aortic valve replacement surgery: a prospective randomized controlled study.

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000412.

Introduction: Anesthetic agents can cause hypotension, and be especially dangerous in patients with severe aortic stenosis, which can lead to even circulatory collapse. Remimazolam is known for its hemodynamic stability compared to propofol. This study is designed to compare effects of remimazolam vs. sevoflurane anesthesia on intraoperative hemodynamics in patients with severe aortic valve stenosis.
Methods: Patients were divided into remimazolam (R) and sevoflurane (S) group. Remimazolam group received remimazolam 6 mg/kg/h with remifentanil during induction and were maintained under anesthesia with remimazolam 1-2 mg/kg/h combined with remifentanil throughout surgery. Sevoflurane group received propofol 1% 1-2 mg/kg with remifentanil for anesthesia induction and were maintained under anesthesia with sevoflurane and remifentanil. Primary endpoint was the comparison of the amount of vasopressors used, and secondary endpoints were the comparison of mean arterial pressure (MAP) at fixed time points, hypotensive and bradycardia events, extubation time, and sedation-agitation-scale at ICU.
Results: After excluding one patient with change of surgical plan, sixty-three patients were enrolled. When comparing percentage change from baseline MAP, R group showed smaller fall from initial MAP at the start of CPB [-5.6 ± 14.9 vs. -10.1 ± 21.6; p = 0.047] and at the end of anesthesia[-30.7 ± 13.9%, vs. -38.1 ± 14.3%; p = 0.005] (Fig. 1). Section 1 was defined as start of anesthesia to start of CPB, Sect. 2 from start of CPB to end of CPB, Sect. 3 from end of CPB to end of anesthesia and Sect. 4 from start of anesthesia to the end of anesthesia. Proportion of hypotension was significantly lower in the R group at Sect. 1[34.9 ± 24.3% vs.48.1 ± 21.4; p = 0.025], Sect. 3 [80.2 ± 21.5% vs.91.9 ± 25.2; p = 0.011]and also in Sect. 4 [66.5 ± 16.9% vs.76.0 ± 16.2%; p = 0.007] (Fig. 2). Norepinephrine use was lower during Sect. 1[0.003 ± 0.008 mcg/kg/min vs. 0.017 ± 0.030 mcg/kg/min; p = 0.015], and Sect. 3[0.040 ± 0.051 mcg/kg/min vs. 0.085 ± 0.080 mcg/kg/min; p = 0.007] in the R group. Phenylephrine use was lower in Sect. 1[0.037 ± 0.061 mcg/kg/min vs. 0.073 ± 0.088 mcg/kg/min; p = 0.042] in the R group. Nicardipine use was higher in the R group in Sect. 3 [0.719 ± 0.547 mcg/kg/min vs. 0.233 ± 0.318 mcg/kg/min; p < 0.001], and Sect. 4[0.270 ± 0.185 mcg/kg/min vs. 0.109 ± 0.137

mcg/kg/min; $p < 0.001$] (Fig. 3). Extubation time was significantly shorter in the R group [4.4 ± 3.3 min vs. 9.6 ± 3.0 min; $p < 0.001$]. Sedation agitation score and intraoperative arrhythmia, postoperative complication did not show any significant difference between the two groups (Table 4).

Conclusions: Remimazolam anesthesia resulted in less use of norepinephrine and phenylephrine before start of CPB and less use of norepinephrine after CPB compared to sevoflurane anesthesia in patients undergoing minimally invasive aortic valve replacement surgery.

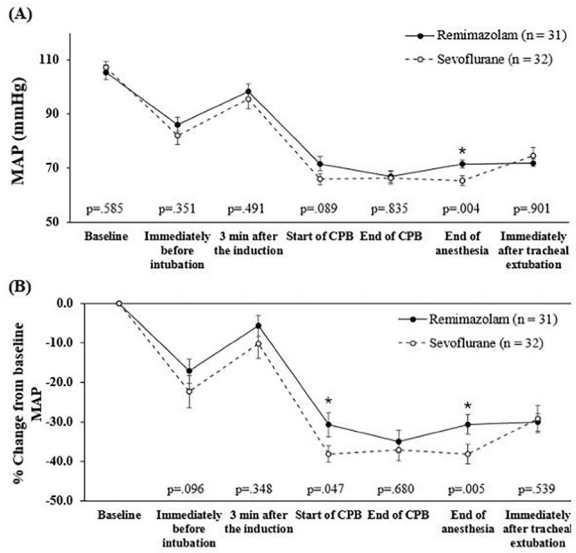


Fig. 1 (abstract 000412) Comparison of hemodynamic parameters between R, and S groups

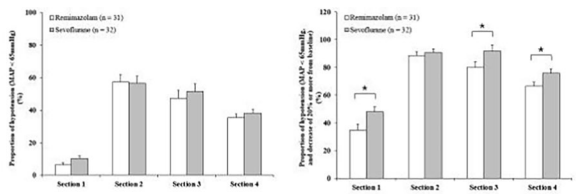


Fig. 2 (abstract 000412) Comparison of duration of cardiovascular events between R, and S groups

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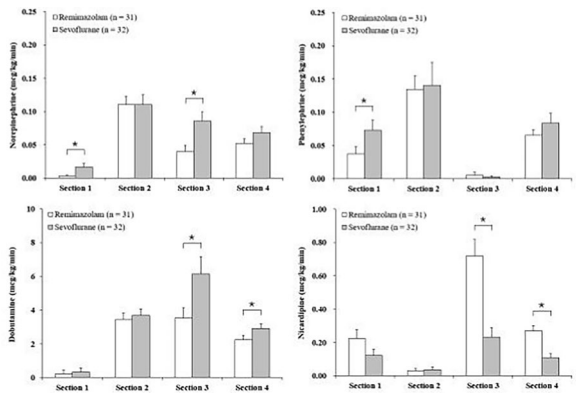


Fig. 3 (abstract 000412) Comparison of dose of inotropics, vasopressors, and other drugs between R, and S groups

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Topic: Perioperative care

000413

Selection of IgA-coated microbiome from endotracheal aspirate

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Intensive Care Medicine Experimental*, *2025;*13(1)**: ***000413.

Introduction: Ventilator-associated pneumonia (VAP) occurred as a result of the dysbiosis observed in patients receiving IMV. Secretory IgA may be involved in the regulation and selection of commensal microorganisms and the establishment of mutualistic host-microbial interactions. Our hypothesis is that patients who develop VAP have lower levels of secretory IgA-coated microbiota in respiratory secretions, leading to a higher inflammatory environment, dysbiosis, and an increase in pathogenic bacteria.

Objectives: This preliminary study aims to assess the feasibility of performing IgA-Seq in endotracheal aspirate samples from patients receiving invasive mechanical ventilation (IMV).

Methods: The respiratory sample was mechanically and chemically disrupted, filtered and centrifuged. Bacterial pellets were separated by centrifugation and resuspended in DPBS. Part of this suspension was reserved as an unstained total microbiome sample and the remainder was stained with a recombinant anti-IgA PE human antibody and sorted by magnetic activation cell sorting (MACS). The unstained microbiome suspension, the unsorted microbiome suspension and the negative and positive fractions of the sorted microbiome suspension were analysed by flow cytometry.
Results: Preliminary results indicate that part of the microbiome present in endotracheal aspirate samples has IgA-coated bacteria. The positive fraction of the sorted pellet has an enrichment in IgA-coated microbiome compared to the unsorted microbiome and the negative fraction of the sorted microbiome. These results are shown in Fig. 1.
Conclusions: MACS sorting can be used to select IgA-coated microbiome from endotracheal aspirate samples.

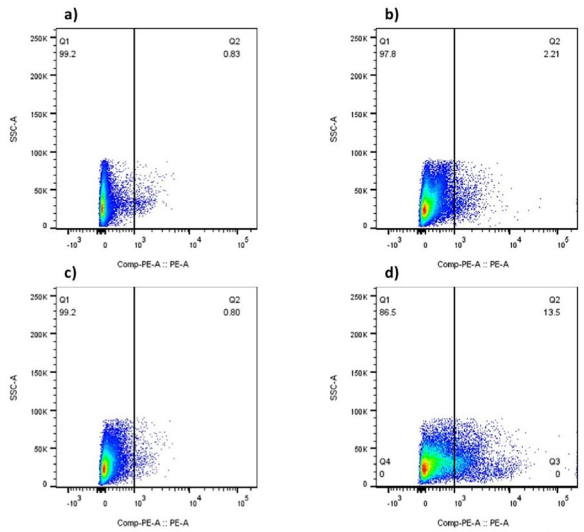


Fig. 1 (abstract 000413) Bacterial flow cytometry analyses, Q1 showing IgA- percentatge and Q2 showing IgA + percentatge of the population. Results are shown for unstained microbiome suspension (a), unsorted microbiome suspension (b), sorted negative fraction of the sorted microbiome (c) and sorted positive fraction of the sorted microbiome (d)

Reference

1 Instituto de Salud Carlos III, Spain, PI23:00106.

Topic: Infections and prevention.

000414

Incidence of adverse incidents in physiotherapy-led rehabilitation in ICU

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000413***.

Introduction: Early mobilisation among intensive care unit (ICU) patients is associated with adverse events. This study aimed to identify the incidence of adverse incidents in physiotherapy led rehabilitation sessions in a large ICU in Ireland.
Methods: Approval as sought from the Saint James's Hospital Research and Innovation Office. No identifiable patient details were included in this data collection therefore ethics was not required. Data were collected across five weeks beginning in November 2024. Treating physiotherapists completed a survey for every rehabilitation contact in the general ICU. While all ICU staff were aware of the data collection, no changes in practice were made. Data collected included the rehabilitation activity, respiratory/ renal/cardiovascular support required, physiological abnormalities during intervention, patient-reported outcomes, level of harm to the patient if any, and number of staff required to complete the session.
Results: 600 patients were screened for suitability across the study period with 308 rehabilitation contacts taking place (median 14/day). The unit has a positive mobility culture with the aim of mobilising all patients into an upright position if medically suitable. Reasons for exclusion included low level of arousal, cardiovascular instability, end-of-life care, or medically requested bed rest. Of the 308 rehabilitation contacts, adverse incidents occurred in 99 rehabilitation sessions, all were determined Grade 1- near miss (n = 74) or Grade 2- mild transient harm to the patient (n = 25). In the 99 rehabilitation sessions there were 148 physiological abnormalities. The most common physiological abnormality was desaturation > 4% (n = 57); increase in FiO2/PS (n = 42); changes in mean arterial pressure less or greater than 20% (n = 16); and changes in heart rate less or greater than 20% (n = 11). Other outcomes during rehabilitation sessions included increased patient reported anxiety (n = 32); nausea/vomiting/diarrhoea (n = 8); unplanned lift to bed/chair (n = 1).
Rehabilitation sessions included sitting out to chair (n = 180); mobilising away from bedspace (n = 171); sitting on edge of bed (n = 132); marching on the spot (n = 39); and sit to stand with standing hoist (n = 35); many sessions included more than one rehabilitation activity. Rehabilitation sessions occurred in patients with complex invasive devices including positive pressure ventilation (PPV) via tracheostomy (n = 26); continuous renal replacement therapy (CRRT) (n = 15); vasopressors (n = 14); PPV via endotracheal tube (n = 6). Rehabilitation activities associated with increased risk of adverse event were mobilising (n = 41); sitting out to chair (n = 20); sitting at edge of bed (n = 16); and transferring with use of standing hoist (n = 13). Median number of trained staff per rehabilitation session was 3 (range 1–4 staff).
Conclusions: Rehabilitation activities in the ICU setting is safe. For those on complex support such as CRRT/PPV/ vasopressors there were minimal associated adverse events of no to mild harm. High levels of patient related anxiety were reported during physiotherapy-led rehabilitation sessions. Physiotherapy-led rehabilitation sessions require a high number of trained staff to safely perform. Due to limitations no data was collected on duration or level of intensity of physiotherapy-led rehabilitation sessions.
Staff who lead and assist in physiotherapy-led rehabilitation sessions in ICU need to have the experience and capacity to adapt treatments, manage mild physiological transient events, and to be able to reassure patients who experience anxiety during the intervention. Training of junior staff should highlight the complexity and physical demand of rehabilitation in the ICU setting. No studies to date have researched the effect of such adverse events on the patient's perception of rehabilitation or the effect that this has on staff post-adverse event.

Topic: Nursing care and physiotherapy.

000415

Implementation of a multimodal delirium prevention strategy in critical care: a quality improvement initiative

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000415***.

Introduction: Delirium affects up to 80% of mechanically ventilated ICU patients, leading to increased mortality, longer hospital stays, and higher healthcare costs. This study aimed to enhance early detection through standardized assessment and implement evidence-based interventions to reduce delirium incidence in critically ill patients.

Methods: This quality improvement initiative was conducted in a 20-bed medical ICU from January to March 2024. All critical care nurses (n = 85) underwent structured CAM-ICU training with competency validation. A comprehensive delirium prevention bundle was developed following root cause analysis using the "5 Whys" methodology. The bundle encompassed four key domains: cognitive stimulation (including therapeutic music), environmental modification, sleep hygiene protocols, and optimised sedation strategies. Implementation followed a three-phase PDSA cycle with electronic health record integration to facilitate documentation.
Results: Analysis of 194 patients (81 pre-intervention, 113 post-intervention) showed significant improvements. CAM-ICU screening compliance increased from an initial 10% (10 assessments) to 92.2% (472 assessments) in phase one, sustaining at 89.9% (671 assessments) through subsequent phases. Delirium prevalence decreased markedly from 30.6% to 6.3% ($\chi^2 = 145.173$, $p < 0.001$). Run chart analysis confirmed sustained improvement with six consecutive points below the pre-intervention median. The shift towards dexmedetomidine-based sedation and implementation of daily sedation interruption protocols likely contributed to improved outcomes.
Conclusions: A structured, multimodal approach to delirium prevention, combining standardised assessment with evidence-based interventions, significantly reduced delirium occurrence in critical care. This quality improvement framework provides a reproducible model for delirium management in intensive care settings.

Topic: Sedation, analgesia and delirium.

000416

Implementation of inhaled volatile anesthetic sedation in the ICU: a single-center experience

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Intensive Care Medicine Experimental, ***2025;*****13(1)**: ***000416***.

Introduction: The use of inhaled volatile anesthetics for ICU sedation has gained interest due to their favorable pharmacokinetic profile and potential benefits in specific patient populations. We describe our experience implementing sevoflurane sedation using the anesthetic conserving device (ACD) in a medical ICU setting.
Methods: We conducted a prospective observational study of patients receiving inhaled sevoflurane via ACD for sedation or bronchodilation in our medical ICU between 2022 and 2024. Primary outcomes included safety, efficacy, and practical considerations of implementation. Environmental monitoring was performed to assess occupational exposure.
Results: Twenty-two patients (mean age 55 years, range 21–80) received sevoflurane for a mean duration of 107 h (range 0.2–286 h). Primary indications were sedation (68%) and bronchospasm (32%). All patients with bronchospasm showed significant improvement, and all patients demonstrated reduced requirements for intravenous sedatives/analgesics. Adverse events included transient hypotension requiring intervention (n = 4), hypernatremia (n = 2), and emergence agitation/delirium (n = 7). No cases of malignant hyperthermia were observed. Occupational exposure measurements remained within safe limits (maximum 1.2 ppm).
Conclusions: Implementation of inhaled sevoflurane sedation was feasible and safe with appropriate protocols, environmental controls, and staff training. Benefits were observed particularly in patients with bronchospasm and difficult sedation. Further research is needed to evaluate long-term outcomes and cost-effectiveness.

Topic: Sedation, analgesia and delirium

000418

The role of filmarray in ventilator-associated lower respiratory tract infections of COPD patients

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Intensive Care Medicine Experimental, ***2025;*****13(1)**: ***000418***.

Introduction: The use of BioFire® FilmArray® Pneumonia Panel (FA) (BioMérieux) may help to rapidly identify pathogens responsible for ventilator-associated lower tract infections (VA-LRTIs), offering the possibility to guide antibiotic treatment. Patients with chronic obstructive pulmonary disease (COPD) have a peculiar pulmonary bacterial microbiota, presenting an increased prevalence of pathogen species such as *Pseudomonas aeruginosa*. The benefit of using FA in this population is unknown, and although promising, it could result in overuse of antibiotic therapy.
Objectives: To determine the risks and benefits of using FA in the management of VA-LRTI in intubated COPD patients.
Methods: In this prospective, observational, monocentric study, we collected invasive respiratory samples at the time of VAP diagnosis and processed them with both standard-of-care cultures (SOC) and FA. A detection threshold > 10^4 copies was considered for FA for the analyses. The percentages of detection sensitivity (Sn), specificity (Sp) and percentages of positive and negative agreement (PPA and NPA) were collected in order to compare the diagnostic performances of the two approaches.
Results: We included 97 patients (16 COPD and 81 controls) with no differences in age, sex and demographics. The use of FA was associated with faster results (1.19 h vs 47.08 h; $p < 0.001$, 95%CI 41.49 to 50.4). Table 1 reports the microbiological findings and Fig. 1 depicts the percentages of pathogen detection related to the two diagnostic methods. The use of FA demonstrated higher detection rates in the COPD group when compared to the control group (87.5% vs 59.3%; $p = 0.045$, 95%CI 1.02 to 1.45). Using the two different methods, PPA was low, whereas Sn, Sp and NPA were extremely high, up to 100 percent in the COPD group (Table 2).
Conclusions: The use of FA offers faster microbiological results but may result in overdiagnosis of VA-LRTI in COPD patients due to the extremely high sensitivity of this technique; however, its high specificity and PNA with respect to SOC could be useful to rule out etiological agents and to guide empirical antimicrobial treatment.

Table 1 Microbiological findings

	General population (n=97)		Non-COPD (n=81)		COPD (n=16)	
	SOC	FA	SOC	FA	SOC	FA
***P. aeruginosa*, n (%)**	5 (5.2)	7 (7.2)	5 (6.1)	5 (6.1)	0 (0.0)	2 (12.5)
***S. aureus*, n (%)**	9 (9.3)	19 (19.6)	9 (11.1)	18 (22.2)	0 (0.0)	1 (6.25)
***Klebsiella* spp., n (%)**	8 (8.2)	13 (13.4)	7 (8.6)	11 (13.6)	1 (6.2)	2 (12.5)
E. coli	1 (1.0)	3 (3.1)	1 (1.2)	3 (3.7)	0 (0.0)	0 (0.0)
***H. influenzae*, n (%)**	0 (0.0)	17 (17.5)	0 (0.0)	15 (18.5)	0 (0.0)	2 (12.5)
***E. cloacae*, n (%)**	2 (2.1)	4 (4.1)	2 (2.5)	3 (3.7)	0 (0.0)	1 (6.25)
***S. pneumoniae*, n (%)**	1 (1.0)	4 (4.1)	1 (1.2)	3 (3.7)	0 (0.0)	1 (6.25)
S. maltophilia	3 (3.1)	-	3 (3.7)	-	0 (0.0)	-
M. catharralis	0 (0.0)	4 (4.1)	0 (0.0)	2 (2.5)	0 (0.0)	2 (12.5)
***Acinetobacter* spp.**	1 (1.0)	2 (2.1)	1 (1.2)	2 (2.5)	0 (0.0)	0 (0.0)
Others, n (%)	4 (4.2)	4 (4.1)	4 (5.0)	3 (3.7)	0 (0.0)	1 (6.25)
Viruses, n (%)	-	21 (21.6)	-	17 (21.0)	-	4 (25)
***Aspergillus* spp., n (%)**	11 (11.3)	-	8 (9.9)	0 (0.0)	3 (18.7)	0 (0.0)

Abbreviations: COPD=chronic obstructive pulmonary disease; SOC= standard of care cultures; FA= FilmArray. The values for pathogens not tested with a specific technique were marked as strikethrough in the table.

Table 2 Results of sensitivity, specificity and concordance analysis

	FA+/SOC+	FA+/SOC-	FA-/SOC+	FA-/SOC-	Sn	Sp	PPA	NPA
Pathogen detection, n (%)								
Non-COPD	24 (29.6)	23 (28.4)	8 (9.9)	26 (32.1)	85.4%	76.5%	51.1%	76.4%
COPD	5 (31.1)	9 (56.2)	0 (0.0)	2 (12.5)	100%	100%	35.7%	100.0%
Multi-drug resistance detection, n (%)								
Non-COPD	3 (3.7)	1 (1.2)	7 (8.6)	70 (86.4)	36.4%	90.9%	30.0%	98.5%
COPD	0 (0.0)	0 (0.0)	1 (6.2)	15 (93.7)	0%	93.7%	0.0%	100.0%

Abbreviations: COPD=chronic obstructive pulmonary disease; SOC= standard of care cultures; FA= FilmArray; Sn= sensitivity; Sp= specificity; PPA= positive percentage agreement; NPA= negative percentage agreement. The values of sensitivity and specificity were calculated considering an extended gold standard including a positivity for at least one of the two techniques considered.

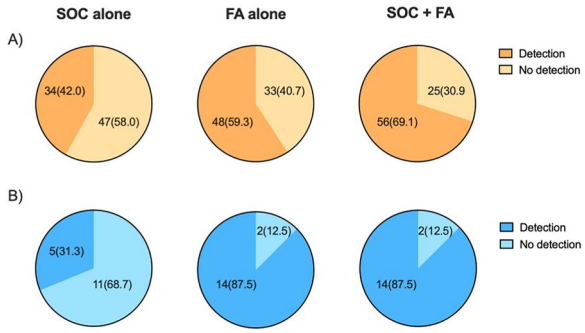


Fig. 1 (abstract 000418) Pathogen detection in the two groups. Incidence is reported as absolute value and percentage (in parentheses). A) Non-COPD patients, n = 81. B) COPD patients, n = 16. In both groups, associating FA to SOC determined a significant increment in detection. However, the percentage increase in detection was substantially greater in the COPD group.

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Topic: Infections and prevention

000419

Bioengineering immunomodulatory nanoparticles to augment neutrophil phagocytosis of bacteria

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***Intensive Care Medicine Experimental*, *2025*;13(1): *000419*.**

Introduction: Sepsis represents life-threatening organ dysfunction due to a dysregulated host response to infection (Singer M, JAMA, 2016), representing 20% of all global deaths (Rudd K, Lancet, 2022) and considerable long-term morbidity in survivors.
With the rise in antimicrobial resistance, particularly in low-middle-income countries, infections are becoming much harder to treat (Antimicrobial Resistance Collaborators, Lancet,2024)3. Despite this urgent need, no new antibiotic class has been introduced since the 1980s and novel approaches are desperately required.
Liposome-based therapeutics have transformed global health, as exemplified by the COVID-19 mRNA vaccine that uses liposomes as the delivery vehicle. Empty liposomes also have their own intrinsic activity that can be modified to modulate biological function.
Objectives: The primary objective of this study is to develop liposomes that enhance neutrophils phagocytosis of Gram-negative bacteria.
Methods: 1. Liposomes were formulated to bind to the negatively charged outer membrane of Gram-negative bacteria.
2. Liposomal properties were systematically optimized to maximize neutrophil phagocytosis.
3. Confocal microscopy and flow cytometry were employed to assess liposome binding to bacteria and subsequent phagocytosis by neutrophils.
Results: We conducted a series of gradient screenings of liposomal compositions, and identified two distinct formulations (2134 and 334) (Fig. 1A). Flow cytometry revealed that liposome binding to E. coli occurred within seconds (Fig. 1B). Confocal imaging showed that both 2134 and 334 liposomes (purple) bind to E. coli (green), with the greatest binding observed with 2134 liposomes (Fig. 1C). Flow cytometry confirmed that Cy-5 labelled 2134 liposomes can bind to granulocytes (Fig. 1D). Confocal microscopy further demonstrated that 2134 liposomes can bind to the granulocyte surface (Fig. 1E). In addition, healthy volunteer leukocytes (neutrophils tagged with PE-labelled CD66b; red) were incubated with E. coli K12 (FITC labelled; green) in the presence or absence of Cy5-labelled liposomes (violet). Confocal microscopy showed that E. coli co-localised to intracellular compartments of neutrophils, consistent with phagocytosis (Fig. 1F and Fig. 1G). Flow cytometry was used to quantify E. coli K12 phagocytosis, which demonstrated a dose-dependent increase in neutrophil phagocytosis of E. coli in the presence of liposomes (Fig. 1H).
Conclusions: We have developed cationic liposomes that can enhance the ability of neutrophils to phagocytose Gram-negative bacteria. Future research should focus on optimizing liposome formulations, and exploring efficacy and safety in vitro and in vivo

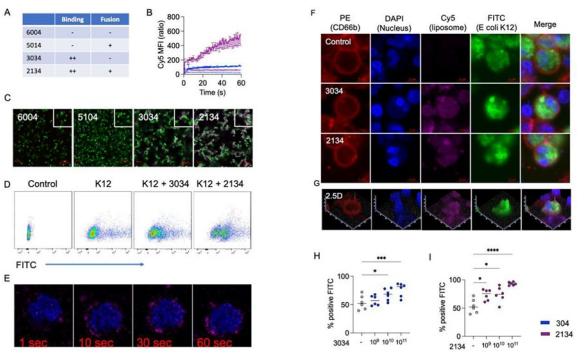


Fig. 1 (abstract 000419) (A) Biophysical characteristics of liposomes. (B) Liposome binding to E coli occurred within seconds as assessed by

flow cytometry. (C) Binding of liposomes (purple) with E coli (green) on confocal imaging reveal greatest binding with 2134 liposomes. (D) Binding of Cy-5 labelled 2134 liposomes to granulocytes on flow cytometry. (E) Binding of liposomes (2134) to granulocyte surface on confocal microscopy. (F) Healthy volunteer leukocytes (neutrophils tagged with PE-labelled CD66b; red) were incubated with E coli K12 (FITC labelled; green) in the presence or absence of Cy5-labelled liposomes (violet). (G). E coli co-localised to intracellular compartments of neutrophils, consistent with phagocytosis. {H) Flow cytometry was used to quantify E Coli K12 phagocytosis, which demonstrated a dose-dependent increase in neutrophil phagocytosis of E coli in the presence of liposomes (n = 3, 2 repeats)

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Topic: Translational biology

000420

Analysis of mortality and functional outcome after decompressive craniectomy in acute cerebrovascular disease

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000420***.

Introduction: The decision to perform decompressive craniectomy (DC) must be individualized as it is an aggressive treatment, not without complications that can increase survival at the expense of severe disability.
Objectives: To describe the indication and outcomes of decompressive craniectomy (DC) in patients with acute cerebrovascular disease, both ischemic and hemorrhagic, in order to prevent secondary brain injury by reversing the mass effect and displacement of brain tissue.
Methods: A retrospective descriptive study was conducted of patients undergoing DC during the acute phase of ischemic (malignant infarction) and hemorrhagic (lobar, basal ganglia, and infratentorial hemorrhagic stroke) brain injuries. Subarachnoid hemorrhage was excluded due to its specific characteristics. The analysis covers a four-year period (2021–2024) to the ICU of the Reina Sofia Hospital of Cordoba (Spain), a tertiary referral center for neurosurgical conditions in the region. The variables evaluated included age, sex, ICU stay, brain injury severity (measured using the GCS, NIHHSS, HIC, and ASPECT scales), mortality, and functional outcomes (modified Rankin Scale).
Continuous variables were expressed as mean ± SD, ordinal variables as median (interquartile range), and qualitative variables as absolute numbers and percentages. The Chi-square test was used to compare proportions. Binary logistic regression was used for the multivariable analysis, using the stepwise method. $P < 0.05$ was considered significant.
Results: Decompressive craniectomy was performed in a total of 63 patients. In the ischemic stroke group (29 patients), 65% were men, with a mean age of 57 years (SD 13.5; range 18–75 years) and a mean ICU stay of 15 days (SD 10.7; range 2–40 days). ICU mortality was 24%, and good functionality (mRS ≤ 3) was observed in 31% of cases. In the hemorrhagic stroke group (34 patients), 59% were men, with a mean age of 55 years (SD 12.7; range 18–75 years) and a mean ICU stay of 21 days (SD 19.4; range 2–110 days). The distribution of lesions was 59% basal ganglia hematomas, 20% lobar hematomas, and 21% infratentorial hematomas. ICU mortality was also 24%, with functional independence (mRS ≤ 3) achieved in 26% of cases. When comparing observed mortality with that predicted according to the HIC score, the actual mortality was lower than estimated in the infratentorial and basal ganglia hemorrhage groups, although this was not statistically significant.
Conclusions: Decompressive craniectomy may offer the possibility of favorable functional outcome in a small proportion of patients, despite the severity of their initial condition.

Topic: Neurointensive care.

000421

Enhancing critical illness recovery: evaluating the impact of electronic self-reported measures and a new care navigator role in follow-up care

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000421***.

Introduction: Seventy percent of patients survive critical illness(1). However this comes with a cost in terms of new chronic diseases and/or permanent disability and within one year over half suffer readmission to hospital despite interventions from critical care follow-up clinics(2–6). These physical, psychological and cognitive aspects of recovery, described as 'post-intensive care syndrome', mean that survivors have a greater dependence on health and social care for up to 5 years post–discharge (7,8). Over the course of a year 93% (153/165) of the patients seen in the critical care follow-up clinic at the study hospital required onward referrals, some of them at 2 years post-discharge from critical care. Ensuring that unmet needs are identified and acted upon early could improve recovery for this at risk population.
Objectives: To evaluate the feasibility and acceptability of a new service intended to identify and respond to unmet needs of critical care survivors earlier through the use of electronic patient-related outcomes (ePROs) and the introduction of a new care navigator role.
Methods: A single-centre qualitative study combining data obtained via an online feedback questionnaire, case notes and from semi-structured interviews with patients and clinicians involved in this pathway.
Results: 1010 critical care survivors (92% requiring support from ≥ 2 services and 47% fulfilling criteria for complex disability at point of hospital discharge) engaged in the new service. 314 of these completed an online feedback questionnaire regarding feasibility and acceptability of the use of ePROs. 96% found the online system easy to use, with 94% able to understand all the questions and 87% able to complete it independently. The new care navigator role was implemented for 127 patients in whom 76% required further actions to be carried out by the care navigator, including onward referrals (62%), signposting to services (65%) and care coordination (92%).
Interviews were conducted with 16 patients who had taken part in this new service and 7 clinicians involved in their care. Insights from patients and clinicians on the care navigator role included that "the care navigator was the key to whole thing", with patients sharing that having a link between the hospital period and returning home has helped them progress and clinicians appreciated the identification of high risk patients earlier and how the care navigator coordinated the patient journey.
Conclusions: The introduction of ePROs and a new care navigator role to compliment an existing critical care follow-up service was feasible and acceptable within this population. The care navigator role was welcomed by both the patients and the clinicians, acting as a link between the hospital teams, the patient and the follow-up care teams. Further investigation is needed to understand the characteristics of those who this service failed to engage so as to start the process of how access and engagement can be improved.

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Topic: Health Services Research and Outcome

000422

End-of-life antibiotic use in palliative care patients in the ICU

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Introduction: Infections and febrile episodes are among the most common acute complications experienced by terminally ill patients. (1) There is ample evidence suggesting antibiotics are currently overused in palliative care settings. (2–5) The literature suggests that many clinicians prescribe antibiotics inappropriately for patients who would not benefit from their use. (2) In this context, there is also the risk of the emergence of multidrug-resistant pathogens. (6) Thus, there is an urgent need to critically examine and audit antibiotic use in end-of-life. (2).
Objectives: This study aims to describe the epidemiological profile of patients receiving palliative care who progress to death in an ICU and to examine the practices surrounding antibiotic use within this population. Additionally, it seeks to assess the impact of care provided by a specialized palliative care team in an intensive care unit (ICU).
Methods: We conducted a single-center, retrospective, observational study analysing medical records of patients admitted to the ICU of a private tertiary hospital in Belo Horizonte, Brazil, between January 1, 2024, and December 31, 2024. The inclusion criteria were patients receiving palliative care either before or during their ICU stay who progressed to death while hospitalized.
Results: A total of 151 medical records were analysed, and the baseline characteristics of the study population, along with the time to the palliative care decision, are presented in Table 1. It is notable that 65% of patients were indicated for palliative care after 7 days of ICU admission, which may suggest a therapeutic failure or difficulty in the early assessment of prognosis.
Among patients with a defined palliative care plan who progressed to death during hospitalization, 47% (n = 72) received antibiotics in the last 24 h of life, including 32% (n = 25) of those in the exclusive palliative care subgroup. According to medical literature, between 21% and 72.6% of patients approaching end of life were treated with antibiotics within 24 h of death. (6).
Additionally, 40% (n = 34) of patients with a defined palliative care plan and 29% (n = 16) of patients in the subgroup with a defined exclusive palliative care plan, who were under follow-up by the specialized palliative care team, received antibiotics in the last 24 h of life. This finding is consistent with data from the literature suggesting that when patients in a medical ICU, assessed as high risk for mortality, had a palliative care consultation, they received fewer and shorter courses of antimicrobials (7) (Fig. 1).
Conclusions: This study highlights the potential overuse of antibiotics in ICU patients receiving palliative care and emphasizes the importance of early intervention by specialized palliative care teams. Additionally, it underscores the need for improved guidelines to minimize unnecessary antibiotic use in terminally ill patients and reduce the risk of antimicrobial resistance

Table 1 Characteristics of the study population

Age, mean, years (SD)[a]	75.5 (14.2)
Sex, No. (%)	
Female	69 (46)
Male	82 (54)
Source of admission, No. (%)	
Hospital floor	81 (53.7)
Emergency	45 (29.8)
Operating room	18 (11.9)
Other	7 (4.6)
Admission type, No. (%)	
Clinical	133 (88.1)
Emergency surgery	14 (9.3)
Elective surgery	4 (2.6)
Reason for ICU admission, No. (%)	
Infection / sepsis	64 (42.4)
Surgery	18 (11.9)
Neurologic	15 (9.9)
Respiratory	14 (9.3)
Cardiovascular	9 (6.0)
Gastrointestinal	9 (6.0)
Cardiorespiratory arrest	8 (5.2)
Other	14 (9.3)
ICU length of stay, mean, days (SD)[a]	12.89 (13.6)
Hospital length of stay, mean, days (SD)[a]	22.7 (22.1)
Charlson Comorbidity Index, mean (SD)[a]	3.74 (3.1)
SAPS3[b], mean (SD)[a]	64.9 (12.6)
SOFA[c], mean (SD)[a]	6.8 (3.2)
SCCM[d] ICU admission priority, No. (%)	
Priority 1	73 (48.3)
Priority 2	9 (6.0)
Priority 3	58 (38.4)
Priority 4	11 (7.3)
Time decision of palliative care, No. (%)	
Before ICU admission	7 (4.5)
< 72 hours after ICU admission	21 (14.0)
< 7 days after ICU admission	25 (16.5)
> 7 days after ICU admission	98 (65.0)

[a] SD (Standard Deviation)
[b] SAPS3 (Simplified Acute Physiology Score 3)
[c] SOFA (Sequential Organ Failure Assessment)
[d] SCCM (Society of Critical Care Medicine)

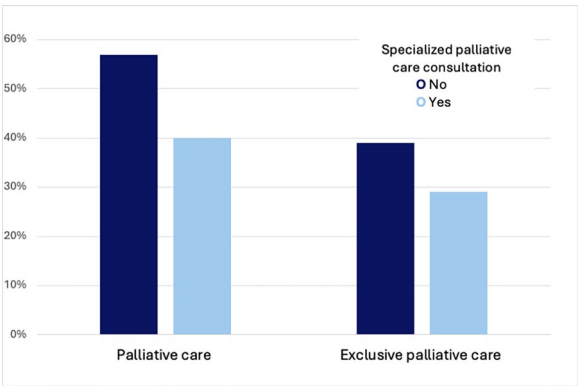


Fig. 1 (abstract 000422) Use of antibiotics in the last 24 h of life

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Topic: Ethics and end of life care

000423

Implementation of a real-time dashboard for antimicrobial usage in the intensive care unit

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000423***.

Introduction: The burden of antimicrobial resistance (AMR) is substantial, with approximately 500,000 AMR-associated deaths in Europe annually (1). Excessive and incorrect use of antimicrobials promotes resistance. Antimicrobial stewardship (ABS) programs have been shown to reduce the unnecessary use of antimicrobials and, thereby, AMR. While the German guideline on antimicrobial stewardship recommends quarterly surveillance and structured analysis of antimicrobial use and resistance (2), there is no universal implementation due to the necessity of effortful manual data collection. Many hospitals rely on data from the pharmaceutical supplier, which is neither recent nor accurate and does not reflect the actual usage of antimicrobials. Simultaneously, data extraction and harmonization from hospital patient data management systems (PDMS) poses numerous challenges, such as unifying data from different sources and filtering implausible data that likely stems from erroneous data entry. To address these challenges, we propose implementing an antimicrobial dashboard displaying usage on intensive care units from Charité-Universitaetsmedizin Berlin.
Objectives: To design and implement an antimicrobial usage dashboard within a generalizable data pipeline that can be easily implemented at hospitals extracting data in Fast Healthcare Interoperability Resources (FHIR) format. Its primary purpose is to monitor antimicrobial prescribing patterns and thereby identify excessive use of broad-spectrum or last-resort antimicrobials.
Methods: A concept and method for systematically analyzing antimicrobial usage data was developed and tested using data collected at the Charité Health Data Platform. We are extracting data for critical patients using a standardized pipeline. Baseline characteristics of the cohort are extracted to allow for the filtering of patients and visualizations in subgroups. Antimicrobial drugs were classified using the WHO AWaRe classification (3) to represent the standard and reserve drugs. Data were displayed on a Streamlit-based (www.streamlit.io) front end (Fig. 1).
Results: We retrospectively extracted antimicrobial administration data between December 2015 and March 2025 from nearly 13,000 cases admitted to the pulmonological ICU comprising over 70,000 individual antimicrobial administrations from the Charité's Health Data Platform. Each administration of an antimicrobial drug included the name of the drug, dosage, rate and unit of dosage, type of administration, and start and end time. Next, we merged patient data (e.g., age, sex, and diagnosis) onto the antimicrobial data using a common pseudonymized identifier. Various challenges were encountered during the development of an antimicrobial dashboard using data from a PDMS First, data sources need to be identified; next, data entries need to be unified, e.g., "Piperacillin 4 g" and "Piperacillin infusion". As data are extracted using drug administration, they must be correctly mapped to a specific patient. Different modes of applications need to be correctly unified and differentiated so that "i.v.", "infusion" and "oral" are correctly identified as systemic administration, and topical administration is analyzed separately. Moreover, several definitions need to be agreed upon: gaps in what duration still counts as one course of treatment and how the escalation and de-escalation of antimicrobial treatment are defined. We successfully deployed the dashboard, illustrating antimicrobial usage and prescribing patterns in various ICUs (Fig. 2).
Conclusions: Due to PDMS data's raw and heterogeneous nature, various challenges arise when developing an antimicrobial dashboard that require careful review and detailed data extraction and harmonization. A dashboard to display antimicrobial stewardship metrics for intensive care units is a promising tool which may lead to improved quality assurance efficacy and more detailed metrics. Furthermore, it can be expanded with additional modules to identify prescription and administration patterns and gain insights into specific care needs and challenges. Validating this concept in FHIR-associated hospitals is a crucial next step and could lead to easily transferable and widespread applicability. Further research is needed to evaluate the dashboard's effectiveness in enhancing adherence to ABS guidelines.

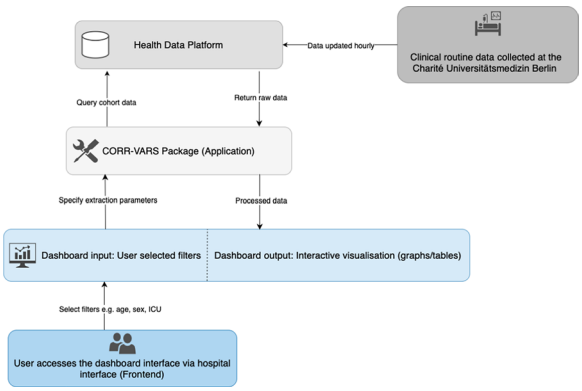


Fig. 1 (abstract 000423) Overview of technical infrastructure: the custom CORR-VARS package queries cohort and variable data from the HDP Data Lake, processes and cleans it, and delivers it to the dashboard in a standardized and usable format

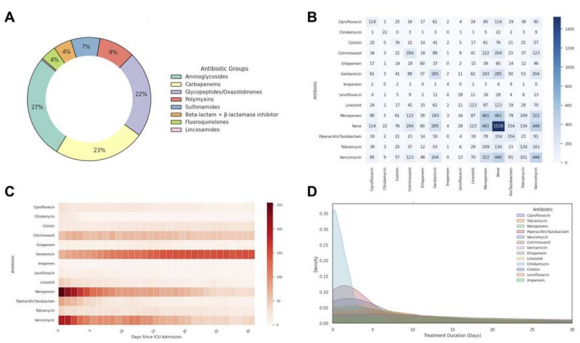


Fig. 2 (abstract 000423) Sample of graphs from ABS dashboard. The data used are non-representative sample data for illustration purposes only. **(A)** A donut chart will be used to present the proportion of antimicrobials administered. **(B)** Cross-over matrix of commonly used

combinations of antimicrobials. **(C)** Common trends and patterns in antimicrobial usage after ICU admissions. **(D)** Distribution of antimicrobial use over treatment duration, highlighting how specific substances are prescribed across different lengths of therapy.

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Topic: Infections and prevention

000424

Modification in ICU design including dynamic light therapy may influence night sleep in mechanically ventilated patients

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Introduction: A previously published pilot study found that modifying ICU room design was associated with a decrease in the incidence of delirium and a change in serum melatonin levels [1]. Sleep is significantly disrupted in critically ill patients and plays a crucial role in maintaining circadian rhythms and influencing the pathology of delirium [2, 3].
Objectives: To analyze if a multi-component change in room design influences sleep in critically ill mechanically ventilated patients.
Methods: This is a secondary endpoint analysis of a proof-of-concept pilot study. Two double bedrooms underwent extensive architectural modifications, including a new dynamic lighting system and noise reduction measures [4, 5]. Polysomnography (PSG) was performed in mechanically ventilated patients for a maximum of three 24-h periods. The recordings were manually scored by a sleep specialist blinded to the study, following the criteria of the American Academy of Sleep Medicine (AASM). The depth of sedation was evaluated at least every eight hours using the Richmond Agitation Sedation Scale (RASS). For this analysis, PSG recordings from 10:00 pm to 6:00 am were utilized.
Results: A total of 99 patients were enrolled, with sleep data analyzed for 47 patients (20 in standard rooms, 27 in modified rooms). In this study sample, conventional sleep stage analysis showed that moderate to non-sedated patients treated in modified rooms had a more close to physiological ranges of slow wave sleep (SWS, which refers to N3) at 31.9%. In contrast, patients with more deep sedation and those treated in standard rooms exhibited significantly higher levels of SWS, reaching up to 75.5%. Patients who were less sedated in modified rooms exhibited a typical distribution of N1 and N2 sleep at 14.5% and 52.7%, respectively, while deeply sedated patients in standard rooms showed the lowest values of 0.6% for N1 and 24.0% for N2. Rapid eye movement (REM) sleep was nearly absent in all patients. Deep-sedated patients had a longer total sleeptime (TST), averaging 470 min in modified rooms and 430 min in standard rooms. In contrast, less sedated patients in modified rooms experienced the lowest TST, averaging 284 min (see Fig. 1). Sedation levels, assessed using the RASS, were similar between both groups, with a median of –2 (modified rooms: IQR –3 to 0; standard rooms: IQR –4 to 0; see Fig. 2).
Conclusions. This preliminary analysis indicates that changes in ICU room design may affect the sleep architecture of mechanically ventilated patients. Additionally, the level of sedation could significantly influence sleep staging, which should be considered in future analyses.

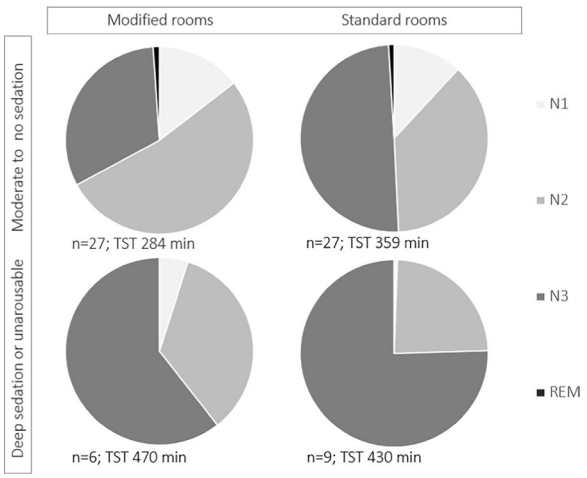


Fig. 1 (abstract 000424) Distribution of sleep stages from polysomnography recordings between 10:00 pm and 6:00 am depending on sedation status for patients in standard and modified rooms. N1, N2, and N3 are the three stages of non-rapid eye movement (NREM) sleep; REM, rapid eye movement sleep; TST, total sleep time. Deep sedation or unarousable is defined as having a Richmond Agitation Sedation Scale (RASS) score below -3.

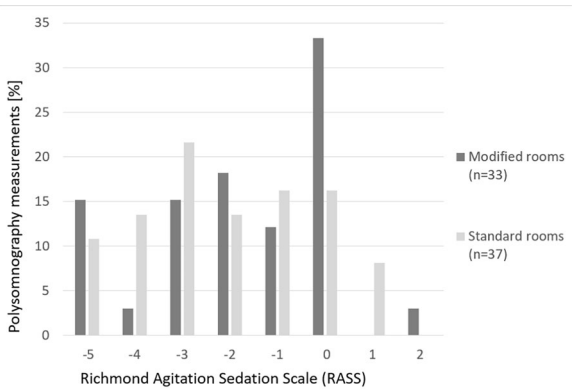


Fig. 2 (abstract 000424) Distribution of polysomnography measurements [%] (n = 70) for different sedation levels. RASS, Richmond Agitation Sedation Scale

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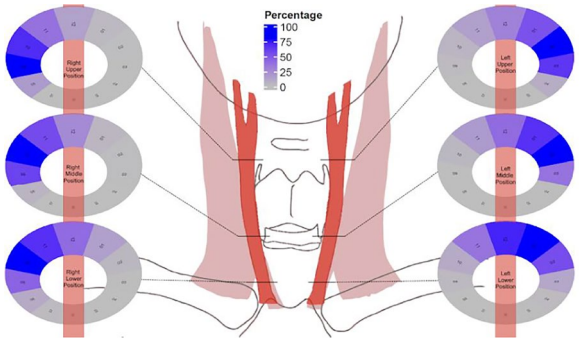
Topic: Sedation, analgesia and delirium

000425

Sonographic anatomical variations of internal jugular vein and common carotid artery relationships in a South African Tertiary Hospital.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000425***.

Introduction: The internal jugular vein (IJV) is a preferred site for central venous access due to its anatomical location and accessibility [1,2]. Originating at the base of the sigmoid sinus, the IJV runs through the jugular foramen, paralleling the carotid artery within the carotid sheath, and is often accessible with ultrasound-guided techniques [3–5]. Complications such as bleeding, arterial puncture, pneumothorax, and infection are reduced with proper training [6–9]. Ultrasound has become standard practice for central venous access, as recommended by the Association of Anaesthesiologists, due to its ability to enhance success rates and reduce complications [2]. Anatomical variations of the IJV, such as positional differences, absence, and duplication, are well-documented globally and contribute to up to 15% of complications [10]. While extensive research exists, few studies have compared the incidence of typical anatomy on the right versus left side, which this study aimed to address.
Objectives: Compare anatomy and anatomical variation of the internal jugular vein and common carotid artery on the left and right side of the neck.
Methods: This cross-sectional descriptive study was conducted at Chris Hani Baragwanath Academic Hospital with ethical approval (Certificate M240140) and written informed consent from 178 adult patients. Participants were screened preoperatively, and demographic data, including age, ethnicity, BMI, and neck circumference, were recorded. Ultrasound scans were performed using a GE LOGIQe machine by a single accredited sonographer to reduce inter-operator variability. Patients were scanned supine at three levels: Sedillot's triangle, the cricoid cartilage, and the upper thyroid cartilage. Vessel measurements included diameter, depth, overlap, and radial relationship between the IJV and the common carotid artery (CCA). Atypical variants such as bifurcation, duplication, or absence were also noted.
Results: The IJV was more frequently located in the typical position at superior levels and on the right side ($P < 0.005$). Atypical variants were rare, with medial IJVs found in 1.12% of right sides and 4.49% of left sides. Right-sided duplications (1.12%) and left-sided bifurcation (0.56%) were observed. Vessel overlap was significantly greater on the left and at inferior levels, with correlations to BMI and age. Depth measurements revealed significant right-to-left differences in IJV diameter at all depths, with no significant skin distance differences. IJV-CCA center-to-center distances differed at all depths ($P < 0.05$). BMI was moderately associated with greater IJV depth on the left side and CCA depth on the right. Older age correlated with greater left-sided IJV depth at superior levels.
Conclusions: Variations in the relationship between the IJV and CCA are unpredictable, emphasizing the importance of using ultrasound for IJV central venous access. Given that the IJV is closer to the skin and has less overlap with the CCA on the right side of the neck compared to the left, it may be safer to attempt right-sided IJV access instead of left-sided access.



(abstract 000425) Incidence of position

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Topic: Perioperative care

000430

Dying with or from ARDS? Uncovering the attributable mortality of ARDS

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000430***.

Introduction: Acute respiratory distress syndrome (ARDS) is a form of acute hypoxemic respiratory failure characterized by bilateral

pulmonary infiltrates and impaired oxygenation, typically triggered by pneumonia, sepsis, trauma, or other critical conditions. Common among patients in intensive care units (ICUs), ARDS is associated with substantial morbidity and mortality (1). However, isolating its independent contribution to patient outcomes remains challenging due to numerous confounding factors.

Objectives: This study aimed to quantify the impact of ARDS on 30- and 60-day mortality, independently of non-respiratory severity, in a large cohort of critically ill patients.

Methods: We analyzed data from the MIMIC-III database. ARDS was defined at 24 h from ICU admission according to the Berlin criteria, based on PaO_2/FiO_2 ratio and PEEP levels (2,3). Missing baseline values were imputed using Multiple Imputation by Chained Equations with predictive mean matching. Propensity scores for ARDS were estimated using logistic regression and applied for 1:1 nearest-neighbor matching without replacement. Matching was performed to balance groups for age, sex, weight, and non-respiratory SOFA scores. Outcomes were evaluated using Cox proportional hazards models.

Results: From the 24-h dataset, 19,567 ICU admissions were included. After matching, 9,952 patients remained (4,976 non-ARDS, 2,613 mild, 2,124 moderate, and 239 severe ARDS, Fig. 1). Mild ARDS was not associated with increased 30-day mortality (Fig. 2A, 2B). Moderate ARDS showed a 1.45-fold increased risk (95% CI 1.30–1.62; $p < 0.001$, Fig. 2A), and severe ARDS a 1.91-fold increased risk (95% CI 1.51–2.42; $p < 0.001$, Fig. 2A). Similar results were found for 60-day mortality (Fig. 2C, 2D).

Conclusions: These findings suggest that it is not merely the presence of ARDS, but its severity that significantly influences patient mortality. While mild ARDS was not associated with worse outcomes, moderate and severe forms were independently linked to substantially higher 30- and 60-day mortality.

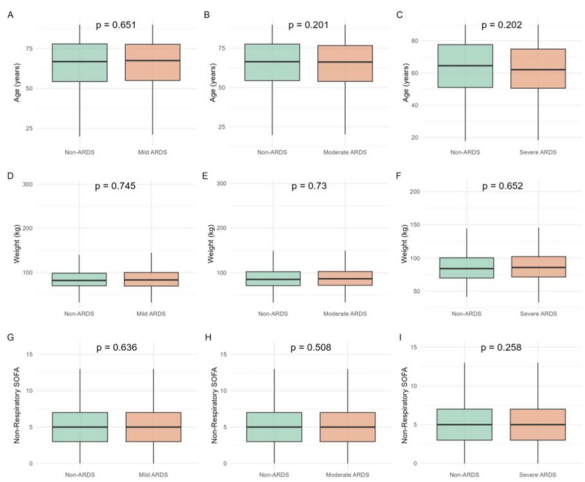


Fig. 1 (abstract 000430) Comparison of matched non-ARDS and ARDS patients across key clinical variables. This figure presents the distribution of age (A-C), weight (D-F), and non-respiratory SOFA score (G-I) among propensity-matched patients with and without ARDS. Each panel compares a specific ARDS severity category with its corresponding matched non-ARDS group, ensuring that each non-ARDS patient included in the analysis has been selected through 1:1 nearest-neighbor matching based on age, gender, weight and non-respiratory SOFA. Statistical comparisons were conducted using two-sample t-tests, and p-values are reported. Non-ARDS patients shown in each comparison represent only the subset of subjects matched to the respective ARDS severity category, rather than the entire non-ARDS population. Boxplots display median values, interquartile ranges, and individual data points, illustrating the balance achieved after propensity score matching. Abbreviations: ARDS—acute respiratory distress syndrome; SOFA—Sequential Organ Failure Assessment

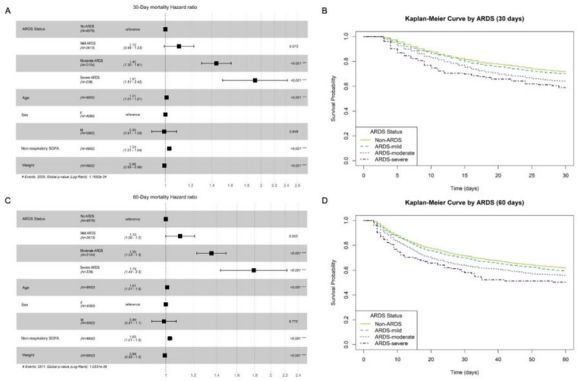


Fig. 2 (abstract 000430) Impact of ARDS severity on 30- and 60-day mortality. Panel A presents a forest plot of hazard ratios for 30-day mortality, stratified by ARDS severity, with non-ARDS patients as the reference group. Panel B shows Kaplan–Meier survival curves for 30-day mortality across ARDS severity groups. Panel C displays a forest plot of hazard ratios for 60-day mortality, following the same stratification as Panel A. Panel D illustrates Kaplan–Meier survival curves for 60-day mortality. Hazard ratios are reported with 95% confidence intervals. Abbreviations: ARDS—acute respiratory distress syndrome; SOFA—Sequential Organ Failure Assessment

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Topic: Acute respiratory failure and mechanical ventilation

000432

Development and validation of the Severe Dengue Mortality Risk Score (SDMRS) for critically ill patients with severe dengue: a multivariate analysis.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000432***.

Introduction: Severe dengue is a leading cause of morbidity and mortality, especially among critically ill patients requiring intensive care unit (ICU) admission. While individual clinical and laboratory risk factors have been identified, a validated scoring system to predict mortality in this patient population remains unavailable.

Objectives: To develop and validate the Severe Dengue Mortality Risk Score (SDMRS) for critically ill patients with severe dengue by utilizing multivariate logistic regression to identify and quantify independent predictors of in-hospital mortality.

Methods: This retrospective cohort study involved 4,933 ICU patients diagnosed with severe dengue. Data were collected on demographic, clinical, and laboratory parameters, and analyzed through multivariate

logistic regression. Independent predictors of in-hospital mortality were identified, and odds ratios (ORs) for significant predictors were transformed into natural logarithms (ln(OR)) to construct a scoring system. The accuracy of the Severe Dengue Mortality Risk Score (SDMRS) was assessed by stratifying patients into low, moderate, and high-risk categories based on the score.

Results: Among the 4,933 patients, 25 (0.51%) died during hospitalization. Multivariate analysis identified five independent predictors of mortality: autoimmune disease, cardiovascular disease, male sex, hypertension, and age. Specifically, autoimmune disease was associated with the highest risk (OR: 14.87, 95% CI: 2.85–77.53, p = 0.004), followed by cardiovascular disease (OR: 4.13, 95% CI: 1.44–11.86, p = 0.008), male sex (OR: 3.11, 95% CI: 1.05–9.16, p = 0.041), hypertension (OR: 3.00, 95% CI: 1.05–8.53, p = 0.041), and age (OR: 1.04 per year increase, 95% CI: 1.00–1.08, p = 0.034). Based on these predictors, the SDMRS was developed by assigning points according to the ln(OR). Autoimmune disease was given 5 points, cardiovascular disease 4 points, hypertension 3 points, male sex 3 points, and age 1 point for each year of increase.

Patients were stratified into three categories: low risk (0–5 points), moderate risk (6–9 points), and high risk (≥ 10 points). The SDMRS demonstrated a strong association with in-hospital mortality, as higher scores were correlated with increased risk of death.

Conclusions: The Severe Dengue Mortality Risk Score (SDMRS) is a novel, evidence-based tool that predicts in-hospital mortality for critically ill patients with severe dengue. By incorporating key clinical factors such as autoimmune disease, cardiovascular disease, male sex, hypertension, and age, the SDMRS offers a practical framework for identifying high-risk patients and guiding early interventions. Further prospective validation is necessary to confirm its clinical utility and applicability in diverse healthcare settings.

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Topic: Infections and prevention

000433

Predictive risk factors for methicillin-resistant Staphylococcus aureus-associated nosocomial lower respiratory tract infections: insights from ENIRRIs cohort

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Introduction: Nosocomial lower respiratory tract infections (nLRTIs), including hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP), remain significant challenges due to high mortality, morbidity, and healthcare costs. Findings from the first analysis of The European Network for ICU-Related Respiratory Infections (ENIRRIs) cohort showed that over one-third of ICU-acquired respiratory infections involved difficult-to-treat pathogens, including methicillin-resistant *Staphylococcus aureus* (MRSA), and were associated with worse outcomes. While some risk factors have been identified for MRSA community-acquired pneumonia (CAP) patients, there is limited data about the risk factors for MRSA nLRTIs. Thus, we used data from a large multinational cohort to identify clinical factors associated with MRSA-associated nLRTIs.

Objectives: To identify independent risk factors associated with MRSA nLRTIs.

Methods: We curated data from 1,060 patients with confirmed MRSA infection in the ENIRRIs study. Variables with > 30% missing data were excluded; those with < 30% missing were imputed using k-Nearest Neighbors (KNN). Random Forest was applied to determine variable importance; top-ranked predictors were entered into a binary logistic regression model. Logistic regression with variable selection was used to confirm model stability. Performance was evaluated using AUC-ROC for discrimination and the Hosmer–Lemeshow test for calibration.

Results: The cohort had a mean age of 60 years (SD 16.61) and was predominantly male (72%). The prevalence of MRSA was 5.2% (55/1060). Within the first 72 h of admission, 53% of patients required invasive mechanical ventilation and 41% required vasopressors. Using Random Forest analysis, the most relevant predictors of MRSA nLRTIs were identified as SOFA score on the first day, 1st day CPIS score, PaO_2/FiO_2 ratio, leukocyte count, and BMI. In the binary logistic regression analysis, a SOFA score ≥ 7 was independently associated with an increased risk of MRSA nLRTIs (OR 3.12, 95% CI: 1.45–6.68, p = 0.004), as were ≥ 5 days of mechanical ventilation (OR 2.78, 95% CI: 1.22–6.31, p = 0.018), and a PaO_2/FiO_2 ratio < 250 mmHg (OR 1.97, 95% CI: 1.07–3.61, p = 0.029).

Conclusions: SOFA score, oxygenation status, and duration of mechanical ventilation were independently associated with the risk of MRSA nLRTIs. These findings highlight early risk stratification's importance in identifying high-risk patients and optimising initial antibiotic selection in critically ill individuals, potentially improving clinical outcomes.

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Topic: Infections and prevention

000434

SIGH35 and end-expiratory occlusion test for assessing fluid responsiveness in critically ill patients undergoing pressure support ventilation: the SETUP study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000434***.

Introduction: Assessing fluid responsiveness is problematic for critically ill patients with spontaneous breathing activity, such as during pressure support ventilation (PSV), since spontaneous breathing activity physiologically affects heart–lung interplay. We compared the reliability of two hemodynamic tests in predicting fluid responsiveness in this clinical setting: SIGH35, based on a ventilator-generated sigh applied at 35 cmH2O for 4 s, and the end-expiratory occlusion test (EEOT).
Methods: This prospective monocentric study was conducted in a general intensive care unit (ICU) and enrolled patients ventilated in PSV showing different inspiratory effort—assessed by airway occlusion pressure (P0.1)—and requiring volume expansion (VE). Hemodynamic variables were continuously recorded by means of the MOSTCARE® system. Patients received a volume expansion using 4 ml/kg of crystalloids over 10 min and were considered responders if an increase in cardiac output (CO) ≥ 10% was observed. The sequence of tests was randomly generated. The reliability of SIGH35 and EEOT in discriminating fluid responsiveness was assessed using a receiver operating characteristic (ROC) curve approach and the areas under ROC curves (AUC) were compared. For the EEOT, we considered the percentage changes of CO between baseline and the end of the test, while for the SIGH35 we considered the percentage changes of pulse pressure (PP) between baseline and the lowest value recorded after SIGH35 application (Nadir—Fig. 1).
Results: Sixty ICU patients were enrolled over a 19-months period, 56 of whom were eventually analyzed. Three patients were excluded from data analysis because of extrasystoles during the beat-to-beat evaluation SIGH35, and one because of ventilator triggering during EEOT. The AUC of PP change after SIGH35 was 0.93 (0.84—0.99) [sensitivity of 93.1% (78.0%–98.7%); specificity of 91.6 (73.0%–98.9%)]; best threshold -25% PP from baseline (grey zone—15% / 35%)]. The AUC of CO change after EEOT was 0.67 (0.52–0.81), showing that the CO increase was not significantly different between responders and non-responders [5.6% vs. -0.35%; p < 0.07)]. The AUC of SIGH35 was therefore significantly larger as compared to the AUC of the EEOT in the overall population (p < 0.0008). In the subgroup having a P0.1 lower than 1.5 cmH2O, the AUC of SIGH35 [0.98 (0.94–0.99)] and of EEOT [0.89 (0.72–0.99] were comparable (p-value = 0.26) (Fig. 2).
Conclusions: In this single-center study on a selected ICU population undergoing PSV, the PP change after the application of one sigh at 35 cmH2O for 4 s reliably predicted fluid responsiveness, with a best cut-off of -25% from baseline. In this setting the SIGH35 performed better than the EEOT, which is, however, still reliable in the subgroup of ICU patients having a small extent of inspiratory efforts.

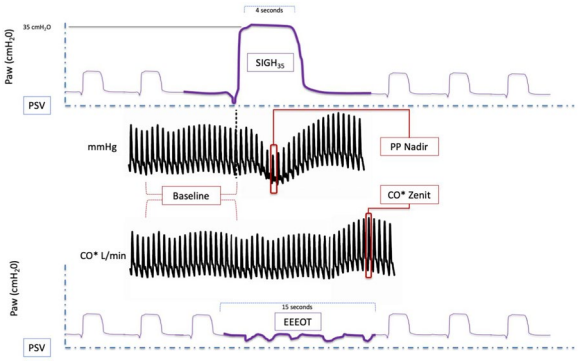


Fig. 1 (abstract 000434) The hemodynamic effect of EEOT was evaluated by considering the mean of cardiac output values of the 10 beats before EEOT start (EEOT_baseline; lower panel of the figure) and highest CO value recorded at the end of the test (CO_zenith). The hemodynamic effect of SIGH35 was evaluated by considering the mean of PP values of the 10 beats before SIGH35start (SIGH35_baseline; upper panel of the figure) and the lowest value of PP recorded after SIGH3 application (PP_nadir)

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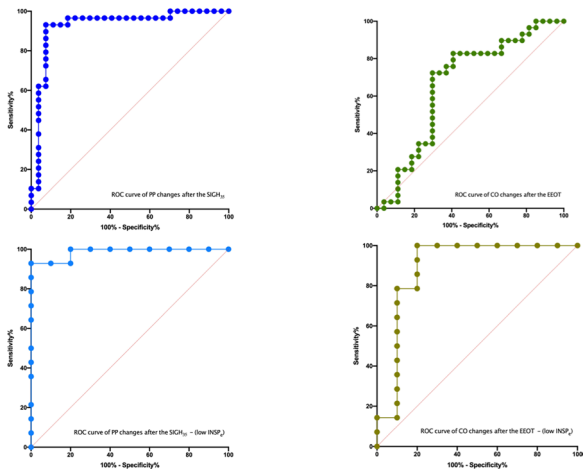


Fig. 2 (abstract 000434) The upper part of the figure shows the ROC curves of the changes of PP after the SIGH35 [AUC = 0.93 (0.84—0.99)] and after the EEOT [AUC = 0.67 (0.52—0.81)] in the overall population. The lower part of the figure shows the ROC curves of the changes of PP after the SIGH35 [AUC = 0.98 (0.94—0.99)] and after the EEOT [AUC = 0.89 (0.72—0.99)] in the subgroup of patients having a small extent of inspiratory efforts

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Topic: Cardiovascular issues in ICU

000435

Driving antimicrobial stewardship in the ICU with molecular syndromic panels

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000435***.

Introduction: Respiratory infections such as severe community-acquired pneumonia (sCAP), hospital-acquired pneumonia (HAP), and ventilator-associated pneumonia (VAP), represent a major cause of ICU admissions and mortality. Rapid etiological identification through molecular syndromic testing may facilitate timely and targeted antimicrobial therapy.
Objectives: To evaluate the diagnostic yield and impact of multiplex PCR-based techniques (BioFire® FilmArray® Pneumonia panel and the Unyvero Hospitalized Pneumonia Panel) on antimicrobial management and clinical outcomes in ICU patients with respiratory infections.
Methods: This retrospective observational study included 27 adult ICU patients admitted between November 2024 and February 2025, diagnosed with sCAP, HAP, or VAP, and evaluated using FilmArray or Unyvero PCR assays for pathogen detection. Data collected included demographics, infection type, APACHE II scores, microbiological results (PCR and cultures), concordance between PCR and culture results, antimicrobial therapy modifications, and clinical outcomes (28-day and in-hospital mortality, PaO_2/FiO_2 improvement, overall clinical improvement, length of ICU and hospital stay, and time on mechanical ventilation). Statistical analysis used Fisher's exact test for categorical variables, with significance set at $p < 0.05$.
Results: A total of 27 ICU patients were included in the study, with a median age of 65 years (IQR: 58–77), and a male predominance (55.6%). Mean APACHE II at sample collection was 18.2 (SD 7.2). FilmArray was used in 24 patients (88.9%) and Unyvero in 3 patients (11.1%), exclusively among VAP cases ($p = 0.008$). PCR testing identified a pathogen in 19 cases (70.4%), while cultures were positive in 14 cases (51.9%). In 2 patients (7.4%), no culture was obtained. Concordance between PCR and culture results was observed in 60% of cases ($n = 25$). Following PCR results, antibiotic treatment was modified in 96.3% of patients, and at least one antimicrobial agent was discontinued in 92.6%. No significant difference was found in the overall rate of positivity between PCR and culture ($p = 0.661$). Concordance between PCR method and culture results was not significantly different between FilmArray and Unyvero ($p = 0.346$).
Regarding outcomes, 28-day mortality was 36%, and in-hospital mortality reached 52%. Although not statistically significant, there was a trend toward lower 28-day mortality in patients with PCR–culture agreement (20% vs 60%, $p = 0.087$). However, in-hospital mortality was significantly lower in this group (26.7% vs 90%, $p = 0.004$). Patients who received targeted antibiotic therapy based on PCR findings showed significantly lower 28-day mortality (25% vs 100%, $p = 0.029$) and a non-significant trend toward lower in-hospital mortality (41.7% vs 100%, $p = 0.098$). Use of targeted antibiotics did not significantly affect ICU length of stay ($p = 0.280$), hospital stay ($p = 0.512$), or mechanical ventilation duration ($p = 0.316$), though trends favored shorter durations.
Clinical improvement, defined by reduction in infection markers, fever, and improvement in PaO_2/FiO_2 ratio, was observed in 80% of patients. Although overall improvement was not significantly associated with PCR–culture agreement ($p = 0.064$), improvement in PaO_2/FiO_2 was significantly more frequent when PCR and culture results were concordant ($p = 0.007$). Higher APACHE II scores at sample collection were significantly associated with both 28-day (23.3 vs 15.7, $p = 0.006$) and in-hospital mortality (23.2 vs 13.6, $p < 0.001$).
Conclusions: Rapid molecular diagnostics significantly influenced the management of ICU patients with respiratory infections. PCR-guided antibiotic modifications occurred in nearly all cases, leading to significant de-escalation. Diagnostic concordance between PCR and culture was associated with better clinical outcomes, including significantly lower in-hospital mortality and improved oxygenation. Additionally, targeted antibiotic therapy guided by PCR results was significantly associated with reduced 28-day mortality and showed a strong trend toward lower in-hospital mortality. No significant reductions in ICU stay, hospital stay, or mechanical ventilation time were observed, possibly due to the small sample size. These findings support the integration of PCR-based diagnostics into routine ICU practice to enhance antimicrobial stewardship and improve patient prognosis.

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3 None

Topic: Infections and prevention

000441

Admission predictors of post-intensive care syndrome family among relatives of ICU survivors

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000441***.

Introduction: Post-intensive care syndrome family (PICS-F) has usually focused on psychological impairments among relatives of former intensive care unit (ICU) patients (1). Despite its relevance, evidence on PICS-F remains scarce, particularly regarding the presence of physical or cognitive impairments and the factors influencing each PICS-F impairment.
Objectives: To identify variables of associated to PICS-F psychological, physical, and cognitive impairments among relatives of ICU survivors.
Methods: Preliminary data analysis of an ongoing cohort study exploring the incidence and related factors of PICS-F in a public hospital in Santiago, Chile (2). Relatives of ICU patients with 3–10 days of ICU

stay and with respiratory support provided sociodemographic data and completed surveys for anxiety/depressive symptoms (PHQ-4), posttraumatic stress disorder symptoms (IES-6), fatigue (SF-36 Vt), cognitive function (MEFO), resilience (BRCS), and perceived social support (mMOS-SSS) at ICU admission and 3 months after hospital discharge. Frequency of PICS-F was calculated using percentages for psychological (PHQ-4 ≥ 6/IES-6 ≥ 1.75), physical (SF-36 Vt < 45), and cognitive (MEFO < 9) impairments. Least Absolute Shrinkage and Selection Operator (LASSO) logistic regressions were used to identify variables at ICU admission associated with each PICS-F impairment 3 months after hospital discharge. The original study was approved by the Ethics Committee at PUC Chile (ID:220318015).
Results: Within the 233 relatives enrolled to date, 89 (38.2%) had complete 3-month post-hospital discharge data for LASSO regressions. PICS-F psychological (PHQ-4/IES-6), physical, and cognitive impairments were present in 25.8%/27.7%, 39.8%, and 1.1% of the sample, respectively. Regarding psychological impairments, higher PHQ-4 scores at ICU admission were linked with increased odds ratio (OR) of significant anxiety/depressive symptoms (OR≈1.14). Conversely, male gender (OR≈0.55), being spouse/partner (OR≈0.65), higher BRCS (OR≈0.94), and SF-36 Vt (OR≈0.99) scores were related to lower OR. Then, high school education (OR≈1.19), being an adult child (OR≈1.29), prior anxiety/depression diagnosis (OR≈1.57), and higher PHQ-4 scores (OR≈1.24) were associated with higher odds of significant PTSD symptoms. At the same time, male gender (OR≈0.35), incomplete elementary school (OR≈0.73), higher mMOS-SSS (OR≈0.99), BRCS (OR≈0.85), and SF-36 Vt scores (OR≈0.99) were linked to fewer odds. Regarding physical impairment, previous anxiety/depression diagnosis (OR≈2.31), higher PHQ-4 (OR≈1.03), and MEFO (OR≈1.04) scores were associated with a higher risk of fatigue. Conversely, higher mMOS-SSS (OR≈0.99) and SF-36 Vt scores (OR≈0.99) were associated with a lower fatigue risk. Low prevalence of cognitive impairment prevented the identification of potential predictors.
Conclusions: Relatives of ICU survivors experience not only psychological, but also physical impairments after hospital discharge. Early screening of risk and protective PICS-F factors during ICU admission, including psychosocial variables, will assist healthcare providers in identifying relatives at risk of worse outcomes in the post-ICU period. Development of interventions aimed at reducing PICS-F should focus on modifiable factors such as improving relatives´ stress buffers (perceived social support and resilience) during ICU stay. Studies with larger sample sizes at follow-ups are warranted to improve confidence in identified predictors.

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Topic: Nursing care and physiotherapy

000442

Predictors of in-hospital mortality in critically ill patients with severe dengue: a retrospective multivariate analysis

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Introduction: Severe dengue remains a major cause of morbidity and mortality, especially in critically ill patients requiring intensive care. Identifying risk factors for mortality is essential for early intervention and resource allocation in these patients.
Objectives: To identify independent clinical and laboratory predictors of in-hospital mortality in critically ill ICU patients with severe dengue using multivariate logistic regression.
Methods: This retrospective cohort study included 4,933 ICU patients diagnosed with severe dengue. Demographic, clinical, and laboratory parameters were analyzed, and multivariate logistic regression was employed to identify independent predictors of in-hospital mortality. Results were expressed as odds ratios (OR) with 95% confidence intervals (CI). A forest plot was created to visualize the strength of associations between significant predictors and mortality. Statistical significance was set at $p < 0.05$.
Results: Of the 4,933 patients, 25 (0.51%) died during hospitalization. Multivariate analysis identified autoimmune disease (OR: 14.87, 95% CI: 2.85–77.53, $p = 0.004$), cardiovascular disease (OR: 4.13, 95% CI: 1.44–11.86, $p = 0.008$), male sex (OR: 3.11, 95% CI: 1.05–9.16, $p = 0.041$), hypertension (OR: 3.00, 95% CI: 1.05–8.53, $p = 0.041$), and age (OR: 1.04 per year increase, 95% CI: 1.00–1.08, $p = 0.034$) as independent predictors of mortality. Other variables, including hepatopathy, thrombosis, pneumonia, neoplasia, coagulopathy, renal disease, diabetes, and dyslipidemia, were not significantly associated with mortality.
Conclusions: In critically ill patients with severe dengue, autoimmune disease, cardiovascular disease, male sex, hypertension, and older age were found to be independent risk factors for mortality. Despite the low overall mortality rate (0.51%), these findings highlight the importance of early identification and targeted management for high-risk patients. Further prospective studies are necessary to validate these results and enhance prognostic stratification for severe dengue.

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Topic: Infections and prevention.

000443

The amphiregulin–epidermal growth factor receptor axis as a theragnostic target in sepsis

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Introduction: Amphiregulin, a tissue-protective growth factor and epidermal growth factor receptor (EGFR) ligand, is a hallmark of bacterial sepsis in neonates (1), identifying a sub-cohort with infection with greater sensitivity than C-reactive protein.

The role of amphiregulin in adult sepsis and immune dysregulation has not been previously explored. Animal models indicate that immune function may be modulated by EGFR signalling, especially in the setting of inflammation (2). Thus, we hypothesize that EGFR signalling, via amphiregulin, modulates immune function in adult sepsis.
Objectives: To (i) assess the association between serum amphiregulin and mortality in adults with sepsis (ii) evaluate levels of amphiregulin and EGFR in monocytes and lymphocytes across disease severity, and (iii) investigate any association with known markers of activation in sepsis.
Methods: Prospective, observational cohort study of patients presenting to the Intensive Care Unit (ICU) with bacterial sepsis. Blood samples taken from healthy volunteers (HV) acted as a reference. Clinical and laboratory variables were collected. Serum immune parameters: interleukin (IL)-1β, IL-6, IL-10, tumor necrosis factor (TNF)-α, PD-1, PD-L1 and amphiregulin were measured by ELISA. Immunophenotyping of peripheral blood mononuclear cells (PBMC) was carried out in a subset of samples using spectral flow cytometry. Data were analysed in GraphPad Prism 10.
Results: ICU non-survivors (n = 19) had significantly higher serum amphiregulin levels on ICU admission ($p < 0.001$), day 1 ($p < 0.05$), and day 5 ($p < 0.01$) compared to survivors (n = 44). When combined with 14 other routinely collected clinical variables, only admission serum amphiregulin was significantly higher in ICU non-survivors compared to survivors ($p < 0.01$).
Flow cytometry analysis carried out on a subset identified an increase in expression of amphiregulin and EGFR in both CD4 + and CD8 + lymphocytes when comparing HV (n = 20) to the ICU cohort (n = 35). Correlation analysis found that CD4 + lymphocyte EGFR expression was associated with elevated levels of IL-10, PD-1, CTLA-4, and decreased IL-17A.
Conclusions: Serum amphiregulin levels differentiates between ICU survivors and non-survivors. CD4 + and CD8 + lymphocytes were identified as being the key immune cells in amphiregulin and EGFR expression, with CD4 + lymphocyte EGFR expression being associated with an immunosuppressive phenotype.
Activation of the amphiregulin–EGFR axis may contribute to immunosuppression in sepsis by promoting an anti-inflammatory phenotype in CD4 + lymphocytes. Amphiregulin could serve as a theragnostic biomarker of immune dysregulation in sepsis. The effect of therapeutic modulation of amphiregulin in sepsis warrants further exploration.

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Topic: Sepsis

000444

The association of inflammation with in-hospital delirium and functional outcomes in traumatic brain injury: a prospective cohort study

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Introduction: Traumatic brain injury (TBI) is a significant public health concern due to high mortality rates and its contribution to long-term disability. Nearly 50% of intensive care units (ICU) admitted TBI patients develop delirium, which is associated with prolonged hospitalization and higher healthcare costs. While systemic inflammation has been linked to delirium, its role in TBI-related delirium remains poorly studied despite its higher incidence in this population.
Objectives. This study investigates the association between systemic inflammatory markers and delirium in ICU-admitted TBI patients and its impact on 2-month outcomes:
Methods: This prospective cohort study enrolled ICU patients with moderate-to-severe TBI at a trauma center (2019–2023). Inflammatory biomarkers were measured at admission, day 3, and day 7. Delirium was assessed with CAM-ICU, and outcomes were evaluated at 2 months using GOSE and NSI. Random Forest modeling was used to identify variables for inclusion in the multivariate logistic regression analysis.
Results: A total of 112 ICU-admitted TBI patients were enrolled between 2022 and 2024 at a trauma center in Bogotá, Colombia. The median age was 31.5 years (IQR 20–48), and 79.5% were male. Delirium occurred in 47.3% of patients and was associated with older age (median [IQR] 37 years [26–50] vs. 27 years [22–44], $p = 0.036$), more severe head injuries (head AIS median [IQR] 4 [3–4] vs. 3 [2–4], $p = 0.001$), lower GCS scores (median [IQR] 9 [6–13] vs. 12 [9–14], $p = 0.022$), and higher APACHE II scores (median [IQR] 12 [9–14] vs. 8 [6–12.78], $p = 0.025$). The IMPACT score predicted a higher risk of mortality (14% [9–21] vs. 7% [5–13], $p = 0.001$) and unfavorable functional outcomes (29% [15–37] vs. 13% [8–23.5], $p < 0.001$) in delirium patients. IL-1β levels on day 7 were significantly elevated in delirium patients (median [IQR] 2.07 [2.07–27.26] vs. 2.07 [0.00–2.07], $p = 0.001$). IL-1β levels > 8.2 pg/dl on day 3 were independently associated with delirium (OR 2.72, 95% CI 1.06–7.13, $p = 0.036$) and mechanical ventilation use (OR 3.05, 95% CI 1.14–8.14, $p = 0.025$). IL-6 and TNF-α showed clearance tendencies rather than an increase over time. Higher IL-1β levels at baseline were associated with a lower risk of unfavorable outcomes at 2 months (OR 0.95, 95% CI 0.91–0.99, $p = 0.01$). Delirium was linked to unfavorable outcomes at 2 months (GOSE ≤ 4, OR 2.64, 95% CI 1.05–6.88, $p = 0.038$) and increased neurobehavioral symptoms (NSI > 20, OR 2.68, 95% CI 1.13–6.76, $p = 0.026$) (**Table 1**).
Conclusions: Delirium was linked to older age, severe injury, prolonged hospitalization, and worse functional outcomes at 2 months. Elevated IL-1β suggests a key role of inflammation in its pathogenesis and long-term effects. These findings support delirium as a secondary brain injury, highlighting the need for early identification and targeted interventions.

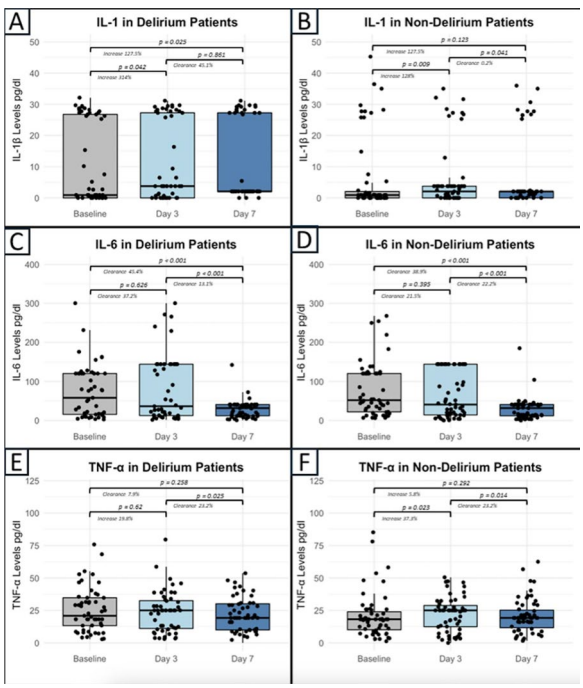


Fig. 1 (abstract 000444) Wilcoxon test for cytokine values between timepoints in delirium and non-delirium patients

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Topic: Neurointensive care

000445

Early comparative analysis of the lung microbiome across upper, middle, and lower respiratory tract samples during the first 24 hours of invasive mechanical ventilation

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Introduction: Invasive mechanical ventilation (IMV) is a revolutionary intervention that has saved millions of lives during the last decades. However, it has been associated with several complications due to the disturbance of the normal physiology of the respiratory system. It has been proposed that the IMV may affect the lung microbiome. However, it is unclear if the microbiome in the upper, middle, and lower respiratory tracts is differently affected by IMV. Given that upper airway, samples are more straightforward to collect and frequently used for pneumonia diagnosis, a comprehensive comparison is essential to understand whether the whole respiratory tract microbiome could be considered a unit or if each part should be considered separate.
Objectives: This study aims to compare the microbiome composition of nasopharyngeal (NP), endotracheal aspirate (ETA), and bronchoalveolar lavage (BAL) samples in patients undergoing IMV to identify differences across respiratory tract sites.
Methods: This observational study included patients admitted to the Intensive Care Unit requiring IMV for ≥ 48 h. Nasopharyngeal swabs, tracheal secretions, and BAL specimens were collected, frozen at -80 °C, and analyzed for 16S rRNA gene PCR. DNA was extracted using the DNeasy® Blood & Tissue Kit and sequenced on Illumina MiSeq. Microbial diversity was assessed using Shannon diversity, Bray–Curtis dissimilarity, Wilcoxon rank-sum test, and PERMANOVA, with analyses conducted in R.
Results: 141 individuals were included; microbiome analysis showed significant differences in beta diversity across sample types (NP, ETA, BAL) (PERMANOVA: $p < 0.01$). PCoA and NMDS analyses confirmed distinct clustering of NP samples (Fig. 1A). Alpha diversity was highest in ETA and lowest in BAL (Kruskal–Wallis: $p < 0.01$) (Fig. 1B). Relative abundance analysis revealed significant differences for *Staphylococcus spp.* (p_adj = 0.0274). Multivariate analysis confirmed microbial composition variation across tissue types ($p = 0.003$), with *Acinetobacter spp.* as a key differentiator ($p = 0.008$). Random Forest classification identified *Staphylococcus spp.*, *Prevotella spp.*, and *Acinetobacter spp.* as the most relevant OTUs, reinforcing their role in microbial differentiation.
Conclusions: The lung microbiome composition differs significantly across the upper (NP), middle (ETA), and lower (BAL) respiratory tract during the first 24 h of IMV. Beta diversity analysis confirmed distinct clustering of NP samples, while alpha diversity was highest in ETA and lowest in BAL. Key taxa, including *Staphylococcus spp.*, *Prevotella spp.*, and *Acinetobacter spp.*, contributed to these differences. These findings highlight the need for site-specific analysis when assessing the respiratory microbiome and its clinical implications in mechanically ventilated patients.

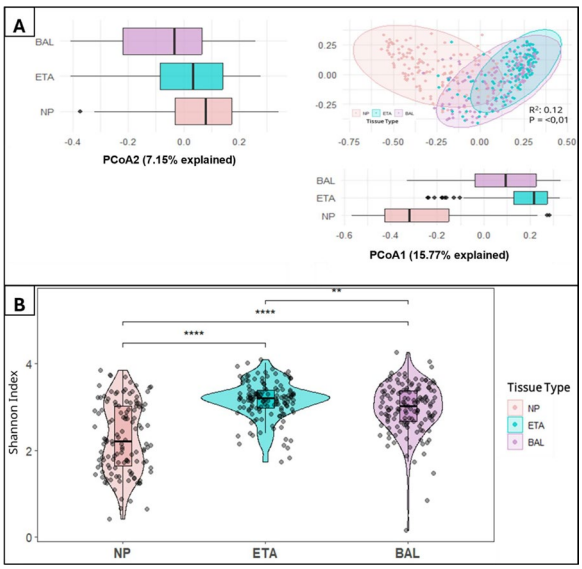


Fig 1 (abstract 000445) Comparison of respiratory microbiota by sampling site. **A.** PCoA based on Bray–Curtis distances shows significant differences in microbial composition among NP, ETA, and BAL samples ($R^2 = 0.12$, $p < 0.01$). **B.** Shannon diversity index differs significantly across sites (**** $p < 0.0001$; ** $p < 0.01$).

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Topic: Infections and prevention

000446

Outcomes of new-onset atrial fibrillation in ICU patients: a single-center experience

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Introduction: New-onset atrial fibrillation (NOAF) is a common arrhythmia in critically ill patients, occurring in 5–11% of those admitted to the intensive care unit (ICU). It is associated with significant morbidity and mortality. Despite the use of various management strategies, evidence regarding optimal treatment is limited, with most data primarily coming from non-ICU populations.
Objectives: To characterize ICU patients with new-onset atrial fibrillation and evaluate the preferred management strategies.
Methods: A retrospective, single-center observational study was conducted on patients with NOAF admitted to a multidisciplinary ICU between January 2020 and June 2022. Clinical and demographic data were collected.
Results: Out of the 3,692 patients admitted to the ICU, 161 (4.4%) were diagnosed with NOAF, including 101 males with a mean age of 69.5 ± 11.8 years. Among these patients, 67% had hypertension, 35% had diabetes, 21% were obese, 13% had ischemic heart disease, and 15% had a history of heart failure. Additionally, 30% were previously treated with beta-blockers, and 4% had been using antiarrhythmic medications.
The primary reasons for ICU admission included sepsis or septic shock (73%), trauma (10%), and cardiogenic shock (7%). During their hospital stay, 79% of patients developed cardiovascular dysfunction. The most commonly used first-line strategy for managing NOAF was rhythm control (85%), followed by observation (7.5%) and rate control (7.5%). In the rhythm control group, 27 patients underwent electrical cardioversion combined with amiodarone, 5 received electrical cardioversion alone, and the remaining 104 were treated solely with amiodarone. No other antiarrhythmic medications were administered. There was no significant difference in the use of beta-blockers and digoxin within the rate control strategy.
Anticoagulation therapy was initiated in 72 patients (39% with enoxaparin and 6% with unfractionated heparin). A recurrent episode of atrial fibrillation occurred in 50% of patients during their hospital stay. During the ICU admission, 33% of patients died; however, recurrence of atrial fibrillation was not associated with increased ICU mortality. No specific predictors of ICU mortality were identified in the NOAF cohort. At the time of discharge, only 45% of patients were prescribed anticoagulation therapy. Of these, 24% were on beta-blockers, and 14% were on a combination of amiodarone and beta-blockers. During a follow-up period of 428 days (range 1–1705), 47% of patients experienced recurrence of atrial fibrillation, and 35% of patients died, with 13 deaths attributed to cardiovascular causes. Additionally, 10 patients were readmitted to the hospital for cardiovascular reasons, including 2 patients for heart failure decompensation due to atrial fibrillation with a rapid ventricular rate, and 1 patient for a cardioembolic stroke.
Conclusions: In patients with NOAF in the ICU, rhythm control is the preferred management strategy. Recurrence rates of atrial fibrillation remain high both during the ICU stay and in the follow-up period, despite the limited use of anticoagulation therapy. The acute, severe illness that led to ICU admission may serve as a trigger for underlying atrial disease, high

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lighting the importance of ongoing monitoring and follow-up for these patients.

Topic: Cardiovascular issues in ICU

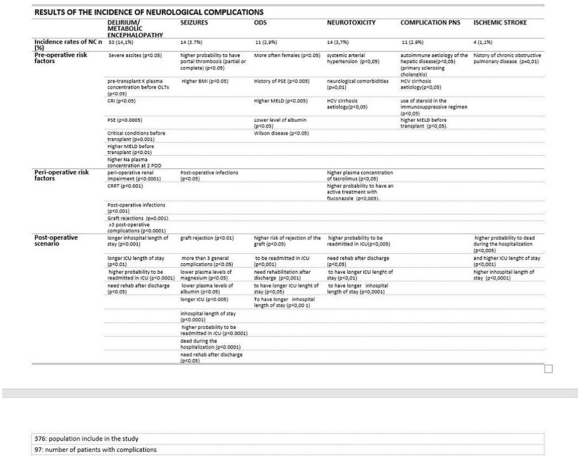
000448

Neurological complications following orthotopic liver transplantation: insights from a single-center study

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Introduction: Orthotopic liver transplantation (OLT) enhances survival and quality of life but is associated with neurological complications (NCs) in 30–60% of patients, leading to increased mortality and healthcare costs. Identifying preoperative and perioperative risk factors, such as age, MELD score, comorbidities, sodium fluctuations, and medication use, can aid in predicting NC risk. (1) (2) (3).
Objectives: To assess the incidence and causes of NCs in OLT recipients and identify independent perioperative risk factors to improve risk stratification and patient outcomes.
Methods: In this retrospective study, we reviewed the medical records of adult patients who underwent OLT between June 2014 and October 2021, focusing on acute NCs during hospitalization (e.g., encephalopathy, seizures, drug toxicity, stroke, and CNS infections). We compared patients with and without NCs to identify risk factors associated with an increased likelihood of NCs. Preoperative, intraoperative, and postoperative factors were analyzed, with outcomes including hospital/ICU stay, complications, rehabilitation needs, and mortality. Ethical approval and informed consent were obtained, and descriptive statistical analysis was performed.
Results: Among 376 patients undergoing OLT, 97 (25.8%) developed NCs, including delirium (14.1%), seizures (3.7%), and neurotoxicity (3.7%). Diagnostic evaluations in 71 patients identified structural abnormalities in 7.2% and mild EEG changes in 65%. Preoperative factors linked to NCs included higher MELD scores (25.8 vs. 22.95, $p = 0.0003$), lower albumin levels (3.2 vs. 3.44, $p = 0.0205$), and a history of chronic renal impairment (37.9% vs. 23.2%, $p = 0.0147$, OR = 2.02). HCV infection was associated with a lower risk of NCs ($p = 0.0405$, OR = 0.61). Perioperative factors included higher sodium levels on postoperative day 2 ($p = 0.0291$) and greater sodium fluctuations ($p = 0.0024$). NC patients had significantly higher rates of acute renal impairment ($p < 0.0001$, OR = 3.74), required continuous renal replacement therapy ($p < 0.0001$, OR = 7.1), and experienced more postoperative infections ($p < 0.0001$, OR = 4.48), graft rejection ($p = 0.0006$, OR = 3.19), and multiple systemic complications ($p < 0.0001$, OR = 4.39). They also had longer hospital (57.28 vs. 19.61 days, $p < 0.0001$) and ICU stays (25.94 vs. 6.45 days, $p < 0.0001$), higher odds of ICU readmission (OR = 6.65), in-hospital death (OR = 7.67), and rehabilitation needs (OR = 8.7), all $p < 0.0001$.
Conclusions: NCs in liver transplant recipients are significant, with risk factors including advanced liver disease, renal failure, and intraoperative issues like sodium shifts and renal impairment. NCs, including

drug-induced neurotoxicity and osmotic demyelinating syndrome, lead to increased morbidity, extended hospital stays, and higher post-transplant disability. Identifying these risk factors preoperatively could enhance patient management and outcomes, guiding surveillance and clinical decisions.



RESULTS OF THE INCIDENCE OF NEUROLOGICAL COMPLICATIONS

	DELIRIUM/ METABOLIC ENCEPHALOPATHY	SEIZURES	ODS	NEUROTOXICITY	COMPLICATION PNS	ISCHEMIC STROKE
Incidence rates of NC n (%)	53 (14,1%)	14 (3.7%)	11 (2,8%)	14 (3,7%)	11 (2.8%)	4 (1,1%)
Pre-operative risk factors	Severe ascites (p=0.09)	higher probability to have portal thrombosis (partial or complete) (p=0.09)	More often females (p=0.09)	systemic arterial hypertension (p=0,09)	autoimmune aetiology of the hepatic disease(p=0,09) (primary sclerosing cholangitis)	history of chronic obstructive pulmonary disease (p=0,01)
	pre-transplant K plasma concentration before OLTx (p=0.09)	Higher BMI (p=0.05)	History of PSE (p=0.009)	neurological comorbidities (p=0,01)	HCV cirrhosis aetiology(p=0,09)	
	CRI (p=0.09)		Higher MELD (p=0.005)	HCV cirrhosis aetiology(p=0,09)	use of steroid in the immunosuppressive regimen (p=0,09)	
	PSE (p=0.0005)		Lower level of albumin (p=0.05)		higher MELD before transplant (p=0,05).	
	Critical conditions before transplant (p=0.001)		Wilson disease (p=0.09)			
	higher MELD before transplant (p=0,01)					
	higher Na plasma concentration at 1 POD					
Peri-operative risk factors	peri-operative renal impairment (p=0.0001)	Post-operative infections (p=0.05)		higher plasma concentration of tacrolimus (p=0,05)		
	CRRT (p=0.001)			higher probability to have an active treatment with fluconazole (p=0.009).		
	Post-operative infections (p=0.001)					
	Graft reactions (p=0.001)					
	>3 post-operative complications (p=0.0001)					
Post-operative scenario	longer inhospital length of stay (p=0.001)	graft rejection (p=0.01)	higher risk of rejection of the graft (p=0,05)	higher probability to be reamitted in ICU(p=0.009)		higher probability to dead during the hospitalization (p=0,09)
	longer ICU length of stay (p=0.01)	more than 3 general complications (p=0.09)	to be readmitted in ICU (p=0,001)	need rehab after discharge (p=0,09)		and higher ICU lenght of stay (p=0,001)
	higher probability to be readmitted in ICU (p=0.0001)	lower plasma levels of magnesium (p=0,05)	need rehabilitation after discharge (p=0,001)	to have longer ICU lenght of stay (p=0,01)		higher inhospital length of stay (p=0,0001)
	need rehab after discharge (p=0.09)	lower plasma levels of albumin (p=0.09)	to have longer ICU lenght of stay (p=0,05)	to have longer inhospital length of stay (p=0,0001)		
		longer ICU (p=0.009)	To have longer inhospital length of stay (p=0,00 1)			
		inhospital length of stay (p=0.0001)				
		higher probability to be readmitted in ICU (p=0.9001)				
		dead during the hospitalization (p=0.0001)				
		need rehab after discharge (p=0.09).				

376: population include in the study
97: number of patients with complications

376: population include un the study.
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Topic: Metabolism, endocrinology, liver failure and nutrition

000452

Usefulness of repeated measurements of cytokines during the first 24 h to predict survival in patients at risk of sepsis

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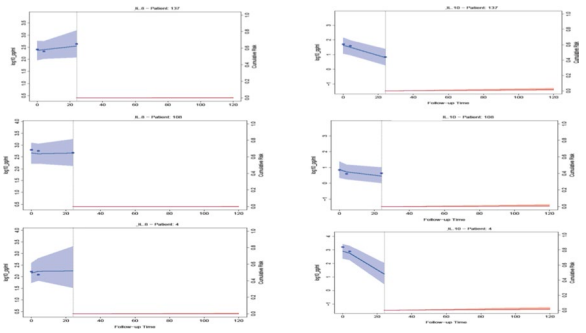
Introduction: Sepsis is a heterogeneous syndrome caused mainly by respiratory infections. Current efforts to reduce the global burden of sepsis focus on improving public and healthcare worker awareness of markers to avoid delays in diagnosis and treatment, prompt treatment with appropriate antibiotics, and supportive care bundles focused on the common bacterial causes of sepsis. Unfortunately, there are few or no useful tools to allow early identification of those patients at high risk of poor outcome. Cytokines are useful in identifying patients with different inflammatory subphenotypes, but the dynamics of these markers over time and their impact on outcomes are not fully understood.

Objectives: The objective of this study is to evaluate the utility of kinetics of biomarker levels in predicting survival.

Methods: Prospective observational cohort of patients with risk of sepsis (defined as infection suspected and NEWS score equal or higher than 3) attending the emergency department of the Parc Tauli University Hospital. Blood samples and severity scores were obtained at baseline, 4 h and 24 h. We used joint models for longitudinal and survival data to determine the association between repeated measurements of cytokines (IL-10, IL-6, IL-8, IL1-RA, MCP.1 and TNF.RI) and survival probabilities.

Results: We analysed data from 170 patients. The median age was 76 years (IQR 64; 85), and the median SOFA score for the highest score in the first 24 h was 3 (IQR 2; 5). The mortality rate was 17% (n = 29), and 15% of patients (n = 27) were admitted to the ICU. Among the six biomarkers, IL-10 levels (hazard ratio 1.09, credible interval 95% 1.01 to 1.20) and IL-8 levels (hazard ratio 0.68, credible interval 0.61 to 0.80) were predictive of survival during follow-up, adjusted for age and SOFA. Hourly change or other functional forms for IL-6, MCP-1 and TNF-RI did not predict survival. Figure 1 shows dynamic predictions (posterior mean and 95% credible band at hours 0, 4, and 24 h after attending the ED for 3 patients).

Conclusions: The kinetics of IL-10 and IL-8 can predict survival. No other cytokine was useful for this prediction.



(abstract 000452) Dynamic predictions for IL-8 and IL-10 models adjusted by age and SOFA score for three random patients

Reference

1 CPP2021-008394

Topic: Sepsis

000453

Renal replacement therapy initiation criteria: toward a phenotype-based prediction model

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Introduction: Indications for renal replacement therapy (RRT) in critically ill patients with acute kidney injury (AKI) are typically categorized

as either urgent (life-threatening hyperkalemia, metabolic acidosis, or pulmonary edema) or non-urgent, such as a serum urea concentration > 40 mmol/L or oligo-anuria lasting more than 72 h. However, whether these distinct categories of RRT indications are associated with different clinical outcomes remains unclear.
Objectives: To describe the distribution of RRT initiation criteria among critically ill patients with AKI and to compare the clinical characteristics and outcomes of patients receiving RRT based on the indication for initiation: urgent, serum urea concentration > 40 mmol/L, or oligo-anuria lasting more than 72 h.
Methods: This post hoc analysis pooled data from the delayed RRT initiation strategy arms of the AKIKI and AKIKI-2 trials (1,2). Patients who received RRT were included and subsequently categorized according to 3 categories of RRT indication: urgent indication or serum urea concentration > 40 mmol/L or oligo anuria > 72 h. Baseline characteristics were compared between groups. Sixty-day mortality was analyzed using Cox models with propensity score weighting and multiple imputation for missing data.
Results: Among the 413 patients included, 184 (45%) received RRT for urgent indications (uremic group), while 229 (55%) received RRT for non-urgent indications (126 (30%) for serum urea > 40 mmol/L (uremic group) and 103 (25%) for oliguria/anuria > 72 h (oligo-anuric group)). Baseline severity scores (SOFA score) and the need for organ support (invasive mechanical ventilation and/or vasopressor infusion) did not differ significantly between the 3 groups. Serum urea concentration at admission was higher in the uremic group (median 19 [9.2–29.8] mmol/L) compared to the urgent (12 [7–19] mmol/L) and oligo-anuric (11 [7–17] mmol/L) groups ($p < 0.001$). The time from occurrence of AKI stage 3 to fulfillment of RRT criteria was shortest in the urgent group (median 1 [1–3] day), followed by the uremic group (2 [1–4] days) and the oligo-anuric group (3 [2–3] days). Day-60 mortality was highest in the urgent group (62.5%), compared to 52.4% in the oligo-anuric group and 41.3% in the uremic group. After adjustment, the hazard ratios for day-60 mortality were 0.64 [0.46–0.88] for the oligo-anuric group and 0.49 [0.35–0.68] for the uremic group, both relative to the urgent group.
Conclusions: Among critically ill patients receiving RRT, indications for initiation were predominantly non-urgent and associated with lower mortality compared to urgent indications. These findings suggest that the underlying reason for RRT initiation may reflect differing clinical trajectories and prognoses in severe AKI.

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5 Programme Hospitalier de Recherche Clinique

Topic: Acute Kidney Injury and haemofiltration

000454

Rapid multiplex PCR for the etiological diagnosis of ventilator-acquired pneumonia (VAP) and severe hospital-acquired pneumonia (HAP): performance in a low multi-drug resistant bacteria incidence setting.

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Introduction: Hospital-acquired pneumonia (HAP) and Ventilator-acquired pneumonia (VAP) are associated with high morbidity and mortality (1). The risk of multidrug-resistant bacteria (MDR), given the proven benefit of prompt and effective antibiotic initiation (2), supposes the use of broad-spectrum antibiotics until microbiological results which may take as long as 72-96 h. Novel molecular diagnostic techniques, such as rapid multiplex PCR (m-PCR), have been proposed as a method to further improve antimicrobial stewardship (AMS) with a faster etiological identification (3).
Objectives: To determine the diagnostic performance of m-PCR on bronchoalveolar lavage (BAL) from patients with suspicion of VAP or severe HAP and the effect of its results on the antimicrobial empirical treatment provided on a real, clinical, low MDR ICU setting.
Methods: Retrospective analysis of VAP and severe HAP (i.e. requiring endotracheal intubation) cases on a third level ICU between 2022 and 2024. BAL sample were collected for m-PCR testing (*BioFire*® FilmArray® Pneumonia Panel) and conventional culture. Any sample was defined as positive by detection of any bacteria with a threshold of 10e3 copies/mL on the semi-quantitative analysis as stated by the manufacturer.
Test metrics, such as sensitivity, specificity, accuracy, positive and negative predictive values of m-PCR for each pathogen were calculated against culture as gold-standard. Median copies of positive m-PCR were compared against culture result using t-test. Treatment modification after m-PCR was analyzed by Chi-squared test.
The present study was previously approved by the local Ethics Committee (SICEIA-2024–001437).
Results: 150 BAL samples from 117 patients were collected, 34% percent corresponded to severe HAP requiring ICU admission and intubation. No difference were found between HAP and NAVM groups, nor on in-ICU mortality (37%). In-hospital mortality was reported higher but not significantly different on de VAP group (44% vs. 37%).
From the BAL samples, 83 (55%) reported identification of any microorganism by m-PCR technique, of which only 54 (65%) had a positive culture. Culture-documented pneumonias were 43%; *P. aeruginosa and S. aureus* the most frequent isolations, followed by other microorganisms not included on the m-PCR panel (28%), mostly *S. maltophilia.*
Overall sensitivity of m-PCR was 97%, with 96% specificity and negative predictive value of 99%. Complete concordance between molecular testing and culture was found on 54% of samples and partial on 21%. Partial and non-concordance was explained found either by negative culture on positive m-PCR samples or isolation of bacteria not included on the m-PCR panel. Only 2 cases were found of negative m-PCR for a microorganism that was later isolated in conventional culture. The number of copies was significantly lower on patients with m-PCR positive/culture negative group compared to both tests yielding a positive result (10e3 vs. 10e6, $p < 0.01$)(Fig. 1).
Only 10 MDR genes were found detected on m-PCR (8%): 6 MEC-A *S. aureus*, 2 OXA-48 *K. pneumoniae*, 1 VIM *A. baumannii* and 1 CTX-M *E. cloacae*; consistent with previous local epidemiological data.
A significant antimicrobial treatment modification was performed after m-PCR, with a change of drug towards detected bacteria on the 34,7% of positive results or narrowing spectrum by suspension of some antibiotic on negative results (15%).

Conclusions. Rapid multiplex PCR testing on BAL was found to have high sensitivity, specificity and NPV on the microbiological diagnosis of VAP and severe HAP. Its use in our setting has impacted on the AMS by narrowing antibiotic spectrum in over half of the patients within the first hours of treatment.

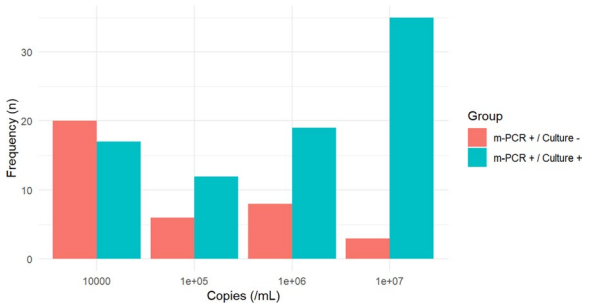


Fig 1 (abstract 000454) Distribution of Rapid Multiplex PCR (m-PCR) positive results by number of copies per milliliter on quantitative analysis. Red bars represent negative culture group and blue bars represent positive culture for the same microorganism. Difference of distribution was founded significant by Mann–Whitney–Wilcoxon test = 815.2.

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Topic: Sepsis

000455

Post-intensive care syndrome—family: results from a 3-month follow-up program in Portugal

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000455***.

Introduction: Post-intensive care syndrome—family (PICS-F) is a life-altering experience involving psychological, physical, and socio-economic challenges, beginning with the emotional toll on families when a patient is admitted to the Intensive Care Unit (ICU). Despite its significant impact on ICU survivors' recovery, assessing PICS-F remains challenging, as recent reviews often lack comprehensive summaries and report varying prevalence due to differences in assessment methods. Regarding our ICU, the 3-month follow-up consultation involves a doctor and 4 nurses, assessing both the patient and their designated family member. In 2024, 118 consultations were conducted for patients meeting referral criteria (mechanical ventilation > 48 h, ≥ 4 days in ICU, or neurological dysfunction during ICU stay). After discharge, the designated family member completes a questionnaire, including the Hospital Anxiety and Depression Scale (HADS), EQ-5D-3L, and Carers Assessment of Difficulties Index (CADI). Based on these results, which are evaluated during the follow-up consultation, cases of PICS-F are identified and addressed accordingly.
Objectives: This study aimed to identify and characterize cases of PICS-F among designated family members of patients eligible for the 3-month follow-up consultation, using validated tools.
Methods: A retrospective study was conducted using data from questionnaires completed by designated family members and evaluated during the 3-month follow-up consultations in 2024. Incomplete or contradictory questionnaires were excluded.
Results: A total of 80 questionnaires were evaluated, and results from the three validated tools were analyzed. Regarding the HADS results, definite cases of anxiety were identified in 26% of respondents, while 4% showed definite signs of depression. Possible (doubtful) cases were observed in 24% for anxiety and 19% for depression. Finally, non-cases accounted for 50% of family members in terms of anxiety and 77% in terms of depression. For the EQ-5D-3L, 23% of participants reported minor mobility issues, with 77% indicating no mobility problems. In terms of personal care, 6% experienced some difficulty, while 94% reported no issues. Regarding the impact of the family member's ICU admission, 78% reported no effect on their daily activities, 21% reported a minor impact, and 1% reported a major impact. Pain and discomfort were noted in 47% of respondents, with 43% reporting some impact and 4% indicating a significant impact. For anxiety and depression, 55% of participants reported no symptoms, 41% reported mild symptoms, and 4% reported severe symptoms. When comparing their current health status with six months ago, 45% reported it was the same, 32% reported improvements, and 23% reported a decline. Overall, anxiety/depression and pain were the most negatively impacted domains among family members as assessed by the EQ-5D-3L. Regarding the CADI, 10% of respondents reported significant difficulties (≥ 45 points) in caregiving, mainly due to financial challenges (22.4%), lack of support from employers (20%), inadequate family support (17.6%), avoidant responses from the patient (12.9%), social life restrictions (11.8%), physical demands of caregiving (10.6%), and interpersonal difficulties with the patient (4.7%). After a thorough review, 18 family members (22.5%) were referred for individual follow-up consultations by our team.
Conclusions: This study was important to raise awareness within our ICU team about the prevalence of PICS-F in our community and establish it as a key area for improvement. Consistent with other studies, anxiety, pain, and discomfort were the most frequently reported issues by family members and caregivers. It is essential to recognize that PICS-F goes beyond psychological effects, encompassing physical and socioeconomic consequences that can hinder a patient's recovery. To prevent long-term impairments, a comprehensive, multidisciplinary approach is required, starting with early identification during the ICU stay and continuing through follow-up consultations. In this context, it is crucial that healthcare teams are trained to identify and appropriately refer families affected by PICS-F. Our follow-up team is currently working to correlate the findings of this study with specific aspects of each patient's ICU stay, aiming to better understand and manage the risk factors associated with PICS-F.

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Topic: Health Services Research and Outcome

000456

Safety on the scales: a UK national survey of ICU patient weighing practices and challenges

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Intensive Care Medicine Experimental, 2025;**13(1)**: 000456.

Introduction: A patient's body weight is central to numerous clinical decisions on the Intensive Care Unit (ICU), including drug dosing, fluid balance and nutritional assessment)$_{1,2}$ However, the evidence suggests that patient weights are estimated and often inaccurate, with a tendency to underestimate.[3]·.[4]
A pilot study conducted in United Kingdom (UK),[3] revealed that 62% of the patients had a significant error in their estimated weight. During this pilot, actually weighing the patient, led to no line/tube dislodgements or unintended consequences, confirming that it is safe and feasible.
Despite national UK guidance[5] recommending weighing patients on hospital admission and weekly thereafter, limited data are available on its compliance.
Objectives: A national survey was sent to healthcare professionals (HCPs) to:

1. Determine the standard practice for obtaining patient weights
2. Investigate the perceived barriers in measuring accurate patient weights
3. Examine concerns regarding safety risks connected to weighing ICU patients
4. Assess healthcare professionals' attitudes toward the frequency of patient weighing

Methods: An anonymous web-based survey using REDCap[6] was disseminated through national networks to nurses, dieticians, pharmacists and physiotherapists working across UK ICUs. The survey instrument consisted of 22 questions, systematically categorized into demographic information, knowledge and perception based queries. Descriptive analyses were conducted using SPSS.
Results: In a survey of 526 respondents with representation across all regions of the UK, nurses made up the majority of respondents (57%). 71% of respondents weigh patients during ICU admission, often within the first 48 h, this indicates that a significant minority do not follow this practice. Key barriers identified, such as equipment limitations (65.77%) and concerns over patient instability (63.01%), underscore the challenges in achieving consistent and accurate weight measurement. Figure 1 shows the importance of the main barriers to weighing patients. Dislodgment of IV lines/tubes (74.8%) was identified as the most prevalent potential safety risk associated with weighing an intubated stable patient, with patient anxiety and discomfort (68.2%) identified in a non-intubated stable patient. Respondents felt that ICU patients should be weighed at least, once a week.
Conclusions: However, accurate and regular weighing in the ICU is critical, as emphasised by guidelines and literature, for precise drug dosing, nutritional management, and fluid balance monitoring. These factors directly impact patient outcomes, potentially reducing ICU stay and improving overall care. To optimise patient management and align with best practices, addressing the identified barriers through improved equipment provision and standardised protocols is essential to ensure that weighing patients becomes a routine and accurate procedure in the ICU.

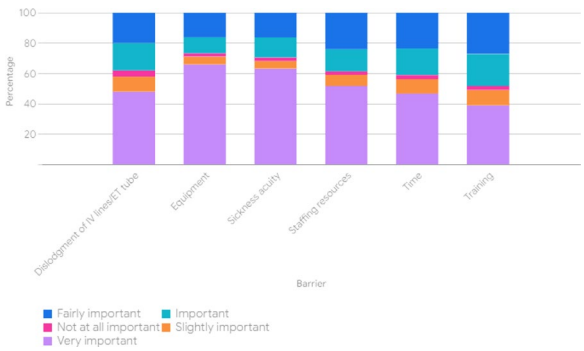


Fig 1 (abstract 000456) Importance of the barriers to weighing patients

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Topic: Nursing care and physiotherapy

000457

Acute carbon monoxide poisoning: development of an experimental rat model for delayed neuropsychiatric sequelae and therapeutic intervention

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000457***.

Introduction: Delayed neuropsychiatric sequelae (DNS) are a well-known yet understudied complication following acute carbon monoxide (CO) poisoning. Despite their clinical significance, no established animal model exists to investigate the underlying pathophysiology or to evaluate potential therapeutic interventions. This study aimed to develop the first reproducible rat model of DNS induced by acute CO exposure and to assess the therapeutic efficacy of two novel interventions: ziprasidone and carbon monoxide-releasing molecule-3 (CORM-3).
Methods: Male Sprague–Dawley rats (250–350 g) were exposed to carbon monoxide (CO) gas at concentrations of 4000, 6000, or 8000 ppm for 20 min. Among these concentrations, the optimal CO concentration for establishing a delayed neuropsychiatric sequelae (DNS) model was identified. Rats exposed to the selected concentration and exhibiting signs of DNS were randomly assigned to one of three groups: ziprasidone (5 mg/kg, oral; $n = 6$), CORM-3 (4 mg/kg, intraperitoneal; $n = 6$), or control ($n = 5$). Treatments were administered once daily from post-exposure week 2 to week 3. Cognitive and

sensorimotor functions were assessed at 0, 2, 4, and 6 weeks post-exposure using a battery of behavioral tests, including the Y-maze, adhesive removal, olfactory discrimination, open field, and muscle strength tests.
Results: Exposure to 6000 ppm of carbon monoxide (CO) for 20 min was identified as the optimal condition for inducing delayed neuropsychiatric sequelae (DNS). By 4 weeks post-exposure, the majority of CO-exposed rats (> 95%) exhibited cognitive impairments and sensorimotor deficits. Performance in the Y-maze and adhesive removal tests at 6 weeks post-exposure was significantly improved in the ziprasidone group (41.8 ± 9.6% and 50 ± 50%, respectively) compared to the control group (8.3 ± 6.1% and 0%, $p < 0.001$). Similarly, the CORM-3 group demonstrated significantly higher scores (54.8 ± 15.4% and 67.7 ± 47.1%) than controls (7.2 ± 6.3% and 0%, $p < 0.001$) 6 weeks post-exposure. Total distance traveled in the open field test was also significantly greater in both treatment groups compared to control group (ziprasidone: 289.2 ± 85.4 cm; CORM-3: 324.3 ± 88.6 cm; control: 118.7 ± 23.4 cm; $p < 0.001$) at 6 weeks post-exposure.
Conclusions: This study introduces the first validated rat model of DNS following CO poisoning and provides preclinical evidence that ziprasidone and CORM-3 may effectively reverse DNS-associated cognitive and behavioral dysfunction. These findings offer a novel experimental platform for therapeutic discovery in post-CO brain injury.

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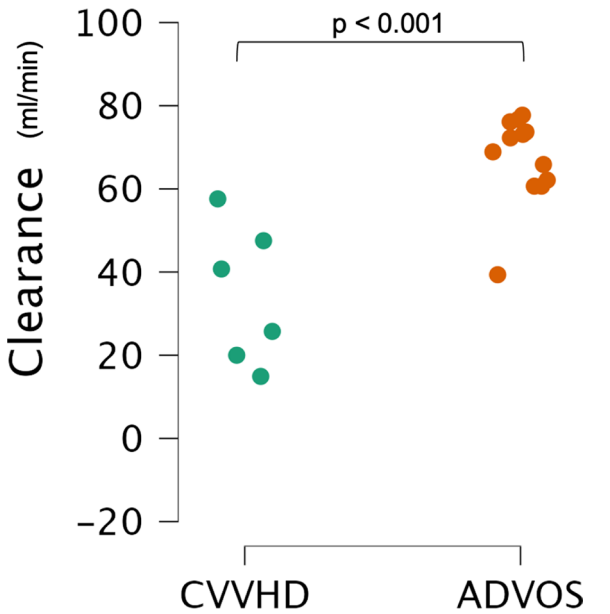
Topic: Pharmacology and Toxicology/Poisoning

000459

Comparison of meropenem elimination in albumin-based ADVOS dialysis versus conventional CVVHD in critically ill patients

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***Intensive Care Medicine Experimental*, *2025*;13(1): *000459*.**

Introduction: Effective antibiotic treatment is crucial in critically ill patients, especially when extracorporeal therapies such as dialysis may alter drug pharmacokinetics. Meropenem—a carbapenem antibiotic with a relatively low plasma protein binding (1.4–24.4%)—might demonstrate different clearance rates during albumin-based Advanced Organ Support (ADVOS) compared to conventional continuous venovenous hemodialysis (CVVHD) [1]. Given the requirement to maintain serum concentrations above the minimum inhibitory concentration (MIC) of 2 µg/mL for sensitive bacteria, understanding these differences is essential. To date, no in vivo data exists on meropenem elimination in patients treated with albumin-based dialysis systems [2].
Methods: This study analyzed 18 dialysis cycles in ICU patients, including 6 cycles with CVVHD and 12 cycles with ADVOS. Patients received meropenem doses ranging from 1000 to 2000 mg every 8 h, with dosing adjusted according to the severity of illness. Meropenem clearance was assessed by comparing pre- and post-filter drug concentrations. Serum levels were measured at 1, 3, and 7 h post-administration to determine adherence to the MIC threshold. Statistical analysis was performed using Student's t-test to compare clearance differences between CVVHD and ADVOS.
Results: The ADVOS system demonstrated a significantly higher clearance of meropenem (67.2 ± 10.1 ml/min) compared to CVVHD (34.5 ± 16.8 ml/min; $p < 0.001$). Importantly, no instances of serum meropenem concentrations falling below the MIC threshold were observed in either dialysis modality.
Conclusions: Albumin-based ADVOS yields significantly higher meropenem clearance than conventional CVVHD without compromising therapeutic serum levels. These findings underscore the need for further studies to refine pharmacokinetic models and optimize dosing regimens in critically ill patients undergoing extracorporeal therapies. Future research should aim to include larger sample sizes, detailed patient demographics, and stratification based on disease severity to further elucidate these effects and guide individualized therapy.



(abstract 000459) omparison of meropenem-clearance between dialysis modalities

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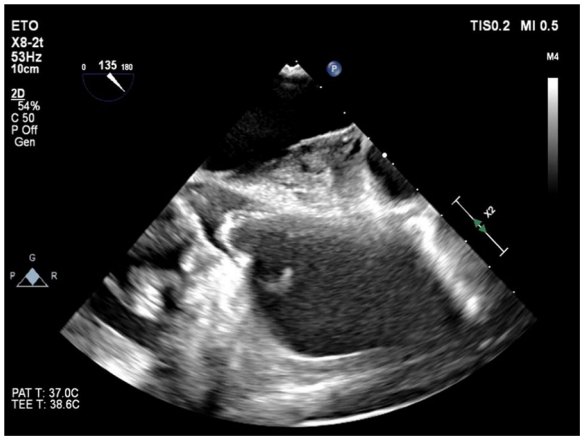
Topic: Acute Kidney Injury and haemofiltration.

000460

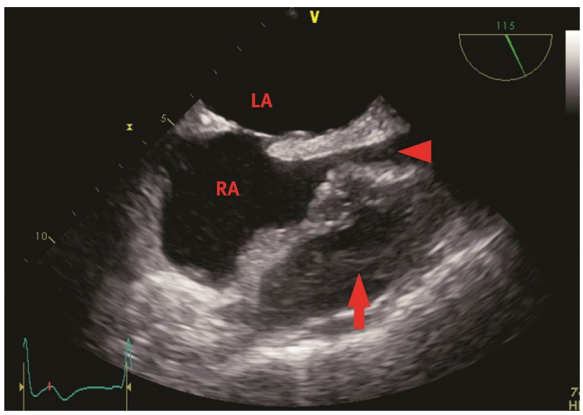
Critical care echocardiography: insights from EDEC and literature review

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000460***.

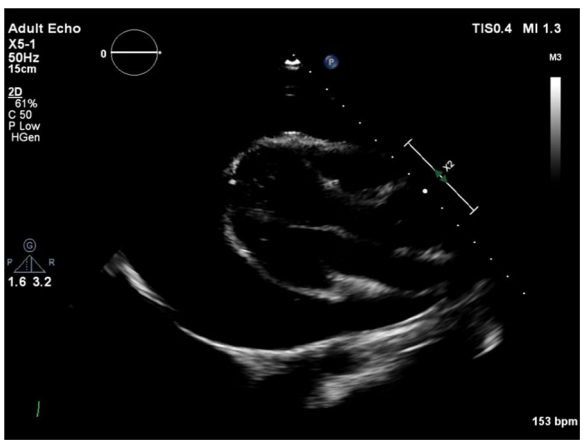
Introduction: Critical care echocardiography (CCE) has become fundamental in the management of critically ill patients. Point-of-care ultrasound (POCUS) is performed by a growing number of emergency care providers because it allows rapid bedside diagnosis [1]. Transthoracic echocardiography (TTE) represents the first-line tool to assess patients in shock state [2]. Transesophageal echocardiography (TEE) has gained importance, particularly in hemodynamically unstable patients under mechanical ventilation [3]. Indications of CCE in the intensive care unit (ICU) include assessment of hemodynamic instability, hypoxemia, cardiac arrest, LV systolic/diastolic function and filling pressures, RV function and pulmonary artery pressures, hemodynamic monitoring and optimization, acute aortic syndrome, procedural guidance [4].
Objectives: The purpose of this article is to illustrate the key role of CCE in our experience and to promote its use in the ICU for diagnosis, monitoring and clinical decision-making.
Methods: This is a single-center prospective cohort study of 135 patients receiving CCE-guided management. Investigated echocardiographic parameters included variables detailed in the TTE/TEE report template developed by the ESICM for the European Diploma in Advanced Critical Care Echocardiography (EDEC) curriculum. TEE was performed when TTE images were inadequate because of low echogenicity, obesity, wounds, chest wall devices, mechanical ventilation, or when more detailed analysis of cardiac structures was required. Adjunctive therapies and changes in resuscitation management included intravenous fluids, vasopressor, inotrope and diuretics.
Results: 135 patients (median age 74, 66% male) underwent CCE-guided management. TTE was performed in 100 cases and TEE in 35 cases. 56 patients were examined under mechanical ventilation. The most common indications for CCE were circulatory shock (50%) and respiratory distress (37%). Septic shock was the main type of shock (41%), followed by cardiogenic shock (26%), obstructive shock (22%), and hypovolemic shock (11%). Assessment of fluid responsiveness was performed in 33 cases (25%). Impaired left ventricular systolic function was diagnosed in 57 patients (42%). Left ventricular diastolic dysfunction with elevated filling pressure was diagnosed in 47 patients (35%). Suggested change in resuscitation management was observed in most cases (95%), including adjustment in vasopressor (50%) and inotrope initiation (15%) when cardiac dysfunction was believed to be responsible of inappropriate organ perfusion. Working diagnosis changed in 88% (n = 119) of patients. The next step of our analysis is to compare the effect of CCE-guided therapy to standard management in terms of survival, fluid/vasopressor/inotropic prescription, ventilator free-days and ICU length of stay. This work is under development and we hope that the results will be proposed as abstract for LIVES 2026 in Lisbon.
Conclusions: CCE represents an increasingly important skill for the modern ICU physician. In this article, we described 135 clinical situations in which TTE/TEE examinations where used in managing unstable patients. Our experience illustrates that CCE can be instrumental in the diagnosis, monitoring and treatment guidance of critically ill patients. Further explorations of the impact of CCE in the ICU appear warranted. Finally, we are convinced that training experience and interpretation in appropriate contexts are key for the safety of the patients. In this regard, the European Diploma in Advanced Critical Care Echocardiography (EDEC) represents an ESICM certification for intensivists with basic echocardiography skills who want to develop their expertise and advance optimal care with clinical practice guidelines.



Transesophageal ultrasound imaging of the ascending aorta (135° probe rotation). This image recorded during cardiac arrest resuscitation demonstrates a Stanford Type A aortic dissection



Transesophageal ultrasound imaging of the bicaval view (115° probe rotation). This image recorded in a postoperative cardiac surgery patient with shock demonstrates a compression of the right atrium (RA) and the superior vena cava (arrowhead) by a 'hidden' posterior pericardial clot (arrow).



Cardiac POCUS imaging with the subcostal approach in a patient with hemodynamic instability in the emergency department. This image demonstrates a massive pericardial effusion responsible for cardiac tamponade

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Topic: Imaging in intensive care

000461

Assessing dyspnea in mechanically ventilated patients: correlation between inspiratory effort and MV-RDOS

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Intensive Care Medicine Experimental, 2025*;13(1)**: ***000461.

Introduction: Dyspnea affects approximately 35–50% of mechanically ventilated (MV) patients and is among the most distressing experiences in the ICU [Demoule]. The Mechanical Ventilation Respiratory Distress Observation Scale (MV-RDOS), with a threshold of ≥ 2.6 indicating dyspnea [Decavèle], is a validated assessment tool but relies on intermittent clinician observation and subjective interpretation. Given that dyspnea is associated with accessory muscle activation, we hypothesize that patient-initiated inspiratory efforts during the insufflation phase may serve as an objective physiological marker of dyspnea.
Objectives: To evaluate whether continuous measurements of the pressure–time product of inspiratory muscle effort (PmusPTP) during the insufflation phase of a ventilator-delivered breath correlates with MV-RDOS and could serve as an objective surrogate for dyspnea in MV patients.
Methods: This IRB-approved, prospective observational study enrolled MV adults with respiratory failure of varying etiologies at three academic medical centers. Airway pressure and flow waveforms were sampled at 32.25 Hz via the ventilator data port and analyzed using a single-compartment model of the respiratory system [Otis] to compute breath-by-breath PmusPTP, both inspiratory and expiratory, during the insufflation phase [Gutierrez]. Inspiratory PmusPTP values were summed across all breaths within consecutive 131-s windows (epochs) to yield an epoch-level inspiratory PmusPTP. MV-RDOS scores were obtained twice daily by trained clinicians for up to five days. The correlation between MV-RDOS and concurrent epoch-level inspiratory PmusPTP was evaluated using Pearson's R^2.
Results: In 86 paired observations from 16 patients (Fig. 1), inspiratory PmusPTP demonstrated a strong positive correlation with MV-RDOS scores ($R^2 = 0.58$, $p < 0.0001$). Using an MV-RDOS threshold of ≥ 2.6 to indicate dyspnea, a PmusPTP cutoff of > 20 $cmH_2O{\cdot}s$ identified dyspnea with 76% sensitivity and 89% specificity.
Conclusions: Inspiratory PmusPTP correlates with MV-RDOS and may enable automated, continuous dyspnea monitoring in MV patients. Further validation is warranted.

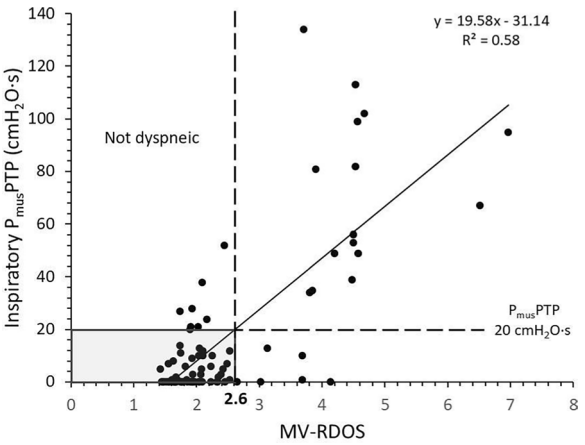


Fig. 1 (abstract 000461) Relationship of MV-RDOS to inspiratory PmusPTP

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Topic: Acute respiratory failure and mechanical ventilation

000462

Impact of frailty on mortality, functional outcome, and quality of life after out-of-hospital cardiac arrest: results from the TTM2-trial

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000462***.

Introduction: While patients with advanced age have an increased mortality risk after an out-of-hospital cardiac arrest (OHCA) [1], less is known about the impact of frailty. Frailty is described as a state or syndrome of reduced physical, physiologic and cognitive reserve with an increased vulnerability to sudden changes in health status caused by a minor illness [2]. Frailty occurs in a third of adults admitted to critical care [3], and is closely related to adverse outcomes [4], but few studies have investigated how frailty affects outcomes after an OHCA.
Objectives: We aimed to explore how frailty is associated to mortality, functional outcome, and quality of life after an OHCA.
Methods: This is an extended analysis of frailty prior to an OHCA within the Targeted Hypothermia versus Targeted Normothermia after Out-of-Hospital Cardiac Arrest (TTM2) trial. Frailty was assessed with Clinical Frailty Scale (CFS), defined CFS ≥5 and divided into fit (CFS 1–3), prefrail (CFS 4), frail (CFS 5) and severely frail (CFS 6–9). We used logistic regression to explore the association between frailty and 6-months mortality and poor functional outcome (modified Rankin Scale 4–6). At 6-months follow-up, we assessed functional decline in prefrail, frail, and severely frail survivors using Glasgow Outcome Scale – Extended, comparing it to their retrospective functional status. In all patients, we evaluated quality of life using EQ-VAS and Life Satisfaction.
Results: Out of 1861 patients, 240 (13%) were prefrail and 81 (4%) frail and 107 (6%) severely frail before the OHCA. 911/1861 (49%) were deceased at 6 months. Mortality was significantly higher with greater frailty, starting from prefrail (adjusted OR 2.85 (95% CI: 2–4.07)), with the highest odds for severely frail (adjusted OR 10.05 (95% CI: 4.82–20.95)) (Fig. 1). Withdrawal of life-sustaining therapies (WLST) was performed in 373 (26%) of fit patients, 124 (52%) of prefrail, 52 (64%) of frail and 71 (66%) of severely frail patients. Poor neurological prognosis was the reason for WLST in 214 (58%) of fit, 50 (40%) of prefrail, 20 (38%) of frail and 14 (20%) of severely frail patients. 988/1861 (53%) had a poor functional outcome at 6 months. Frailty was associated with poor functional outcome, starting from the prefrail (adjusted OR 3.15 (95% CI: 2.16—4.6)) and with the highest odds for severely frail (adjusted OR 40.92 (95% CI 9.8—170.79)) (Fig. 1). In survivors, functional decline was more pronounced with greater frailty (Fig. 2). Prefrail and frail survivors reported overall good quality of life, but slightly lower general health and life satisfaction compared to fit survivors (Fig. 3a-b).
Conclusions: Frailty was significantly associated with mortality and poor functional outcome after OHCA. When surviving, frail survivors may report acceptable quality of life.

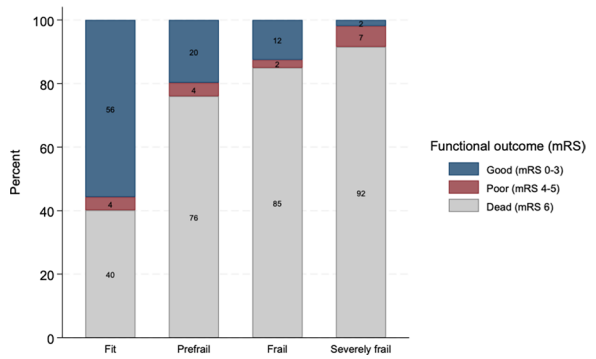


Fig. 1 (abstract 000462) Mortality and functional outcome according to mRS at 6 months

mRS modified Rankin Scale.

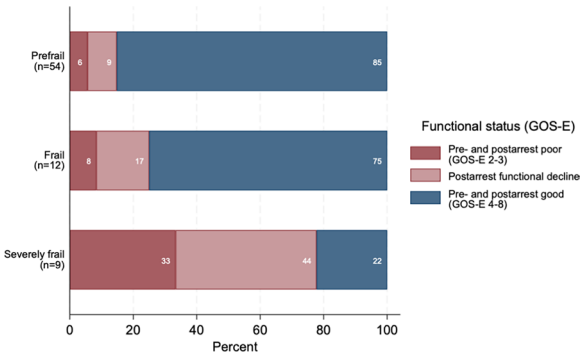


Fig. 2 (abstract 000462) Functional decline according to GOS-E at 6 months compared to pre-arrest functional status. GOS-E 2–3 was considered a poor functional status, GOS-E 4–8 a good functional status and a change from good to poor was defined as a functional decline GOS-E Glasgow Outcome Scale—Extended.

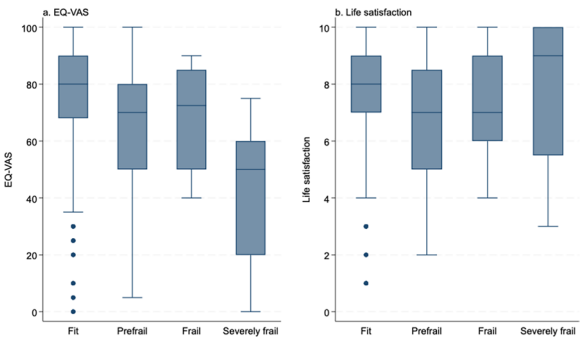


Fig 3 (abstract 000462) a-b Boxplot of patient-reported outcome of general health (EQ-VAS) and life satisfaction at 6 months. EQ-VAS: fit survivors reported in median self-rated health to 80 (IQR 68–90), prefrail in median 70 (IQR 50–80), frail in median 72.5 (IQR 50–85) and severely frail in median 50 (IQR 20–60). Life satisfaction: fit survivors reported in median life satisfaction to 8 (IQR 7–9), prefrail in median 7 (IQR 5–8.5), frail in median 7 (IQR 6–9) and severely frail in median 9 (IQR 5.5–10).
747/858 (87%) of fit survivors, 49/59 (83%) of prefrail survivors, 10/13 (77%) of frail survivors and 5/9 (56%) of severely frail survivors reported on EQ-VAS. 736/858 (86%) of fit survivors, 48/59 (81%) of prefrail survivors, 9/13 (69%) of frail survivors and 4/9 (44%) of severely frail survivors reported on life satisfaction.
EQ-VAS EuroQol-visual analogue scale.

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Knutsson Foundation, the Hans-Gabriel and Alice Trolle-Wachtmeister Foundation for Medical Research. The founding organisations had no role in the design and conduct of the study, data collection, analysis and interpretation, writing and submission of manuscript for publication.
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Topic: Cardiac arrest

000463

Pharmacist-managed therapeutic drug monitoring service in an intensive care unit

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000463***.

Introduction: In the intensive care unit (ICU), drug dosing presents challenges due to variable pharmacokinetics, such as expanded apparent volume of distribution, owing to fluid resuscitation, which can result in inadequate dosing, and end-organ dysfunction, which impacts drug clearance or metabolism. Pharmacists in the ICU are positioned to advise on individual drug dosing using therapeutic drug monitoring to maximise the efficacy of medications while minimising drug toxicity(1). Achieving therapeutic serum concentrations for medications with a narrow therapeutic range is crucial for critically ill patients.
Objectives: The aim of this study was to evaluate the impact of a pharmacist-managed therapeutic drug monitoring service in a mixed ICU of an acute general hospital on dosing optimisation and minimisation of potential adverse drug events (ADEs).
Methods: The study was conducted over three months in 2023, where clinical pharmacists reviewed the medication charts of patients admitted to the ICU and participated in daily ward rounds as part of the multidisciplinary team. Data about TDM activities carried out by pharmacists were compiled. The pharmacists provided clear guidance on timing of TDM in relation to drug administration, interpreted TDM results and provided specialised pharmacological advice following TDM results, including adjustments in dose or frequency for subsequent doses, in collaboration with ICU clinicians. Recommendations by pharmacists also took into account the patient's clinical condition, changes in renal replacement therapies, administration modes, and drug-drug interactions. All pharmacists' recommendations were evaluated by a panel of experts for their potential to prevent a potential ADE.
Results: Over the three-month period, among 164 patients admitted to the ICU, 35 patients needed TDM recommendations from pharmacists, resulting in a total of 93 interventions. The medications most frequently involved in TDM were antimicrobials (71%), comprising aminoglycosides and vancomycin, anti-epileptics (13%) and digoxin (12%). Pharmacist recommendations included requesting TDM (52%), adjusting daily dosage (16%), modifying dosing intervals or infusion rates (17%), withholding medications in cases of supratherapeutic levels (12%), changing method of administration (2%) or proposing alternative therapy in case of severe interactions (1%). The expert panel assessed the interventions to have a medium (20%) or low (80%) probability of preventing a potential ADE. Interventions with a medium probability of preventing a potential ADE included omitting the planned dose of aminoglycoside in a patient with kidney injury who was receiving a continuous replacement therapy free period, and carrying out TDM until the trough was within range; requesting TDM and proposing the need for alternative treatment due to interaction between sodium valproate and meropenem; stopping vancomycin infusion and requesting TDM due to sudden decline in renal function and development of an acute kidney injury in a patient being treated with vancomycin continuous infusion.
Conclusions: A pharmacist-managed TDM service helped optimise medication doses for drugs with a narrow therapeutic range and those with a high incidence of toxicity. Timely interpretation and appropriate management of TDM assisted in preventing potential ADEs in critically ill patients.

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Topic: Pharmacology and Toxicology/Poisoning

000465

Cerebrospinal fluid lactate and serum procalcitonin for differentiating bacterial from viral meningitis: a comparative diagnostic accuracy study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000465***.

Introduction: Distinguishing bacterial from viral meningitis remains a major challenge in emergency and intensive care settings due to overlapping clinical and biological features. While cerebrospinal fluid lactate (CSF) and serum procalcitonin analysis is a cornerstone in diagnosis, conventional markers such as white blood cells and protein levels lack specificity.
Recent studies suggest that CSF lactate and serum procalcitonin (PCT) may provide superior diagnostic accuracy.[1,2,3] However, recent studies have highlighted the potential superiority of cerebrospinal fluid lactate as a more sensitive and specific biomarker in this context.
Objectives: This study aims to compare the sensitivity and specificity of CSF lactate and serum PCT in differentiating bacterial from viral meningitis, with a focus on their respective receiver operating charasteristic (ROC) curves.
Methods: We conducted a retrospective cohort study including 220 patients (110 bacterial meningitis and 110 viral meningitis) admitted for acute meningitis to University hospital ICU between 2018 and 2023. All patients were 40 + -15 years old and underwent lumbar puncture within the first hour.
Bacterial meningitis was confirmed based on CSF culture and/or PCR positivity for bacterial pathogens whereas viral meningitis was diagnosed via viral PCR and negative bacterial cultures. CSF lactate and serum PCT were measured at admission.
Diagnostic performance was assessed using ROC curve analysis, comparing the area under the curve (AUC), sensitivity and specificity of both biomarkers.
Results: Statistical analysis used Mann–Whitney test and results expressed as mean +—standard deviation.
CSF lactate levels were significantly higher in bacterial meningitidis patients (6.2 + -1.8mmol/L) compared to viral cases (2.3 + -0.9mmo/L) $P < 0.001$.
Serum PCT was also elevated in bacterial cases compared to viral cases, respectively (4.8 + -2.5ng/ml vs 0.6 + -0.4ng/ml, $P < 0.001$).
ROC curve analysis revealed that CSF lactate had a higher area under curve AUC (0.98) compared to serum PCT AUC (0.88) with a superior sensitivity (94%) and specificity (91%) at an optimal cut-off of 3.5mmol/L (Fig. 1).

Conclusions: CSF lactate outperforms serum PCT for differentiating bacterial from viral meningitis demonstrating higher sensitivity and specificity. Its rapid availability and superior diagnostic accuracy make it a valuable biomarker in acute meningitis management. However, combining both biomarkers may enhance diagnostic accuracy particularly in early or atypical presentations.
Integrating CSF lactate into diagnostic protocols may improve early decision-making, especially in critically ill patients.

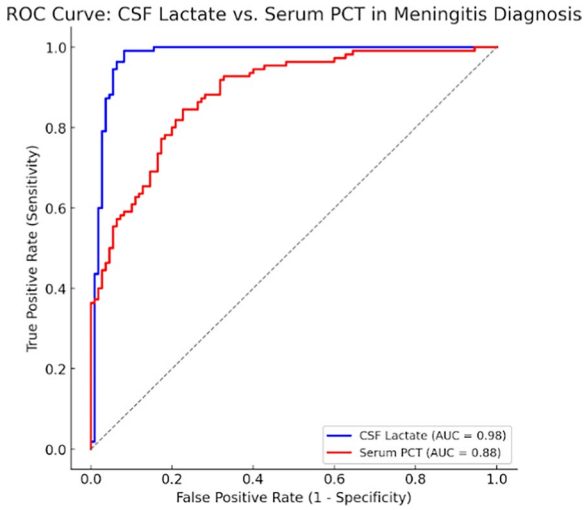


Fig. 1 (abstract 000465) ROC curve CSF lactate vs serum PCT in meningitidis diagnosis

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4 Thanks a lot to my colleagues for their collaboration

Topic: Sepsis

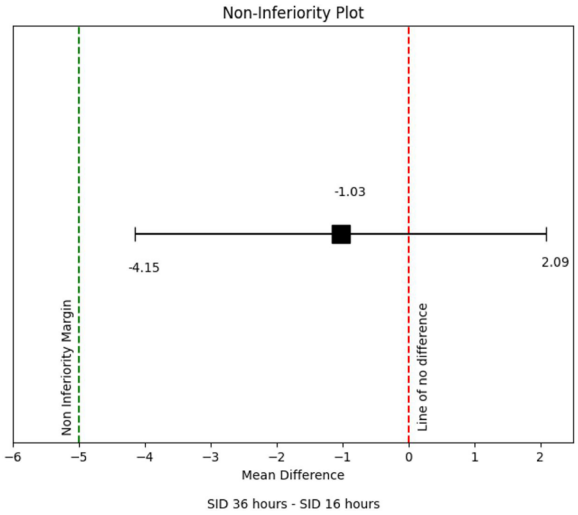
000467

Effect of pre-transplant dialysis at 36 hours versus 16 hours on strong ion difference: a non-inferiority randomized clinical trial in renal transplant recipients

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000467***.

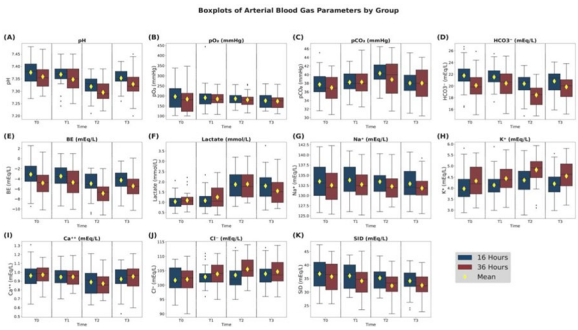
Introduction. Background: Scheduling a hemodialysis (HD) immediately prior to a renal transplant in stable end-stage renal disease patients involves extra cost, time, equipment and personnel commitment to both the healthcare system and the patients. We conducted this study to investigate if we could safely avoid dialysis 16 h prior to a scheduled live related renal transplant (LRRT).

Methods. Methods: This study was a randomized parallel arm clinical trial which recruited 75 adults on thrice weekly HD presenting for LRRT to our tertiary care center between January 2022–June 2023. Forty-eight hours prior to the planned LRRT the consenting patients were allocated to terminate elective HD at either 36 h or 16 h prior to the scheduled transplant time. Blood gases and electrolytes were sampled before induction of general anaesthesia (T0) to evaluate *non-inferiority at a margin of -5* for the mean difference (36 h-16 h) in *apparent strong ion difference* (SIDa). The intraoperative management of anaesthesia and goal-directed fluid management was as per institute protocol. The patients were followed up for intraoperative hemodynamics and post-operative graft function (creatinine, urine output and dialysis requirement till day 7).
Results: Of 191 screened, 75 (38 in 36 h vs 37 in 16 h group) patients completed the study. The mean difference of SIDa at T0 was -1.03 [95% CI, -4.15 to 2.09] demonstrating non-inferiority of 36 h HD. There was no difference in the pH or potassium at this time point. The 36 h group had higher CVP and lower PPV at T0 and maintained better MAP throughout the surgery. There was no difference in the intraoperative fluid, vasopressor requirement, acid–base balance or in the postoperative graft function.
Conclusions. Conclusion: Dialysis done 36 h before renal transplant is non-inferior to dialysis done 16 h before transplant in terms of SIDa.



Non-inferiority plot

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Boxplots of ABG parameters between groups

Topic: Perioperative care

000469

Effect of different ventilatory settings on mechanical power and [(4xΔP) + RR] index under isocapnic conditions

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Correspondence: E. Benidis.
Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000469***.

Introduction: Mechanical power (MP) reflects the transfer of energy from the ventilator to the respiratory system per unit of time [1]. It consists of three components: Elastic Dynamic MP, Elastic Static MP, and Resistive MP, with only the first being positively associated with mortality. Amato's group found that of the variables considered for calculating MP, only the driving pressure (ΔP) and respiratory rate (RR) were associated with mortality. In fact, it was found that the magnitude of the effect on mortality of each unit of ΔP is approximately four times the magnitude of the effect on mortality of each unit of RR, which led to the creation of the index [(4xΔP) + RR] [2].
Objectives: To determine the changes in mechanical power, its three components and the [(4xΔP) + RR] index, resulting from the simultaneous modification of tidal volume (VT) and respiratory rate while maintaining isocapnic conditions.
Methods: The study was carried out in 2024 in the ICUs of the "Sotiria" and "Sismanogleio" General Hospitals of Athens. The study included hemodynamically stable, intubated and mechanically ventilated adult patients, without their own respiratory effort. Patients were ventilated with 6, 8 and 10 ml/kg of predicted body weight (in random order) in Assist Volume Control mode, while simultaneously varying the respiratory rate to achieve isocapnic conditions, i.e. PaCO2 with a deviation of less than 5% of the initial value. The other ventilatory settings remained unchanged. Subsequently, for each tidal volume, MP [0.098 × MV x (Ppeak—ΔP/2)], elastic static MP [0.098 × MV x PEEP], elastic dynamic MP [0.098 × MV x ΔP/2], resistive MP [0.098 × MV x (Ppeak—Pplateau)], and the index [(4xΔP) + RR] were calculated [2,3]. The statistical significance level was set at $p < 0.05$.
Results: The study enrolled 36 patients. The mean age was 66.75 ± 14.09 years and the mean compliance 45,71 ± 15,57 ml/cmH2O. 36% had pneumonia. Mechanical power, elastic static MP and resistive MP, all are decreased statistically significantly as the tidal volume increases from 6, to 8 and finally to 10 ml/kg of PBW (p-value < 0.005 between all three tidal volumes). Changes in VT from 6 to 8 ml/kg of PBW as well as from 6 to 10 ml/kg of PBW are significantly associated with an increase in elastic dynamic MP (p-value < 0.005 for both) (Fig. 1). A significant positive association was found between VT changes and the [(4xΔP) + RR] index, both when VT increased from 6 to 10 ml/kg of PBW (p-value < 0.005) and from 8 to 10 ml/kg of PBW (p-value = 0.011) (Fig. 2).
Conclusions: As the tidal volume increases under isocapnic conditions, mechanical power decreases due to the decrease in minute ventilation, which in turn causes a decrease in elastic static MP and resistive MP. On the contrary, the indices that are best associated with both mortality and the pathophysiology of ventilator-induced lung injury, namely elastic dynamic MP and the [(4xΔP) + RR] index, show an increasing trend as the driving pressure increases.

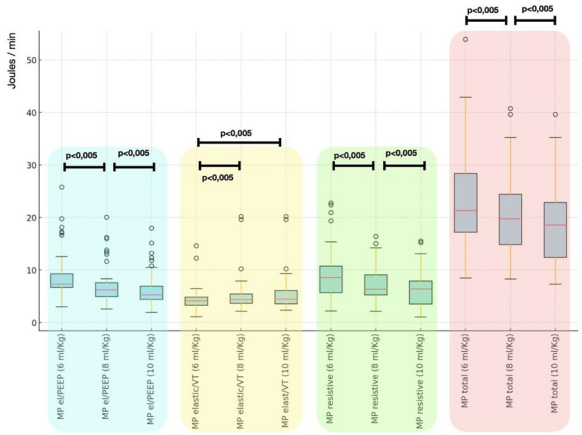


Fig. 1 (abstract 000469) Box plot for elastic static MP (blue), elastic dynamic MP (yellow), resistive MP (green) and total mechanical power (red) for tidal volumes of 6, 8 and 10 ml/kg of PBW.

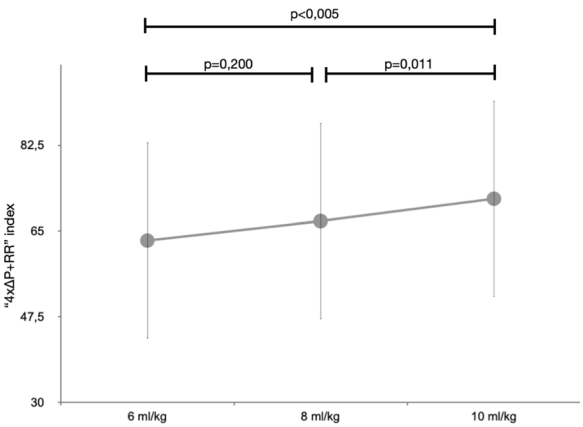


Fig 2 (abstract 000469) The mean and standard deviation of the [(4xΔP) + RR] index for tidal volumes of 6, 8 and 10 ml/kg of PBW

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Topic: Acute respiratory failure and mechanical ventilation

000473

The impact of the antimicrobial stewardship program on antibiotic use and resistance patterns: a quasi-experimental study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000473***.

Introduction: The indiscriminate use of antibiotics has resulted in the rise of multidrug-resistant (MDR) organisms in intensive care units (ICU) and the global threat of antibiotic resistance. Antimicrobial Stewardship Programs (ASPs) are coordinated efforts designed to promote the judicious use of antimicrobials, improve patient outcomes, decrease microbial resistance, and reduce the spread of multidrug-resistant infections. (1–3).
Objectives: This study aimed to evaluate the impact of an ASP on antibiotic consumption and antimicrobial resistance in a tertiary cardiac center in Egypt.
Methods: A quasi-experimental study was conducted in the adult critical care unit at our centre from July 1, 2023, to June 30, 2024, comparing antimicrobial consumption estimated by defined daily dose (DDD) per 1000 patients and antimicrobial resistance before and after the implementation of the ASP.
Results: During the pre-intervention phase, 1000 patients were admitted to the ICU, while in the post-intervention period, 982 patients were admitted to the ICU. Following the Antibiotic Stewardship Program (ASP) implementation, the mean monthly antimicrobial utilization decreased by 23%, from 14,414 to 11,012 DDD per 1,000 bed days ($p = 0.097$).
Colistin consumption significantly decreased, dropping from 817 to 53 DDD per 1,000 bed days after the intervention ($p = 0.006$). Colistin is one of the most frequently used drugs for treating multidrug-resistant organisms (MDRO), and this decrease in consumption may be attributed to a reduction in resistance rates.
Additionally, there was a drop in tigecycline use, with a mean reduction of 36 DDD per 1,000 bed days ($p = 0.16$). Ceftazidime–avibactam consumption decreased from 163 to 27 DDD per 1,000 patient days ($p = 0.2$).
There was also a slight increase in meropenem consumption, from 1,169 to 1,258 DDD per 1,000 patient days. This increase in meropenem usage may be due to a decrease in the percentage of carbapenem-resistant Enterobacteriaceae.
The consumption of levofloxacin, trimethoprim–sulfamethoxazole, and linezolid also increased, but not significantly. The mean total monthly consumption of these three drugs increased by 59 DDD per 1,000 patient days for levofloxacin ($p = 0.9$), 147 DDD per 1,000 patient days for trimethoprim-sulfamethoxazole ($p = 0.97$), and 12 DDD per 1,000 patient days for linezolid ($p = 0.73$). This increase may be attributed to a rise in the IV to oral switch rate. (Figure A).
There was a significant reduction in the percentage of carbapenem-resistant Enterobacteriaceae from 40 to 30% ($p < 0.001$). (Figure B).
Conclusions: Implementing an ASP in the critical care unit significantly improved antibiotic consumption and reduced antimicrobial resistance, emphasizing its value in addressing the challenges of antimicrobial misuse and resistance in resource-limited settings.

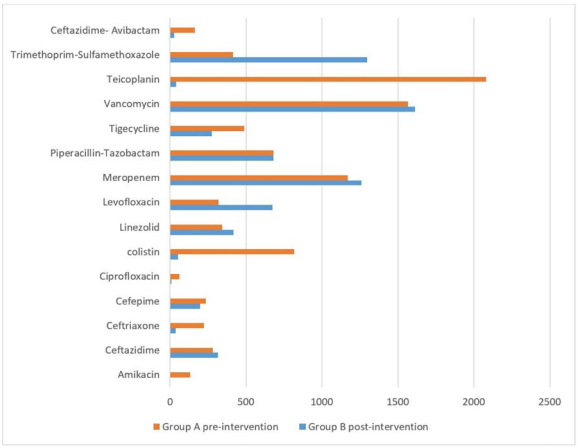


Figure A (abstract 000473) Comparison of total monthly antimicrobial consumption, expressed as defined daily doses (DDD) per 1,000 bed-days, during the pre-intervention and post-intervention phases

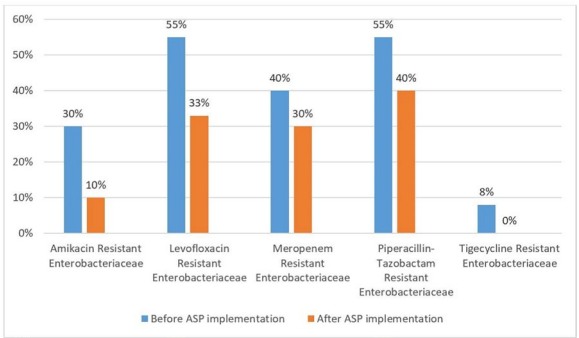


Figure B (abstract 000473) Comparison of antibiotic resistance patterns in the pre-intervention and post-intervention phases

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Topic: Sepsis

000475

Diagnostic of lateral flow (LFA) and enzyme-linked immunosorbent assay (ELISA) to detect the Aspergillus galactomannan levels in bronchoalveolar lavage fluid: impact on antifungal use

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000475***.

Introduction: Invasive pulmonary aspergillosis (IPA) represents a severe fungal infection with high morbimortality among individuals (1). The diagnosis, based on EORTC criteria, supposes a challenge on clinical practice, since cultures are often unreliable given the slow growth of *Aspergillus* species in vitro *(2)*. Moreover, the detection of galactomannan antigen (GM) by ELISA is not usually available 24 h a day, which also makes rapid diagnosis difficult. Novel qualitative molecular techniques such as the lateral flow assay (LFA) may provide the detection of galactomannan on the bedside and further determine the prompt initiation of antifungal therapy.

Objectives: To evaluate the performance of lateral flow assay for galactomannan (LFA) on bronchoalveolar lavage (BAL) samples for the diagnosis of IPA among critical care patients and its impact on antifungal use.

Methods: Multicentric, retrospective analysis of BAL samples gathered from ICU patients between July 2022 and December 2024 in whom IPA was suspected and galactomannan determination were performed: Lateral Flow Assay (IMMY™, Norman Oklahoma USA) and quantitative ELISA (Platelia®, BioRad®); as well as conventional culture. ELISA GM was considered positive using an optical index threshold of ≥ 1.

Risk factors for fungal infections, epidemiological characteristics as well as microbiological testing results and treatment before and after the results were collected. IPA diagnosis was established by BM-AspICU criteria (3).

Overall performance of each test was calculated and compared, using Cohen's Kappa. Statistical analysis was performed by classical T and Chi-squared test.

Approval from the local ethics committee was obtained (SICEIA-2024–002428).

Results: In total, 243 BAL samples from 194 ICU patients were collected. The main admission diagnosis recorded was acute respiratory failure (69%) followed by sepsis or septic shock (25%). 45% of patients presented immunosuppression, being high doses of corticosteroids (45%), active immunosuppressive treatment (31%) and onco-hematological malignancy (21%) the most common. A total of 34 cases of probable IPA (17,5%) were diagnosed. Neutropenia (OR 5.1, 95% CI 1.3–22), solid neoplasia (OR 4.31, 95% CI 1.09–16) and HIV infection (OR 5.15, 95% CI 1.04–26) were found as risk factors for IPA.

Test performances are shown in Table 1. As stated, LF-GM yields a consistent NPV value for either ELISA or culture, over 90% in both cases. PPV, however, was found low in both Lateral Flow and ELISA compared with culture (Fig. 1). There was an association between a discordant LF + /ELISA-case with lower median optical indexes on ELISA when compared to LF + /ELISA + (2,32 vs. 5,2, p < 0.05) (Fig. 2).

Table 1.(abstract 000475) Performance statistics of the different methods studied

	Accuracy	Kappa	Sensitivity	Specificity	PPV	NPV
LF vs. ELISA	0.88	0.56	0.65	0.92	0.62	0.93
LF vs. culture	0.87	0.46	0.74	0.89	0.40	0.97
ELISA vs. culture	0.91	0.62	0.91	0.91	0.53	0.99

Regarding the consequences of LF results, its result had a statistically significant effect on antifungal treatment. LF positiveness led to antifungal initiation or maintenance on 75% of cases, whereas on negative LF withholding antifungals or suspension if started were the most frequent actions (90%). On the 17 cases where ELISA was found negative after prior positive LF, treatment was suspended on 83% of patients.

Conclusions: Lateral flow galactomannan assay presents a high negative predictive value and concordance with ELISA and fungal culture, providing support on the physician decision to treat suspected IPA patients in the ICU. Higher positive predictive values may be obtained with higher optic index positive threshold although more evidence is necessary. In our series, false-positive LF does not induce antifungal overtreatment and its use had an overall positive effect on rationalized antifungal use.

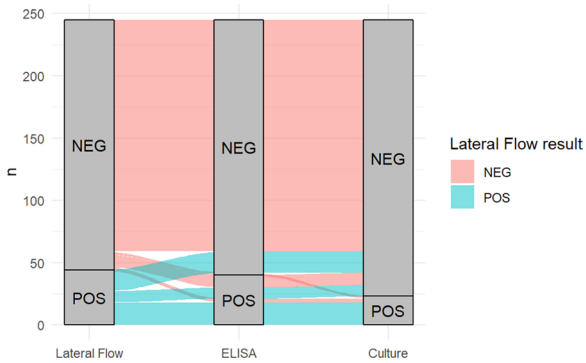


Fig. 1 (abstract 000475) Alluvial plot representing the concordance between Lateral Flow Assay, ELISA and conventional culture regarding the detection of fungi (either positive galactomannan in the former or aspergillus spp. in the later).

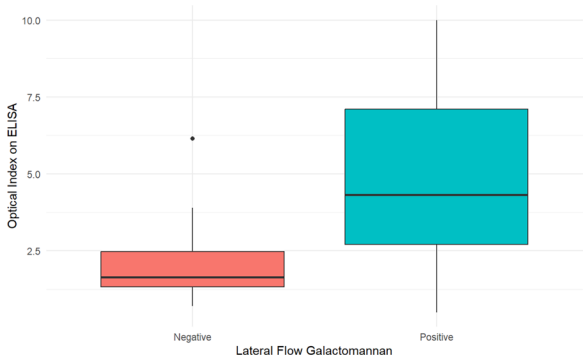


Fig. 2 (abstract 000475) Boxplot representing the distribution of ELISA Optical index value for galactomannan determination

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Topic: Sepsis

000477

Plasma calprotectin as a marker of infection in patients requiring intensive care or undergoing major surgery—a prospective observational study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000477***.

Introduction: Differentiating infection from sterile inflammation is often difficult, particularly when underlying inflammatory processes are active, e.g. during chemotherapy or after surgery/trauma. To prevent unnecessary antibiotic prescriptions and needless investigation, a reliable and rapid diagnostic tool is required. Calprotectin is released into the circulation by activated immune cells and could represent a useful diagnostic option.
Objectives: To assess the diagnostic performance of calprotectin for an adjudicated diagnosis of infection, and to compare it against established biomarkers in two specific patient populations.
Methods: Patients undergoing major elective non-cardiac surgery and patients in whom infection was suspected during their intensive care unit (ICU) admission were prospectively enrolled in this observational single-centre study. Diagnostic adjudication was performed retrospectively by experienced physicians after reviewing patient files including microbiology data, blinded to calprotectin measurements. For patients undergoing surgery, post hoc adjudication was performed according to the Standardised Endpoints in Perioperative Medicine (StEP) initiative.[1] For ICU patients, an adjudicated diagnosis was made of no infection, low probability, high probability, or definite infection.
Results: 84 patients (median age 65 years [IQR 55–71]), of whom 74 (88%) had active cancer, were recruited after major non-cardiac surgery. 34 (40%) were adjudicated to have post-operative infection. Plasma calprotectin levels were low pre-operatively (median 0.34 mg/l [IQR 0.12–0.75]) with a clear rise in the post-operative samples (Fig. 1A). However, the calprotectin level could not discriminate between infection and inflammation (Table 1). By comparison, C-reactive protein (CRP) showed higher concentrations in patients with infection from postoperative day 1–2 onwards and better diagnostic discrimination.
98 ICU patients (median age 58 years [IQR 46–70]) were also enrolled, of whom 34 (34%) had an adjudicated post hoc diagnosis of high probability or confirmed infection. Overall median plasma calprotectin level in the first sample taken was 3.0 mg/l [IQR 2.0–6.0], again with poor ability to differentiate infectious from non-infectious processes (Fig. 1B). This remained the same over subsequent days. No other measured biomarker (CRP, white cell count, neutrophil count, interleukin-6) was able to consistently differentiate between definite/high probability infection and zero or low probability infection.

Table 1: (abstract 000477) Diagnostic discrimination of calprotectin and CRP for an adjudicated diagnosis of infection in patients undergoing major non-cardiac surgery at different sample timepoints.

Biomarker	Sample time	AUC [95%-CI]
Calprotectin	Post-op d0	0.54 [0.41–0.67]
CRP	Post-op d0	0.51 [0.35–0.66]
Calprotectin	Post-op d1-2	0.58 [0.42–0.73]
CRP	Post-op d1-2	0.70 [0.58–0.82]
Calprotectin	Post-op d5-7	0.65 [0.42–0.88]
CRP	Post-op d5-7	0.77 [0.66–0.88]

Conclusions. In this study, calprotectin could not discriminate reliably between infectious and sterile inflammation in two cohorts from different hospital settings. While CRP concentrations were more useful from days 1–2 onward in surgical patients, rapid and accurate diagnosis of infection in ICU patients remains a major challenge.

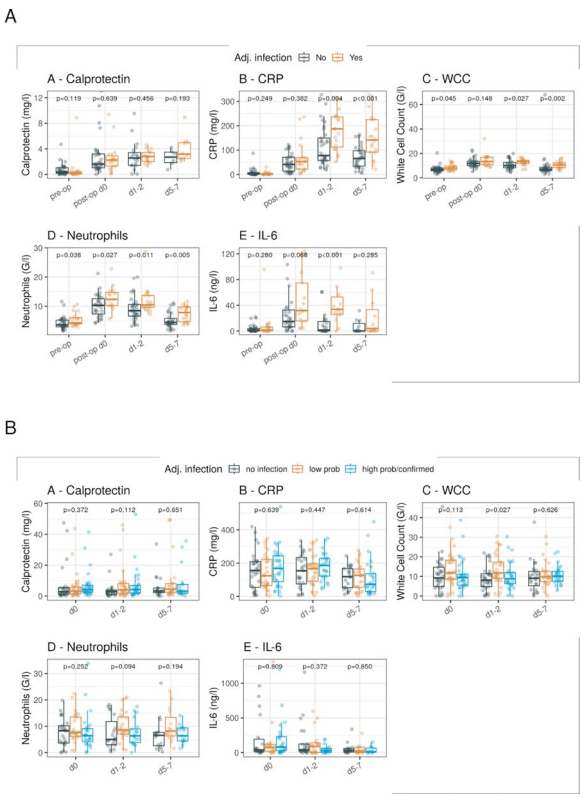


Figure 1 (abstract 000477) Longitudinal dynamic of biomarkers in patients undergoing major non-cardiac surgery (A) and patients with suspected infection on the intensive care unit (B). Patients are stratified by their adjudicated diagnosis

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Topic: Infections and prevention

000478

The impact of hospital case-volume on outcomes for patients receiving interventional therapies for pulmonary embolism across the United States 2016–2022.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000478***.

Introduction: Interventional therapies for pulmonary embolism (PE) are becoming increasingly prevalent for the treatment of intermediate and high-risk PE, including catheter directed thrombolytics (CDT) and mechanical thrombectomy (MT). There is widespread evidence in other endovascular interventional therapies that high volume centers have improved outcomes and less complications, including percutaneous coronary intervention, and interventional stroke thrombectomy.1–3 However, it is unknown if these benefits of higher volume translate to interventional therapies for PE.
Objectives: To investigate the relationship between increasing yearly hospital case volume for interventional therapies and all-cause in-hospital mortality in patients admitted with PE across the United States.
Methods: We conducted a retrospective cohort analysis of all adults (^{3}18 years) admitted to hospital in the US with PE that received interventional therapies between 2016 and 2022. Both the diagnosis of PE and the use of interventional therapies were identified using ICD10 codes. If patients had both CDT as well as MT, we characterized them as belonging to the MT group. For classification of case-volume, we utilized a continuous variable as well as creating the following annual case volume categories: 1–25 cases per year, 26–50 cases per year, 51–75 cases per year, > 75 cases per year. Multivariate logistic regression modelling was used to model adjusted all-cause in-hospital mortality and included mechanical ventilation, cardiac arrest, age, sex, and co-morbidities.
Results: We identified 24,122 patients who underwent interventional therapies while hospitalized for PE from the 2016–2022 NIS samples. Of these patients, 14,691 (60.1%) underwent CDT, whereas 9,431 (39.1%) underwent MT. The total number of procedures at each type of hospital was: 1–25 cases 14,899 (61.8%), 26–50 cases 6,183 (25.6%), 51–75 cases 2,040 (8.5%), > 75 cases 1,000 (4.2%). Mortality in the low-volume (1–25/year) centers was 8.9% compared to 5.7% at the high-volume (> 75/year) centers ($p < 0.01$). After multivariate adjustment, increasing hospital-case volume was associated with a significantly reduced risk of mortality (odds ratio (OR) 0.96 per 10 case/year increase, 95% confidence interval (CI) 0.94–0.98, $p < 0.01$). Patients were transferred in from other hospitals to high-volume (> 75/year) centers more frequently than low-volume centers (18.6% vs 33.3%, $p < 0.01$).
Conclusions: Performance of interventional therapies for PE at higher volume centers was associated with lower risk of all-cause in-hospital mortality. Further studies are needed to better characterize this relationship.

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Topic: Cardiovascular issues in ICU

000481

Differences in positive end-expiratory pressure and ventilation distribution determined by decremental PEEP titration among ventilator modes: final report

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000481***.

Introduction: In acute respiratory distress syndrome (ARDS), setting an appropriate level of positive end-expiratory pressure (PEEP) is critical, yet the optimal method for determining PEEP remains unclear. Recently, electrical impedance tomography (EIT)-based methods for PEEP titration have been investigated; however, no standardized approach regarding ventilator mode has been established. An interim analysis of this study was presented at the ESICM 36th annual congress, and the current report presents the final analysis.
Objectives: To compare the optimal PEEP levels determined by decremental PEEP titration using EIT across three different mechanical ventilation modes.
Methods: This study enrolled adult patients (aged $\geq$ 18 years) with ARDS who were admitted to the intensive care unit of Tokyo Bay Urayasu Ichikawa Medical Center and received continuous neuromuscular blockade. Exclusion criteria included pregnancy, the presence of a chest drain, recent thoracic surgery (within 1 week), contraindications to EIT, and hemodynamic instability. Decremental PEEP titration was performed from 22 cmH_2O to 4 cmH_2O in 3 cmH_2O steps. Three ventilation modes—pressure-controlled ventilation (PCV), volume-controlled ventilation with a square waveform, and volume-controlled ventilation with a decelerating waveform—were tested in random order in each patient. The overdistension-collapse (O/C) cross point and the anteroposterior (A/P) point, defined as the PEEP level at which ventilation is evenly distributed between ventral and dorsal lung regions, were identified via offline EIT analysis and compared across modes.
Results: Seventeen patients were included (13 men [77%], mean body mass index 27.0 $\pm$ 6.75). The pre-titration P/F ratio was 124 $\pm$ 36.6, and respiratory compliance was 33.3 $\pm$ 10.0 mL/cmH_2O. The A/P points were 11.1 $\pm$ 4.27 cmH_2O in PCV, 12.9 $\pm$ 4.55 cmH_2O in square waveform VCV, and 11.9 $\pm$ 4.21 cmH_2O in decelerating waveform VCV. The square waveform VCV had significantly higher A/P points than the other two modes ($P < 0.05$). The O/C points were 11.9 $\pm$ 2.75 cmH_2O in PCV, 12.71 $\pm$ 2.94 cmH_2O in square waveform VCV, and 13.2 $\pm$ 3.04 cmH_2O in decelerating waveform VCV. PCV showed significantly lower O/C points compared to the other modes ($P < 0.05$).
Conclusions: This study demonstrates that the optimal PEEP determined by EIT-based titration may vary depending on the ventilator mode used. These findings suggest that ventilator mode should be considered when setting PEEP in patients with ARDS.

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Topic: Acute respiratory failure and mechanical ventilation

000482

Mean arterial pressure to norepinephrine equivalent dose ratio—a potential indicator of treatment response and short-term mortality in critically ill septic patients undergoing blood purification therapy

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000482***.

Introduction: Mean arterial pressure to norepinephrine equivalent dose ratio (MAP/NEQ index), has recently gained attention as a prognostic tool in critical care, including for predicting intensive care unit (ICU) mortality [1] and guiding nutritional or renal support interventions [2; 3] However, its outcome prediction utility in the setting of blood purification therapies, particularly devices such as the Oxiris hemofilter, remains underexplored. Beyond its renal support function, the Oxiris filter has demonstrated potential in sepsis management by adsorbing cytokines and pathogen- or damage-associated molecular patterns, potentially improving immunological response and reducing septic shock. Early identification of patients who are likely to benefit from Oxiris-based continuous renal replacement therapy (CRRT) may improve clinical outcomes and survival predictability.
Objectives.
To assess the prognostic value of the MAP/NEQ index and its dynamic change (Δ) over time during CRRT in predicting short-term ICU mortality.
To evaluate MAP/NEQ index association with immunological response severity (indicated by interleukin-6 (IL-6) levels) and microcirculatory dysfunction (serum lactate levels).
Methods: This retrospective observational study included 15 critically ill sepsis patients treated with Oxiris-based CRRT in the ICU in Pauls Stradins Clinical University hospital from 2022 until 2025. MAP, NEQ, IL-6, lactates were recorded at 0, 6, 12, and 24 h after initiation of CRRT. NEQ dose was calculated as: norepinephrine (μg/kg/min) + 2.5 × vasopressin (U/min) [4]. The primary endpoint was 7-day mortality following CRRT treatment initiation. The ΔMAP/NEQ index was defined as the difference between the final (24 h) and initial (0 h) recorded values. SPSS v29 was used for statistical analysis.
Results: CRRT was initiated at a median of 4 h (IQR: 2.00—18.75) following ICU admission. Four patients (27%) died within the first week of ICU admission and CRRT initiation due to complications of septic shock. In two cases (13%), vasopressor support was no longer required to maintain adequate blood pressure 24 h after CRRT initiation. Survivors demonstrated a significantly higher ΔMAP/NEQ index (754.80 ± 404.50 mmHg·min/kg/μg) compared to non-survivors (–97.11 ± 145.35 mmHg·min/kg/μg), as determined by the Mann–Whitney U test ($U = 6.000$, $p < 0.05$) (Fig. 1). ROC analysis yielded an AUC of 0.864 (95% CI: 0.665–1.000; $p < 0.05$), indicating good discriminative ability (Fig. 2). A cutoff of ≥ 94.4 for ΔMAP/NEQ index predicted 7-day survival with 72.7% sensitivity and 75% specificity. Spearman correlation analysis revealed significant negative associations between initial MAP/NEQ index and lactate (rho = -0.486, $p < 0.05$), initial MAP/NEQ index and IL-6 (rho = -0.609, $p < 0.05$), and ΔMAP/NEQ index and 7-day mortality (rho = –0.558, $p < 0.05$).
Conclusions: Dynamic changes in the MAP/NEQ index during CRRT may serve as a non-invasive, real-time indicator of treatment response and short-term prognosis. Higher ΔMAP/NEQ index was associated with better survival outcomes and inversely correlated with inflammatory markers and microcirculation dysfunction. These findings support the integration of MAP/NEQ index monitoring into clinical decision-making for patients undergoing Oxiris-based CRRT. Although the sample size is limited, ROC analysis suggests ΔMAP/NEQ index may have prognostic utility, meaning further research is needed.

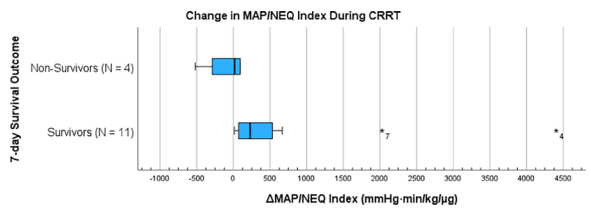


Fig 1 (abstract 000482) Changes in mean arterial pressure to norepinephrine equivalent dose ratio during the first 24 h of CRRT. Survivors demonstrated significantly greater increases in the ΔMAP/NEQ index compared to non-survivors. Individual outliers are shown as separate data points
Abbreviations:
CRRT—continuous renal replacement therapy; MAP—mean arterial pressure; NEQ—norepinephrine equivalent dose.

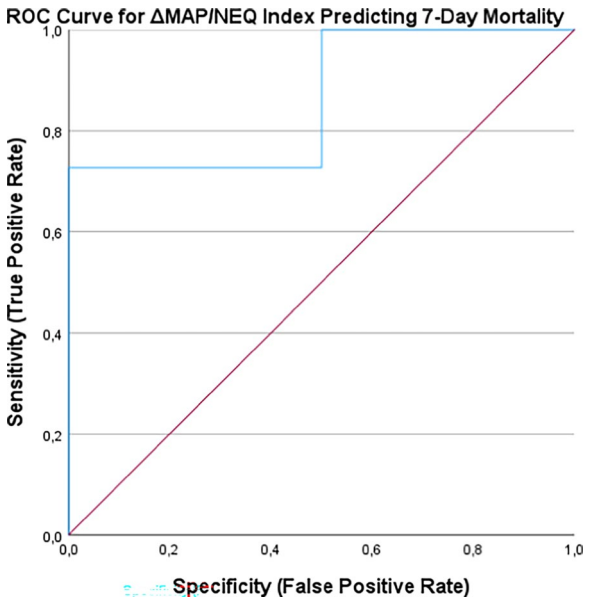


Fig 2 (abstract 000482) Receiver-operating characteristic curve evaluating change in mean arterial pressure to norepinephrine equivalent dose ratio during the first 24 h of CRRT as a predictor of 7-day mortality. The area under the curve indicates good discriminative performance.
Abbreviations:
CRRT—continuous renal replacement therapy; MAP—mean arterial pressure; NEQ—norepinephrine equivalent dose; ROC—receiver-operating characteristic.

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Topic: Acute Kidney Injury and haemofiltration

000483

Association between 24-hour fluid balance and hospital mortality in ICU patients with decompensated heart failure: a retrospective single-center study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000483***.

Introduction: Optimal fluid management in ICU patients with congestive heart failure (CHF) remains unclear. Recent studies in general CHF populations suggest that early net fluid removal may improve symptoms, preserve organ function, and reduce adverse outcomes [1]. However, evidence in ICU-specific CHF cohorts is limited. We aimed to evaluate whether 24-h net fluid balance is associated with hospital mortality in critically ill CHF patients requiring intensive care.
Objectives: To assess the association between 24-h net fluid balance after ICU admission and hospital mortality in CHF patients requiring critical care.
Methods: We conducted a retrospective observational study in a tertiary hospital ICU in Japan. Adult patients admitted between April 2016 and March 2023 with CHF who received diuretics or active fluid removal within the first 24 h were included. Patients were divided into two groups based on their 24-h net fluid balance. The cutoff value used for stratification was determined during analysis. The primary outcome was hospital mortality. Secondary outcomes included ICU mortality, ICU-free days (defined as 28-day minus ICU stay, with deaths scored as 0), hospital-free days, and 24-h urine output. Crude and adjusted absolute differences (95% CI) were reported.
Results: Among the 191 patients included, the median age was 75 years (IQR: 63–82), 126 (66.0%) were male, 118 (61.8%) received invasive mechanical ventilation, and 36 (18.8%) were chronic hemodialysis patients at ICU admission. Based on a cutoff of − 1070 mL, 96 patients were classified into the More Negative balance group and 95 into the Less Negative or Positive balance group. Hospital mortality was 8.3% in the More Negative group vs. 15.8% in the Less Negative or Positive group (p = 0.025), and ICU mortality was 1.0% vs. 5.3% (p = 0.209). ICU-free days were 25 vs. 24; crude difference + 2.8 days (95% CI: 1.1 to 4.4). Hospital-free days were 8 vs. 4; crude difference + 1.6 days (95% CI: − 0.4 to 3.7). Furosemide dose over 24 h was higher in the Less Negative group (median 60.0 vs. 40.0 mg, p = 0.158). After adjusting for baseline characteristics, hospital mortality was slightly higher in the More Negative balance group (adjusted difference: + 3.2%, 95% CI: − 2.1 to + 8.5), although the confidence interval included zero. In contrast, ICU mortality was slightly lower (− 1.3%, 95% CI: − 4.8 to + 2.2). The More Negative group also had more ICU-free days (adjusted difference: + 1.7 days, 95% CI: 0.3 to 3.0), while hospital-free days were similar between groups (+ 0.6 days, 95% CI: − 1.3 to 2.6).
Conclusions: In critically ill CHF patients who received early diuresis or fluid removal, a more negative 24-h net fluid balance was associated with more ICU-free days and lower unadjusted hospital mortality. However, adjusted analyses did not confirm a significant mortality benefit.

	24-h Net Fluid balance			
	Less negative or positive balance (n= 95)	More Negative balance (N= 96)	Crude absolute difference	Adjusted absolute difference
In total (ml)	1099 (776, 1547)	773 (564, 1039)	-384 (-563, -205)	-411 (-600, -222)
Out total (ml)	1385 (1086, 1739)	2623 (2190, 3464)	1462 (1218, 1706)	1437 (1181, 1693)
ICU death, n (%)	5 (5.3)	1 (1.0)	-4.2 (-9.2, 0.7)	-1.3 (-4.8, 2.2)
Hospital death, n (%)	15 (15.8)	8 (8.3)	-7.5 (-16.6, 1.7)	3.2 (-2.1, 8.5)
28-ICU-free days (days)	24 (21, 25)	25 (24, 26)	2.8 (1.1, 4.4)	1.7 (0.3, 3.0)
28-hospital free days (days)	4 (0, 13)	8 (0, 14)	1.6 (-0.4, 3.7)	0.6 (-1.3, 2.6)

Crude and adjusted absolute differences in clinical outcomes between patients with a more negative versus less negative or positive 24-hour net fluid balance after ICU admission. Adjusted absolute differences were calculated after accounting for baseline characteristics.

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2 No specific funding was received.

Topic: Cardiovascular issues in ICU

000484

Impact of ventilation mode on lung injury in an acute respiratory distress syndrome model with strong inspiratory effort promoting double triggering

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000484***.

Introduction: In active ARDS patients, double triggering and breath stacking may promote lung injury due to increased lung stress and strain. In this animal model study, we tested the hypothesis that double triggering under volume control ventilation (VCV) would result in more severe lung injury compared to pressure control ventilation (PCV).
Methods: Seventeen pigs (average weight approximately 30 kg) were studied and allocated to either the VCV group (n = 9) or the PCV group (n = 8). Mild lung injury was induced by saline lung lavage followed by 1 h of injurious ventilation. Subsequently, inspired CO_2, flow rate, and inspiratory time were adjusted to achieve a double-triggering rate of 50–70% over a 3-h mechanical ventilation period. In the VCV group, tidal volume was set at 7 ml/kg, while in the PCV group, inspiratory pressure was titrated to achieve a tidal volume of 6–8 ml/kg.
Results: During double triggering, the VCV group exhibited higher tidal volume, airway and transpulmonary plateau pressure, and driving pressure. This resulted in greater minute ventilation and smaller spontaneous efforts, as assessed by ΔPes and Pmus (Table 1).
Lung injury scores tended to be higher in the PCV group (VCV: 2.00 [2.00–3.00] vs. PCV: 3.00 [3.00–5.25], p = 0.170), although the difference was not statistically significant. However, the Cliff's delta value of 0.60 suggests a moderate to large effect size, indicating a trend toward more severe lung injury in the PCV group compared to the VCV group.

Variable	VCV groupMedian [IQR]	PCV groupMedian [IQR]	p-value
FiO2	0.50 [0.33–0.60]	0.65 [0.47–0.70]	0.1059
PEEP (cmH2O)	8.57 [8.39–9.05]	7.30 [6.12–8.11]	0.1996
Respiratory rate (min-1)	44.00 [41.00–51.50]	30.50 [28.19–40.25]	0.0302
Tidal volume single (ml)	234.00 [211.50–279.00]	182.00 [166.12–199.50]	0.0055
Tidal volume double (ml)	410.50 [349.75–474.50]	177.75 [166.19–199.06]	0.001
MV (L/min)	20.69 [15.70–24.45]	9.86 [8.30–10.91]	0.0016
Paw_plt single (cmH2O)	21.39 [20.26–25.45]	16.79 [15.48–19.22]	0.0274
Paw_plt double (cmH2O)	32.02 [29.92–36.57]	18.26 [17.29–19.20]	< 0.0001

Variable	VCV groupMedian [IQR]	PCV groupMedian [IQR]	p-value
Delta Paw single (cmH2O)	12.47 [11.21–16.72]	10.00 [8.70–11.92]	0.0745
Delta Paw double (cmH2O)	23.47 [22.61–27.69]	11.23 [9.52–11.91]	< 0.0001
PL_plt single (cmH2O)	9.81 [9.68–15.21]	7.58 [5.54–13.38]	0.1672
PL_plt double (cmH2O)	20.11 [17.69–28.05]	8.81 [7.44–11.25]	0.001
Delta PL single (cmH2O)	9.62 [8.24–11.93]	7.87 [6.59–9.77]	0.1139
Delta PL double (cmH2O)	18.95 [17.96–25.01]	8.14 [7.57–9.24]	< 0.0001
Delta Pes (cmH2O)	4.15 [3.46–6.35]	6.96 [6.29–8.13]	0.0464
Pmus (cmH2O)	7.75 [5.08–9.23]	10.56 [8.66–11.71]	0.0592

MV: minute ventilation, Paw: airway pressure, PL: transpulmonary pressure, plt: plateau, Pes: esophageal pressure, Pmus: muscular pressure.
Conclusions: Double triggering induced higher lung stress and strain in the VCV group compared to the PCV group. Conventional protective thresholds for volume and pressure were exceeded because of breath stacking in VCV but not in PCV. Paradoxically, the PCV group tended to develop more severe lung injury, although the difference did not reach statistical significance, possibly due to limited statistical power. Double triggering markedly increased minute ventilation in the VCV group but not in the PCV group, promoting stronger inspiratory efforts in the PCV group to compensate for CO_2 retention. While intra-tidal recruitment was not directly assessed, we speculate that in the PCV group, spontaneous effort may have contributed to lung injury through atelectrauma, even in the absence of overt lung overdistension.

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1 We would like to express our sincere gratitude to Dr. Giacomo Bellani for his valuable advice and insightful comments, which greatly contributed to the development of this work.

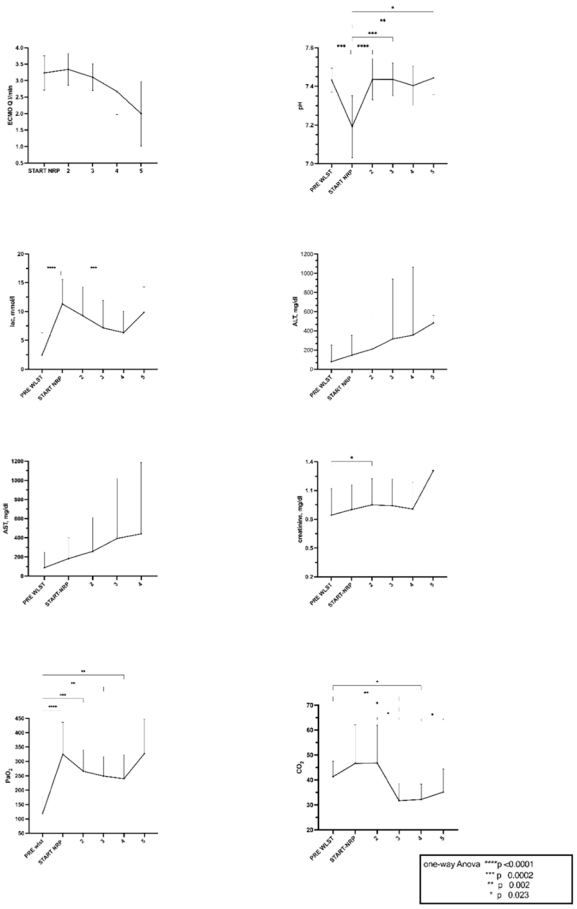
Topic: Acute respiratory failure and mechanical ventilation

000488

REVIVE-20 "REgional perfusion and VIability Evaluation after 20-min no-touch in DCD"

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000488***.

Introduction: Donation after Circulatory Death (DCD) has emerged as effective strategy to expand abdominal donor pool. Despite initial skepticism about the viability of organs exposed to warm ischemia, the implementation of Normothermic Regional Perfusion (NRP) with extracorporal membrane oxygenation (ECMO) improved functional outcomes allowing for restoring oxygenated blood flow post-mortem.(1–4).
Objectives: The study aims to explore the correlation between perfusion flows during NRP and the metabolic and organ biomarkes (ph, pao2, pCo2, lactates, alanine transaminase (ALT), aspartate aminotransferase (AST) and creatinine). All of these parameters are routinely used to assess organs suitability and quality of perfusion.
Methods: In this retrospective study, we analyze all abdominal DCD performed in our hospital between 2023 and 2025. Eligible donors were selected both from uncontrolled (uDCD) and controlled c-DCD. For cDCD a decision of withdrawal of life supports (WLST) is made ensuring patient comfort during the dying process. Before WLST vascular access is obtained inserting guidewires in both arterial and femoral arteries. After asystole, the no-touch period begins, after which death is formally declared. Functional warm ischemia time (FWIT) is the defined period from drop of arterial systolic pressure under 50 mmHg and asystole. The agonal period is from asystole to start NRP. ECMO arterial and venous cannulas, along with an aortic occlusion balloon are inserted over the previously positioned wires; NRP is initiated and maintained until cold perfusion is achieved. Blood gas analyses and laboratory tests are collected at basale, at start NRP and then hourly.
Results: A total of 19 potential donors were selected, 16 from cDCD and 3 uDCD. NRP was not performed for one uDCD. Of the 18 NRP performed, 17 donor organs retrieval and transplantation were completed. Median donor age was 68 years and body mass index (BMI) 27; anoxic brain injury and cerebrovascular accidents were the major causes of death. In cDCD mean FWIT 58 min, the mean agonal period was 28 min, NRP duration was 3 h 07 min, mean NRP duration was 6 h 01 min for uDCD. Only 2 donors needed 5 h of NRP. As expected pH dropped and lactates increased after circulatory arrest compared to baseline, during NRP pH improved at every time point, while lactates decreased over time significantly at 4 h. PaO2 remained stable, paCO2 decreased over time during NRP significantly at 2 and 3 h. ALT AST and creatinine increased not significantly over time, creatinine worsen significantly compare to baseline at 2 h of reperfusion.
Conclusions: The data suggest that maintaining ECMO flow above 2 L/min during NRP may exert a protective effect on abdominal organs, as indicated by lactate clearance and progressive pH normalization. Flow reduction observed during some procedures may be attributed to bleeding and vasoplegia. Preserving adequate flow is essential to ensure optimal organ perfusion and metabolic recovery.



Time-course of ECMO flow, metabolic and biochemical parameters during normothermic regional perfusion (NRP)

	Mean	SD
Age (y)	68	±9
Weight (kg)	76	±15
Height (cm)	170	±10
BMI	27	±5
	N (tot 19)	**%**
Sex		
Male	10	53
Female	9	47
Causes of death		
Hemorragic stroke	3	16
Post-anoxic encephalopaty	7	37
Ischemic stroke	2	11
Neuromuscolar disorder	1	5
TBI	1	5
Cardiac arrest ECLS	3	16
Other causes	2	11
Type of donation		
c DCD (#)	16	84
NRP (yes)	16	100
NRP (no)	0	0
Procurement (yes)	15	94
Procurement (no)	1	6
u DCD (#)	3	16
NRP (yes)	2	67
NRP (no)	1	33
Procurement (yes)	2	67
Procurement (no)	0	0
cDCD timing	Mean	SD
FWIT (min)	54min	±21min
Agonal period (min)	28min	±21min
NRP (h, min)	3h 7min	±54min
uDCD timing		
NRP (h,min)	6h 1min	±2h 41min

Anthropometric and clinical features of DCD donors

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Topic: Brain death, organ donation and transplantation

000489

Correlation between a semiquantitative scale and peak expiratory flow measured via mechanical ventilator

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000489***.

Introduction: Extubation failure is associated with an inability to manage secretions and ineffective cough, both of which depend on expiratory muscle strength and peak expiratory flow (PEF). Despite their relevance, there is no standardized method to assess cough strength in mechanically ventilated patients. Measuring PEF directly from the ventilator has emerged as a promising tool, with values above 60 L/s associated with higher extubation success rates.
Objectives: To evaluate interprofessional correlation using a semiquantitative cough scale and to determine its relationship with ventilator-measured PEF as a predictor of extubation success.
Methods: This was a prospective, observational, descriptive study conducted in a 20-bed polyvalent intensive care unit between June and November 2024. Patients aged over 18 years, intubated for more than 48 h, capable of passing a spontaneous breathing trial (SBT), and able to follow commands were included. The SBT was conducted in pressure support mode for 30 min, followed by a 30–60 min rest period. Maximal inspiratory pressure (MIP) was used as an indicator of inspiratory muscle strength. Cough strength was assessed by the care team using a previously validated semiquantitative scale, while PEF was measured directly from the ventilator; the best value of three attempts was recorded. Extubation failure was defined as the need for reintubation within 48 h.
Results: A total of 14 patients were included, 65% of whom were male, with a mean age of 59 years, an average APACHE II score of 13, and an average ICU stay of 7.5 days. Patients had a mean MIP of -32 cmH_2O and a mean PEF of 80 L/s. Two patients required reintubation: one due to uncontrolled delirium and another due to bronchoplegia—the latter being the only patient with a PEF of 40 L/s.
A statistically significant correlation was found between advanced age and decreased MIP and PEF, with an increased need for noninvasive ventilatory support post-extubation in this subgroup.
Interprofessional evaluation of cough capacity using the semiquantitative scale demonstrated an intraclass correlation coefficient of 0.82. When comparing the cough scale with PEF, a correlation coefficient of 0.79 was observed.
Conclusions: PEF measurement directly from the ventilator is a simple and effective technique that significantly correlates with the semiquantitative cough scale, providing an objective and practical parameter for predicting extubation success in mechanically ventilated patients. However, further studies with larger sample sizes are required to validate and standardize this tool as a clinical predictor of extubation outcomes.

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Topic: Acute respiratory failure and mechanical ventilation

000490

Relation between resting energy expenditure and nitrogen losses during ICU stay, an observational prospective study, the REENLICU study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000490***.

Introduction: Resting energy expenditure (REE) varies among ICU patients and across time, necessitating repeated assessment to tailor nutritional support. Indirect calorimetry (IC) is the gold standard for measuring REE and also provides the respiratory quotient (RQ), an indicator of substrate metabolism. While amino acid oxidation via nitrogen losses (NL) usually contributes to a steady portion of REE, the relationship between REE and NL has not been extensively studied in the ICU setting.
Objectives: The primary objective was to evaluate the association between REE, measured by IC, and daily nitrogen losses via urinary nitrogen or plasma urea (with preserved renal function) in ICU patients. Secondary objectives included exploring temporal changes and associations among REE, RQ, and nitrogen balance (NBAL) throughout the ICU stay.
Methods: This prospective, single-center observational study was conducted in the ICU of XX Hospital. Adult patients eligible for IC, initiated no later than day 3 of ICU admission, were included. The primary exclusion criterion was the need for renal replacement therapy. REE was measured using IC on days 3, 5, 7, 10, and 14. Nitrogen losses for 24 h were calculated from urinary nitrogen and adjusted for plasma urea. Data collected included SOFA scores, RQ, NBAL, and patient characteristics. Associations were analyzed using linear and mixed-effects models.
Results: Data from 83 patients were analyzed. Median age was 66 [58 – 76] years, with 59% male and a median BMI of 26.0[22.3 – 29.8] kg/m^2. The most frequent comorbidities included hypertension (44.6%) and chronic pulmonary disease (28.9%). The majority of patients required vasopressors (73.5%) and mechanical ventilation (79.5%). REE remained relatively stable during the ICU stay (from 1607 kcal on day 3 to 1878 kcal on day 14; $p = 0.205$). A non-significant trends to an increase RQ was found over time (from 0.76 to ~ 0.86; $p = 0.051$), suggesting evolving substrate utilization. Nitrogen losses were highest on day 3 (11.33[7.59; 15.18] g/day) and decreased over time ($p = 0.080$). NBAL improved significantly, transitioning from −4.71 g/day on day 3 to + 3.64 g/day on day 14 ($p = 0.002$). A weak but statistically significant association was observed between nitrogen losses and REE ($p = 0.024$; $R^2 = 0.03$). However, in multivariate models, nitrogen losses were not significantly associated with REE ($p = 0.41$). Factors independently associated with higher REE included male sex, higher BMI, increased SOFA scores, and respiratory comorbidities, while older age and renal comorbidities were linked to lower REE.
Conclusions: Although a weak association exists between nitrogen losses and REE, nitrogen loss alone is an inadequate predictor of REE. These findings support continued reliance on indirect calorimetry for individualized nutritional management, and further research is needed to validate surrogate markers of metabolic demand in critically ill patients.

Reference

1 2022 RESEARCH AWARDS NUTRITION LEARNING PATHWAY

Topic: Metabolism, endocrinology, liver failure and nutrition.

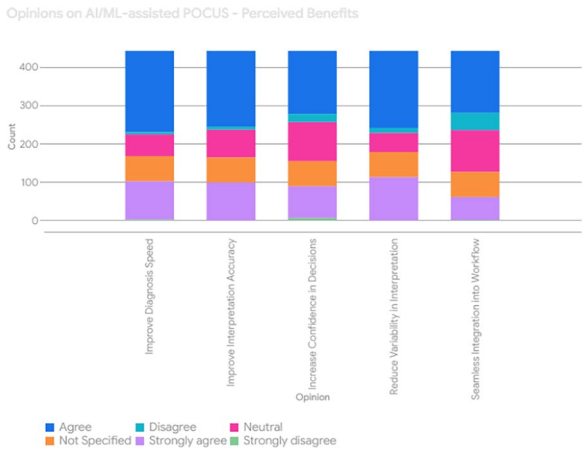
000491

Charting the future—results from the COMPASS-AI ((Clinical Obstacles to Machine-learning POCUS Adoption and System-wide AI Implementation) survey

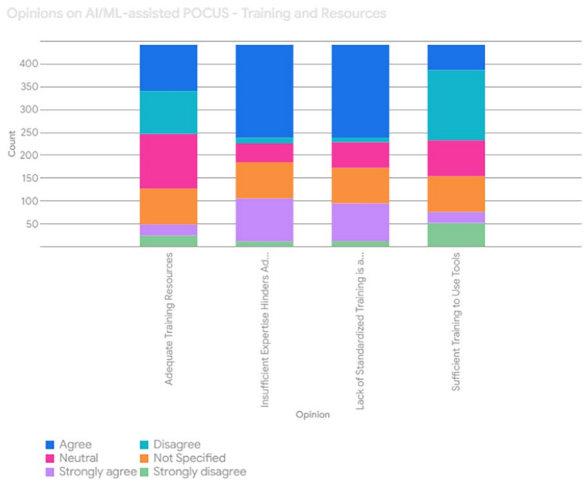
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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000491***.

Introduction: Point-of-care ultrasound (POCUS) has become an indispensable tool in a variety of clinical settings, including emergency medicine, critical care, and primary care. Because POCUS examinations can be performed rapidly at the bedside and integrated seamlessly into routine clinical workflows, they have the potential to expedite diagnosis and guide immediate therapeutic decisions. In parallel, the field of artificial intelligence (AI) has advanced considerably in recent years, driven by innovations in deep learning, computational power, and the availability of large medical imaging datasets. These advances have sparked interest in AI-driven algorithms that can enhance the diagnostic accuracy, consistency, and efficiency of POCUS.
Objectives: This study investigated the global perceptions, familiarity, and adoption of AI/ML in POCUS among healthcare professionals.
Methods: An international, web-based survey was conducted with healthcare professionals involved in POCUS. The survey covered demographics, AI/ML familiarity, and opinions on AI/ML-assisted POCUS. Data were analyzed using descriptive statistics and frequency distributions.
Results: A total of 422 healthcare professionals participated. Respondents were primarily from Asia (39.6%) and Europe (29.4%), with intensive care (53.3%) and emergency medicine (28.4%) being the main specialties. While many respondents were familiar with AI/ML in daily life (39.3% very familiar), familiarity in healthcare varied (16.4% very familiar, 36% slightly familiar, 35.6% somewhat familiar). AI/ML tool use in patient care was reported by 27.3%. Overall, there was enthusiasm for AI/ML in POCUS, with significant agreement that it could improve diagnosis speed and interpretation accuracy. However, concerns about training (36.5% disagreed/12.1% strongly disagreed they had sufficient training), trust in algorithms (41.2% neutral), and implementation barriers such as cost (49.8% agreed/strongly agreed) were prominent. A total of 422 healthcare professionals participated. Respondents were primarily from Asia (39.6%) and Europe (29.4%), with intensive care (53.3%) and emergency medicine (28.4%) being the main specialties. While many respondents were familiar with AI/ML in daily life (39.3% very familiar), familiarity in healthcare varied (16.4% very familiar, 36% slightly familiar, 35.6% somewhat familiar). AI/ML tool use in patient care was reported by 27.3%. Overall, there was enthusiasm for AI/ML in POCUS, with significant agreement that it could improve diagnosis speed and interpretation accuracy. However, concerns about training (36.5% disagreed/12.1% strongly disagreed they had sufficient training), trust in algorithms (41.2% neutral), and implementation barriers such as cost (49.8% agreed/strongly agreed) were prominent.
Conclusions: This global survey highlights healthcare professionals' interest in AI/ML for POCUS, alongside critical concerns about training, trust, and implementation. These findings emphasize the need for

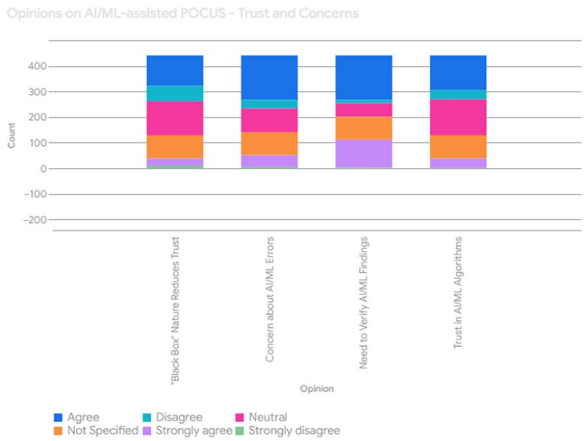
targeted strategies to support responsible and effective AI/ML adoption in POCUS.



Opinions on AI/ML-assisted POCUS—perceived benefits



Opinions on AI/ML-assisted POCUS—training and resources



Opinions on AI/ML-assisted POCUS—trust and concerns

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4 Not applicable

Topic: Information systems and Data Science

000492

The association between body mass index and reintubation among critically ill patients: a multicenter retrospective cohort study

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000492.

Introduction: Extubation failure is associated with increased in-hospital mortality. Body mass index (BMI) greater than 30 kg/m2 is known as one of the reintubation risk factors. (1) However, previous studies have not been evaluated the association between lower BMI and reintubation.
Objectives: This study aimed to address the association between lower BMI and reintubation among critical ill patients.
Methods: We performed a multicenter retrospective cohort study using the Japanese ICU database. From April 2018 to March 2023, we included adult patients (> 18 years) who received mechanical ventilation for at least 24 h from ICU admission until their first extubation attempt. Patients who underwent tracheostomy before ICU admission or before the first extubation attempt were excluded. BMI was collected at ICU admission. Reintubation was defined as the re-implementation of mechanical ventilation within 72 h after extubation.
A multivariable logistic regression analysis was performed to assess the association between BMI and the risk of reintubation. The models were adjusted for age, sex, Sequential Organ Failure Assessment (SOFA) score at ICU admission, duration of first mechanical ventilation, and number of comorbidities (e.g., heart failure, liver cirrhosis, and immunosuppression). BMI was treated as a continuous variable and modeled using a natural spline function. Based on these results, BMI were categorized into five groups: underweight (≤ 18.5 kg/m2), slightly underweight (18.5–21.9 kg/m2), normal (22.0–24.9 kg/m2), overweight (25.0–29.9 kg/m2), and obesity (≥ 30.0 kg/m2).
Results: Of the 21,516 eligible patients from 95 ICUs, 7,074 (32.9%) were female. Their mean (standard deviation [SD]) age was 68.0 (14.1) years, the mean (SD) BMI was 23.9 (4.8) kg/m2, and the median (interquartile range) SOFA score was 8 (7–11). The number of patients in each BMI group was 2,297 (10.7%) in the underweight, 5,347 (24.9%) in the normal weight, 6,073 (28.2%) in the reference, 5,682 (26.4%) in the overweight, and 2,117 (9.8%) in the obesity, respectively. Reintubation was performed in 1,375 (6.4%) patients.
After adjustment using the multivariable regression model, the reintubation rate decreased with increasing BMI below 25 kg/m2, whereas the decline became more gradual above 25 kg/m2 (Figure). Using BMI 22.0–24.9 kg/m^2 (normal weight) as the reference, the underweight group was associated with higher risk for reintubation (OR 1.69, 95% confidential interval [CI] 1.42–2.00, P < 0.001), whereas the obesity group with lower risk for reintubation (OR 0.62, 95% CI 0.48–0.78, P = < 0.001).
Conclusions: In this study, we investigated the association between BMI and reintubation. These results indicate that underweight is significantly associated with an increased reintubation risk, while obesity was associated with a decreased risk.

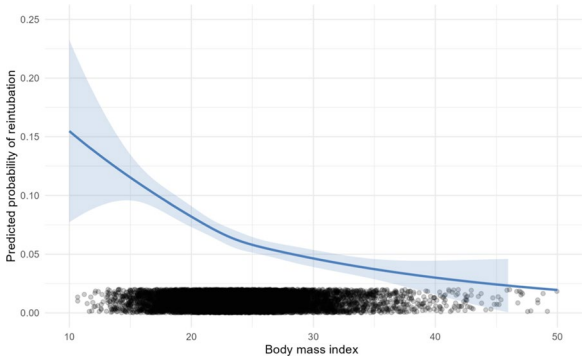


Figure (abstract 000492) Spline curve illustrating the predicted probability of reintubation across the continuous range of body mass index (kg/m2). The solid line represents the estimated reintubation rate, and the shaded area indicates the 95% confidence interval.

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Topic: Acute respiratory failure and mechanical ventilation.

000493

The Use of Stroke Related Early Tracheostomy Score (SET) as a Predictor for the Need for Tracheostomy in stroke patients admitted to ICU.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000493***.

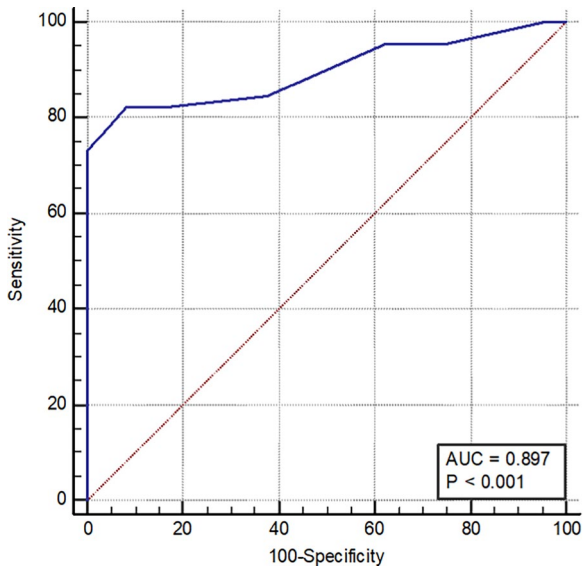
Introduction: Long-term ventilated stroke patients are at a high risk of death and poor neurological outcome. They mostly need tracheostomy, especially when weaning from mechanical ventilation and extubation is difficult or delayed. The rate of tracheostomy is higher in stroke patients compared to the general intensive care unit (ICU) population. The stroke-related early tracheostomy score (SET score) was used in the pilot trial SETPOINT (stroke-related early tracheostomy versus prolonged orotracheal intubation in neurocritical care trial) and is essentially related to the previously proposed TRACH (clinical and radiological predictors of tracheostomy in supratentorial spontaneous intracerebral hemorrhage) score. In subsequent studies involving ventilated cerebrovascular neurocritical ICU patients, the SET score has demonstrated a moderate accuracy in predicting the ICU length of stay (LOS), ventilation duration, and tracheostomy need in neurocritical patients. The SET score was initially developed as an in-house screening tool based on tracheostomy predictors identified in several retrospective studies. These were combined under the categories: (1) neurological function (maximum 10 points), (2) neurological lesion ((maximum 22 points), and (3) general organ function/procedure (maximum 16 points). detailed SET score points calculation (table I).

Objectives: This research is aiming at externally validating a standardized tool (SET SCORE) for unifying the need for tracheostomy in stroke patients who are ventilated and expected to have a difficult weaning from mechanical ventilation and *to study the predictive value of SET score in the prediction of ICU length of stay and 28 days mortality.*

Methods: The study is a prospective observational cohort study where tracheostomy was performed for mechanically ventilated stroke patients in ICU. The timing was dictated as per the standard of care in ventilator dependent patients. ***Primary outcome****: to study the predictive value of SET score in the prediction of the need for tracheostomy in stroke patients.* ***Secondary outcome****: to study the predictive value of SET score in the prediction of ICU length of stay and 28 days mortality.* ***Inclusion criteria:*** stroke ventilated patients more than 18 years old. ***Exclusion criteria:*** stroke patients less than 18 years. The study was held in Kuwait Hospital Dubai and Al Qassimi Hospital/Emirates Health Services in United Arab of Emirates. Ethical committee approval was taken according to rules and regulations.

Results: In our study, we have enrolled 114 cerebral stroke patients who were admitted to the ICU and fulfilled the eligibility criteria. Regarding the type of stroke, most of the patients had MCA infractions 39.5%, while 23.7% and 19.3% had basal ganglia and cerebral hemorrhage, respectively. Subarachnoid hemorrhage and cerebellar infarction/hemorrhage were reported in 10.5% and 7.0% of patients. SET-score offered a good discrimination power (AUC = 0.897) to predict the need for tracheostomy. With an optimal cutoff point of 8, the SET score provided a sensitivity of 82.22% and a specificity of 91.67%. Regarding the ROC curve analysis of the discrimination power for predicting prolonged ICU stay (> 10 days) in cerebral stroke patients. SET-score offered a discrimination power (AUC = 0.767) to predict prolonged ICU stay. With an optimal cutoff point of 11, the SET score provided a sensitivity of 73.85% and a specificity of 72.09%, with reference to the ROC curve analysis of the model to distinguish patients who die from patients who survived cerebral stroke. SET-score gave a poor discrimination power (AUC = 0.516) to predict death. With an optimal cutoff point of 16, the SET score provided a sensitivity of 76.92% and a low specificity of 34.09%.

Conclusions: SET-score offered a good discrimination power (AUC = 0.897) to predict the need for tracheostomy in stroke patients admitted to ICU.



SET Score ROC curve for prediction for need of tracheostomy.

Table 1 Detailed SET Score points calculation

Area of assessment	Situation	Points
Neurological function	Dysphagia	4
	Observed aspiration	3
	GCS on admission <10	3
Neurological lesion	Brainstem	4
	Space-occupying cerebellar	3
	Ischemic infarct >2/3 MCA territory	4
	ICH volume >25 ml	4
	Diffuse lesion	3
	Hydrocephalus	4
General organ function/procedure	(Neuro)surgical intervention	2
	Additional respiratory disease	3
	PaO_2/FiO_2 < 150	2
	APS (of APACHEII) > 20	4
	LIS > 1	2
	Sepsis	3

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Topic: Neurointensive care

000494

Practices in the management of the physiologically difficult airway in an intensive care unit

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Introduction: Orotracheal intubation in critically ill patients is associated with a high incidence of adverse events, with major complications reported in approximately 45% of cases during the peri-intubation period, such as hemodynamic instability (42.6%), severe hypoxemia (9.3%), and cardiac arrest (3.1%). While most guidelines focus on anatomically difficult airways, the physiologically difficult airway (PDA) is of particular relevance in critically ill patients. This condition is characterized by physiological alterations that increase the risk of hemodynamic instability, severe hypoxemia, and cardiac arrest, regardless of airway anatomy. Managing the PDA requires structured assessment and targeted preparation, with a focus on pre-induction optimization.
Objectives: The primary objectives are to characterize peri-intubation procedures in an intensive care unit (ICU); assess vital signs before and after intubation; correlate pre-induction parameters with complications; and analyze drug and device choices according to the patients' physiological profile.
Methods: This is a prospective observational study. Data were collected through questionnaires completed by physicians. Adult patients admitted to the ICU of a district hospital between 01/10/2024 and 31/01/2025, requiring advanced airway management during their stay, were included. Patients already intubated at admission were excluded.
Results: A total of 43 intubations were analyzed, with a mean age of 62 years. Males accounted for 69.8% of cases. The most frequent indications were respiratory failure (58.1%) and altered mental status (32.6%). Most airways were considered anatomically easy, with Cormack–Lehane grade I–II views. The main physiological factors identified as contributors to a difficult airway were hypoxemia (n = 30) and hemodynamic instability (n = 19). An airway management checklist was used in only 3 cases, and pre-intubation echocardiography was performed in only 6. Preoxygenation methods included high-flow nasal cannula (34.9%), non-rebreather mask (30.2%), bag-valve-mask (25.6%), and non-invasive ventilation (7%); the median peripheral oxygen saturation (SpO_2) prior to induction was 95%. Intubation was performed using a videolaryngoscope in 100% of cases, with a first-attempt success rate of 93%. Induction was mainly achieved with propofol and ketamine, and 93% of patients received neuromuscular blockade with rocuronium. After intubation, 7 patients developed severe hypoxemia ($SpO_2 \leq 85\%$) and 15 experienced severe hypotension (MAP < 50 mmHg). One case of cardiac arrest was recorded.
Conclusions: In this patient cohort, a high first-attempt intubation success rate and a low incidence of peri-intubation complications were observed, although there remains room for improvement in preoxygenation and hemodynamic monitoring. Despite the high prevalence of factors associated with physiologically difficult airways (PDA), the use of structured assessment and management tools was infrequent. The adoption of these tools and the systematic integration of PDA-focused approaches may contribute to reducing complications and enhancing the safety of intubation procedures in the ICU.

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Topic: Acute respiratory failure and mechanical ventilation

000497

Early renal resistive index as a predictor of acute kidney injury and 28-day mortality in cardiogenic shock: a prospective observational study

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Introduction: Acute kidney injury (AKI) is a frequent complication in patients with cardiogenic shock (CS) and is associated with increased morbidity and mortality. Renal resistive index (RRI) has emerged as a potential early marker of renal dysfunction.[1,2,3] RRI,a non-invasive ultrasonographic marker derived from intrarenal blood flow patterns, reflects renal vascular resistance and has shown promise as a dynamic indicator of renal perfusion impairment. However its utility as a predictive tool in cardiogenic shock remains underexplored.
Objectives: This study aims to evaluate the predictive value of RRI for AKI development in patients with cardiogenic shock.
Methods: We conducted a prospective observational study from January 2020 to December 2023 in a tertiary intensive care unit. A total of 110 patients with CS (mean age 67 + -12 years,68% male) were included and enrolled consecutively. RRI was measured in interlobar arteries of both kidneys at: T0 or H3(3 h after admission), T1 (24 h post-admission), T2 (48 h post-admission) and T3 (72 h post-admission).RRI was calculated as (peaksystolic velocity - end diastolic velocity)/peak systolic velocity.
Patients were stratified into 2 groups based on the RRI at T0 (3h post-admission): RRI < 0.74 and RRI > 0.74.
The primary endpoint was the development of AKI within 3 days and secondary endpoint was 28 day mortality.
AKI was defined according to the KDIGO criteria and assessed at T3 (72h post-admission). Comparisons were made between patients developing AKI and those without AKI.
Statistical analysis used Mann–Whitney test and results expressed as mean +—standard deviation.

A ROC curve analysis was performed to compare the diagnostic performance of RRI, NGAL and serum creatinine.
Results: Patients who developed AKI at Day 3 had significantly higher RRI values at T0 (3 h post-admission) compared to those without AKI (T0:0.75 + -0.04vs0.69 + -0.003, P < 0.001).
Using ROC curve analysis, RRI at T0 or H3 (3h post-admission) showed the highest predictive value for AKI (AUC = 0.89 95%CI:0.84–0.94), outperforming NGAL (AUC = 0.81) and creatinine (AUC 0.78) (Fig. 1).
A cutoff value of RRI > 0.74 at T0 was associated with a sensitivity of 86% and specificity of 84% for AKI at DAY 3.
Regarding mortality, 28 day mortality was significantly higher in patients with RRI > 0.74 compared to those with RRI < 0.74, respectively, 52% vs19% p < 0.001.
Conclusions: RRI measured within the first 3 h (T0) after ICU admission serves as an early predictor of AKI at Day 3 in CS patients, with superior performance compared to NGAL and serum creatinine. In this prospective study of 110 patients with CS, an elevated RRI measured as early as 3 h after admission was strongly associated with both AKI and 28 day mortality.
These findings support the integration of renal Doppler ultrasound for early AKI risk stratification in critically ill patients [4,5].

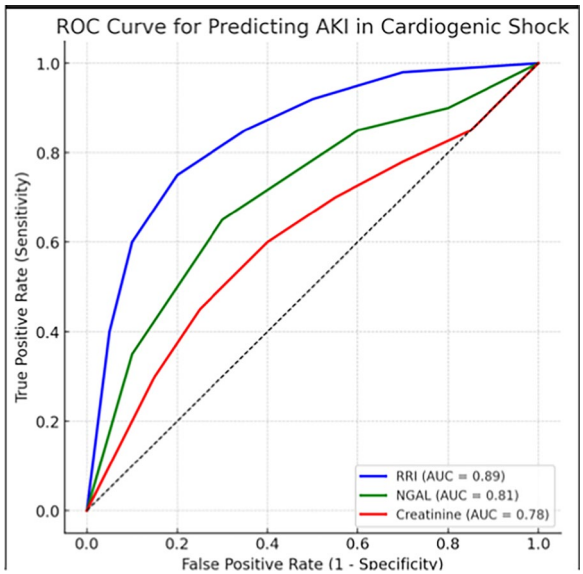


Fig 1 (abstract 000497) RRI, NGAL and creatinine roc curve for predicting aki in cardiogenic shock

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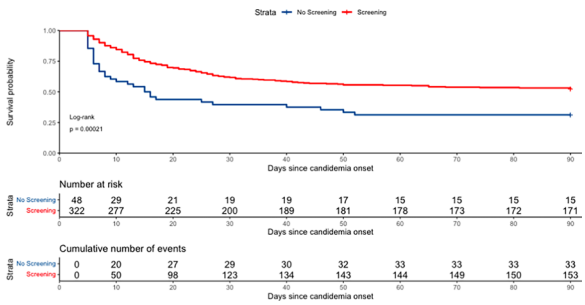
Topic: Acute Kidney Injury and haemofiltration

000498

Screening, prevalence, and risk factors for secondary localization during candidemia in intensive care unit patients: the French CandidICU multicenter study

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Introduction: Candidemia is a life-threatening fungal infection in intensive care unit (ICU) patients, which can be complicated by secondary localizations (SL). SL can occur in patients with candidemia in various sites: vascular (thrombosis), abdominal (notably hepatosplenic or renal), cardiac, ophthalmic, pulmonary, and/or osteo-articular, which influences the management of these critical patients. However, the prevalence, risk-factors and outcomes of patients with SL are still poorly understood.
Methods: The CandidICU study was a retrospective multicenter cohort study conducted in 16 French ICUs. All adult patients hospitalized from January 2015 to January 2023 with at least one positive blood culture for Candida spp. were enrolled. We assessed the prevalence and risk-factors for SL. In addition, we explored the clinical courses according to the screening and occurrence of SL were.
Results: Among 492 patients with at least one positive blood culture for Candida spp., 376 were screened for SL (76.4%). At least one SL was diagnosed in 82 patients (21.8%). Competing risk analysis identified the SAPSII score and the duration of positive blood cultures as independent risk factors for SL (sdHR 1.01 [95%CI 1.00–1.02]; p = 0.031 and sdHR 1.05 [95%CI 1.02–1.08]; p = 0.003, respectively). Age and Candida glabrata infection were protective factors against SL (sdHR 0.98 [95%CI 0.97–1.00]; p = 0.016 and sdHR 0.38 [95%CI 0.15–0.99]; p = 0.048, respectively). Finally, patients with SL received longer antifungal treatment (18 [11–30] versus 14 [6–18] days; p < 0.001) and had a higher rate of antifungal escalation (27.8% versus 12.3%; p = 0.002).
Conclusions: In this cohort, 76·4% of ICU patients with candidemia were screened for SL and at least one SL was diagnosed in 21·8%. The severity at ICU admission and duration of positive blood cultures were identified as independent risk factors for SL, whereas age and Candida glabrata infection were protective. Finally, the screening and occurrence of SL were associated with significant changes in the management of patients. These results support the need for extensive and systematic screening for SL in critically ill patients with candidemia.



Survival curves of the overall population according to secondary localisation screening with exclusion of patients dying within the first five days after candidemia onset

Variables	Unadjusted analysis			Adjusted analysis		
	sdHR	95%CI	*p* value	sdHR	95%CI	*p* value
Baseline features						
Age (years)	0·98	0·97-1·00	0·046	0·98	0·97-1·00	0·016
Male sex	1·07	0·66-1·71	0·790			
Comorbidities						
Obesity (BMI>30)	1·10	0·66-1·81	0·720			
Cirrhosis	1·07	0·54-2·09	0·850			
Diabetes	0·61	0·33-1·11	0·10			
Chronic renal failure	0·67	0·24-1·87	0·45			
Underlying cause of immunosuppression						
Solid organ transplantation	0·76	0·25-3·34	0·640			
Hematological malignancy	1·35	0·80-2·29	0·260			
Neutropenia	2·07	1·19-3·60	0·010			
Solid tumor	0·84	0·48-1·46	0·530			
Immune-mediated inflammatory disease	0·33	0·08-1·38	0·130			
HIV	1·41	0·47-4·22	0·540			
Long term corticosteroids	1·45	0·81-2·60	0·21			
Initial laboratory findings and management						
Antifungal prophylaxis	1·14	0·46-2·78	0·78			
Time from hospital admission and candidemia (days)	1·00	0·99-1·01	0·59			
Time from ICU admission and candidemia (days)	0·99	0·97-1·00	0·18			
Surgical reason for ICU admission	0·72	0·43-1·21	0·21			
Sepsis or septic shock at ICU admission	1·49	0·85-2·60	0·16			
Parenteral nutrition	1·19	0·77-1·86	0·430			
Antibiotics	1·11	0·52-2·35	0·780			
SAPS II	1·01	1·00-1·02	0·068	1·01	1·00-1·02	0·031
Lactate at ICU admission	1·02	0·96-1·08	0·50			
Suspected source of candidemia						
Digestive	0·96	0·62-1·49	0·86			
Catheter related proved candidemia	1·63	1·02-2·58	0·039			
Catheter related suspected candidemia	1·01	0·54-1·88	0·98			
Urinary	0·66	0·15-2·96	0·59			
Respiratory	0·30	0·04-2·27	0·24			
Cutaneous	1·01	0·40-2·54	0·99			
Other of unknown	0·58	0·26-1·31	0·19			
***Candida* species**						
Candida albicans	1·61	0·97-2·66	0·063			
Candida glabrata	0·37	0·15-0·92	0·033	0·38	0·15-0·99	0·048
Candida parapsilosis	0·52	0·13-2·05	0·35			
Candida tropicalis	1·00	0·41-2·48	0·99			
Candida krusei	1·43	0·51-4·01	0·50			
Other or unknown *candida* species	0·93	0·35-2·51	0·89			
Duration of positive blood cultures (days)	1·04	1·01-1·08	0·024	1·05	1·02-1·08	0·003
Time between candidemia and antifungal treatment	0·98	0·92-1·06	0·70			
Echinocandin as first antifungal treatment	0·87	0·51-1·49	0·62			

Baseline characteristics and clinical course of candidemia patients according to the screening of secondary locations (n = 492).

Topic: Infections and prevention

000499

Perceptions and emotional experience of intensive care unit nurses caring for patients and families undergoing terminal extubation in a Japanese hospital: a qualitative study

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Introduction: Fulfilling end-of-life care is a global issue in intensive care settings. In Japan, where life support discontinuation is generally recognized as not allowed once it is administered, most facilities are conservative and reluctant to implement treatment withdrawal in the intensive care unit (ICU) even when it is obvious that the patient's life is not to be saved. Discontinuation of unwanted life support and terminal extubation (TE) are implemented after discussions with patients or families by the multidisciplinary team in the ICU of hospital A in Japan, following the institutional policy of providing patient-centered medicine reflecting each patient's value. However, no clinical guidelines have clearly indicated the method of TE in Japan currently; thus, appropriate intervention seems uncertain as to how those nurses of the hospital recognize, feel, and cope with uncertainty in their practice.
Objectives: The aim of this study is to explore the emotions and perceptions regarding TE of ICU nurses, who care for patients and their families undergoing the intervention.
Methods: This study used a qualitative design based on the content analysis approach. Data were collected from 11 purposefully selected ICU nurses at a hospital in Japan using a semi-structured interview guide.
Results: The study identified four main categories regarding perceptions: 1) beneficial and could become the utmost palliative care to patients who wish not to remain on ventilators; 2) the family's wishes should also be respected as well as the relevant surrounding people's consensus besides the patient's value and intention; 3) essential to build organizational infrastructure, including education, adherence to the process indicated by the organization's manual, and multidisciplinary collaboration with psychological safety; and 4) as not common, necessary to understand the diversity of feelings in medical staff besides concerns over public reaction and legal aspects. Four main categories regarding emotional experiences include 1) being shocked initially, but TE implementation alleviates the ethical dilemma one once had; 2) being distressed under certain circumstances, such as when the patient's values are unclear, when one's understanding of the whole picture is inadequate, or when one feels the process is being rushed; 3) difficulty in optimizing care for patients and families undergoing TE due to unfamiliarity with providing palliative care in ICU; and 4) as TE being inseparable from death, enabling TE implementation at the facility makes one more aware of readiness to face death than ever.
Conclusions: The study revealed the tendency of ICU nurses' perceptions and emotions regarding TE, demonstrating important implications to better mutual understanding among a medical team and to clarify issues to be resolved in the future when implementing TE appropriately at a facility.

Topic: Ethics and end of life care

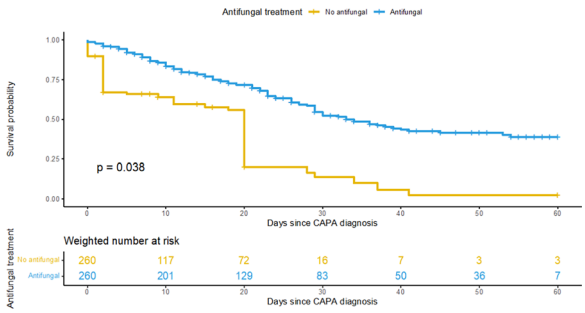
000502

Effects of antifungal treatment in COVID-19 associated pulmonary aspergillosis: a European multicenter cohort study

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Introduction. Invasive pulmonary aspergillosis has emerged as an opportunistic fungal infection complicating severe COVID-19. However, the effect of antifungal treatment in COVID-19-associated pulmonary aspergillosis (CAPA) remains poorly explored while severe diseases still exist in immunocompromised patients.
Methods. We aimed to explore the impact of antifungal treatment on day-60 mortality including possible and proven CAPA cases from a large French multicenter study along with all consecutives CAPA cases from 5 major intensive care units (ICU). Patients were compared according to antifungal treatment. Survival analysis was conducted using a Cox regression analysis. Additionally, to account for potential imbalance in baseline characteristics, an inverse probability of treatment weighting (IPTW) based on a propensity score along with an emulated targeted trial analyses were conducted.
Results. In total, 259 CAPA patients were included. Of these, 237 patients (91.5%) received antifungal treatment for CAPA, with 215 (90.7%) receiving azole antifungal drugs. Baseline characteristics were similar between patients who received antifungals and those who did not. Multivariable Cox regression analysis in the raw population evidenced that patient's age (HR 1.02, 95%CI 1.00–1.04, p = 0.025), immunosuppressive treatment (HR 2.16, 95%CI 1.46–3.19, p < 0.001], and remdesivir use (HR 2.07, 95%CI 1.17–3.69, p = 0.013) were independently associated with increased 60-day mortality. Male sex (HR 0.63, 95%CI 0.41–0.97, p = 0.037) and antifungal treatment (HR 0.39, 95%CI 0.21–0.73, p = 0.003) appeared to be a protective factor against 60-day mortality.
Both Cox weighted regression and Cox regression conducted in the emulated trial analysis evidenced a decreased 60-day mortality in patients receiving antifungal treatment (Weighted HR 0.33 [95%CI 0.18–0.59], p < 0.001and HR 0.39 [95%CI 0.18–0.82], p = 0.0131, respectively).
Conclusions. In this large European multicenter study of CAPA patients, we observed a significant improved survival in patients receiving antifungal therapy. The high mortality rate observed in CAPA in immunocompromised patients, as well as the improved outcome in treated patients, should encourage clinicians to actively screen for CAPA to enable rapid diagnosis and treatment. This may also apply to other viral–fungal coinfections.



Weighted survival analysis of probable and proven CAPA patients according to antifungal treatment.

	Crude HR			Adjusted HR		
	HR	95% CI	*p* value	HR	95% CI	*p* value
Baseline characteristics						
Age (years)	1.02	1.00-1.04	0.062	1.02	1.00-1.04	0.025
Male sex	0.68	0.45-1.03	0.068	0.63	0.41-0.97	0.037
Comorbidities						
Obesity (BMI>30)	0.86	0.57-1.29	0.473			
Diabetes	0.97	0.66-1.44	0.892			
COPD	1.35	0.83-2.19	0.221			
Hematological malignancy	1.59	0.97-2.60	0.066			
Neutropenia	1.06	0.34-3.34	0.920			
Long-term corticosteroids	0.45	0.14-1.42	0.175			
Solid organ transplantation	1.19	0.75-1.90	0.455			
Any immunosuppressive drug	1.86	1.28-2.72	0.001	2.16	1.46-3.19	<0.001
Clinical and biological findings at ICU admission						
Lymphopenia	1.16	0.69-1.94	0.569			
SOFA at ICU admission	1.01	0.96-1.06	0.743			
Treatment received for COVID-19						
Any corticosteroids for COVID-19	1.08	0.65-1.80	0.769			
Dexamethasone	0.96	0.64-1.46	0.868			
Anti IL-6	1.35	0.68-2.66	0.399			
Corticosteroids and Anti IL-6	1.35	0.49-3.68	0.556			
Remdesivir	1.58	0.92-2.69	0.092	2.07	1.17-3.69	0.013
CAPA diagnosis and management						
Time from intubation and CAPA onset (days)	1.00	0.98-1.02	0.732			
Antifungal treatment	0.56	0.30-1.02	0.058	0.39	0.21-0.73	0.003

Abbreviations: BMI: Body Mass Index; CAPA: COVID-19 associated Pulmonary Aspergillosis; COPD: Chronic Obstructive Pulmonary Disease; COVID-19: Coronavirus Disease 2019; ICU: Intensive Care Unit; IL: interleukin; SOFA:Sequential Organ Failure Assessment

60-day survival analysis of probable and proven CAPA patients.

Topic: Infections and prevention

000504

Mortality in ICU patients stratified for sex and age: analysis of a multinational cohort study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000504***.

Introduction. In the general population, females show a higher life expectancy than males. Additionally, it is evident that mortality increases with increasing age.
OBJECTIVES. The objective of this study is to evaluate the impact of sex and age in ICU patients, and specifically whether the mortality trends observed in the general population persist within the intensive care context.
Methods. Data from the DecubICUs study (NCT 03270345), a multinational, prospective, point-prevalence study with a 12-week follow-up for hospital mortality, were analyzed [1]. Only high-income economy countries were included (n = 31). Kaplan–Meier (KM) curves were plotted, and mortality differences were assessed using a mixed-effects logistic regression with age and age-adjusted SAPS-II as fixed effects and country as a random effect. Age categories considered were 18–39 years (reference category), 40–49 years, 50–59 years, 60–69 years, 70–79 years, and 80 + years.
Results. A total of 6,241 patients were included, of whom 3,856 were male (62%). KM curves indicated that life expectancy dropped for higher age categories (image 1). Higher odds ratios (ORs) for mortality were found in age groups starting at 50 years, compared to those aged 18–39 (see table). A stepwise increase in mortality ORs with advancing age was observed in the full and male cohort (image 2). Females in their 60s did not exhibit the same stepwise increase in OR (1.71, 1.02–2.89). When stratifying by sex, no sex-based differences in mortality were found, apart from a difference in survival estimates between males and females in their 60s (p = 0.031).

Mortality odds ratios (OR) and 95% confidence intervals (CI) of ICU patients—full cohort

Age category	OR	95%CI	p-value
18–39	Reference	-	-
40–49	1.29	0.90–1.86	0.161
50–59	1.83	1.34–2.50	< 0.001
60–69	2.34	1.75–3.14	< 0.001
70–79	3.50	2.62–4.67	< 0.001
80 and older	3.95	2.87–5.42	< 0.001

Conclusions. The consistent increase in mortality risk with age matches the trend seen in the general population. In contrast with the general life expectancy, no significant differences in mortality between the sexes were observed. Hypotheses on why females confer a mortality advantage in the general population, may require nuance in ICU patients, or potentially unknown factors might negate this effect. The observed anomaly in sexagenarian females requests further research. Although sex-based differences in treatment and outcomes have been previously reported, the specific finding that females in their 60s exhibit better outcomes is novel and might reflect a peculiarity of the dataset.

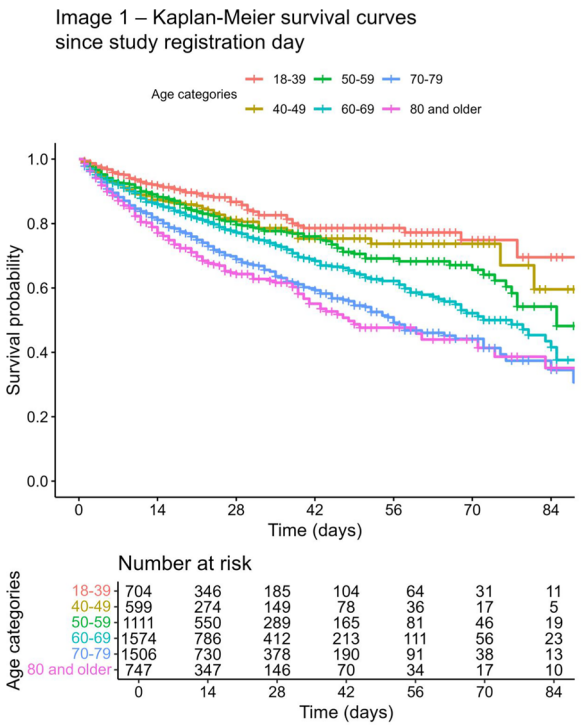


Image 1 (abstract 000504) Kaplan–Meier survival curves since study registration day

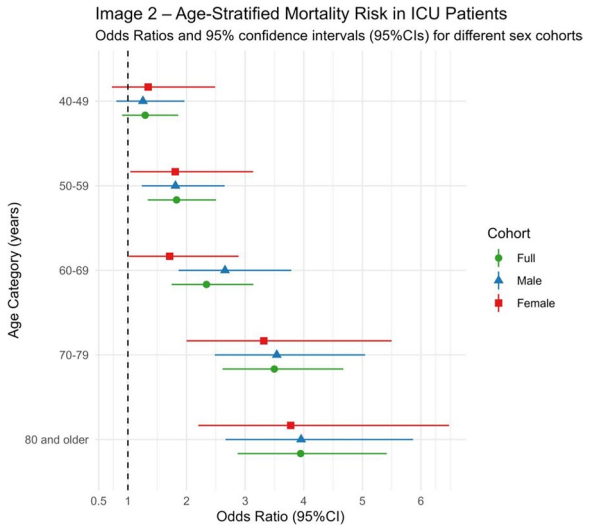


Image 2 (abstract 000504) Age-stratified mortality risk in ICU patients

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2 This study was conducted without financial support from any funding sources.

Topic: Health Services Research and Outcome

000505

Predictors and outcomes of extracorporeal membrane oxygenation for early primary graft failure after adult heart transplantation

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000505***.

Introduction. Early post-operative graft failure requiring ECMO can complicate heart transplantation.

Objectives. We sought to analyze the predictors and outcomes of extracorporeal membrane oxygenation (ECMO) support for early primary graft failure and determine its impact on mortality and complications in the first 30 days post-transplantation.

Methods. A retrospective review of all adults who underwent heart transplant in a single hospital between 2014 and 2024.

Results. Over a 10-year period, 25 (20.3%) of 123 patients who underwent heart transplantation in our hospital required ECMO support postoperatively. Those on postoperative ECMO were younger 47 vs 53 yr old, p 0.02, received more frequently preoperative amiodarone 40.9 vs 14.4% p 0.005, were more frequently transplanted emergently 52 vs 21%, were more frequently on ECMO preoperatively 52.4 vs 13.7%, and on vasopressors 46,7 vs 16,3%., more frequently had bilirubin > 2 mg/dl (37.5 vs 17.8% p 0.05) had longer extracorporeal circulation times 137 vs 107 min p 0.001 with similar ischemia times. Patients on postop ECMO support spent more days in ICU 17 vs 8,9 p 0,001, under mechanical ventilation 60 vs 9,15 h p 0,001 and were more frequently thrombopenic.

We found no differences regarding the type of donation (donation cardiac death DCD vs brain death DBD), donor's history of cardiac arrest,

type of cardioplegia (Del Nido vs Celsior), preoperative infection, donors under mechanical ventilation, donor's age or donor's days in ICU.
Mean duration of preoperative ECMo support was 5 ± 5.6 days (IQR 3.5–10.5), with mortality reaching 19% (vs 8.8%), and on postop ECMO 4 ± 2.5 days (IQR 3.5–6). Mortality in patients on postop ECMO reached 24% vs 7.1% in those without primary graft failure p 0.002. Overall only 18.2% of the patients had no rejection episodes in the first year, being it more frequent in postop ECMO patients (23 vs 0%, NS). Regarding hemodynamically comprising rejection episodes, more patients without postop ECMO support were free from rejection 45.9% vs 27.3%, NS.
On multiple logistic regression analysis, the use of amiodarone preoperatively, inotrope support, urgent priority or ECMo support preoperatively did not increase the mortality risk, while postoperative ECMO support was associated with a 5.1 OR (95% CI 1.047–25.51).
Conclusions. Primary graft dysfunction is a serious complication following heart transplant. Treatment with ECMO in the immediate postoperative period is associated with mortality, while in our patients, other known factors did not increase the risk of death.

Topic: Cardiovascular issues in ICU

000509

Thrombocytopenia after CMV reactivation treatment

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000509***.

Introduction. Cytomegalovirus (CMV) reactivation is a common complication in critically ill patients, particularly those in the intensive care unit (ICU) [1] [2]. While the implications of CMV reactivation have been extensively studied, the development of thrombocytopenia in this context remains less understood. Thrombocytopenia, characterized by decreased platelet count, is a frequent hematological abnormality in critically ill patients and can contribute to increased morbidity and mortality [3] [4]. This study aims to investigate the effect of antiviral treatment on ICU patients' thrombocyte levels and examine the impact of thrombocytopenia on patient outcomes.
Objectives. The primary objectives of this study were:

- To identify the clinical and laboratory factors associated with the development of thrombocytopenia in ICU patients treated for CMV reactivation.
- To determine the effect of thrombocytopenia on mortality in this patient population.

Methods. This study employed a data-based, observational, and cohort design. A retrospective review was conducted of all patients with CMV reactivation admitted to the Intensive Care Unit (ICU) between January 1, 2019, and March 1, 2025. The study population comprised patients with CMV reactivation who were treated with ganciclovir. CMV reactivation was defined as CMV DNA levels ≥ 4000 copies/mL in tracheal aspirate samples, with an upward trend and accompanied by clinical findings, and severe thrombocytopenia as < 50,000 platelets/μL. For analysis, the patient cohort was stratified into two groups: patients who did not develop thrombocytopenia and patients who developed thrombocytopenia.
Results. During the study period, 81 patients received treatment for CMV reactivation. The results indicated that patients who developed thrombocytopenia were older (p = 0.05) and presented with lower platelet levels at the initiation of therapy (p = 0.001). CMV reactivation in patients with severe thrombocytopenia was correlated with decreased platelet counts from the initiation of therapy (p = 0.001), and this trend persisted throughout the treatment course (p = 0.001). Furthermore, this group exhibited a significantly higher mortality rate (p = 0.023), and frequently presented with positive blood cultures (p < 0.001). Cox regression analysis revealed that platelet levels during CMV reactivation are a significant variable in the development of thrombocytopenia (p = 0.011).
Conclusions. CMV reactivation in critically ill patients is associated with the development of severe thrombocytopenia. Patients who developed severe thrombocytopenia had lower platelet levels at the initiation of therapy, the presence of positive blood culture as a co-infection, and a higher mortality rate. Lower platelet levels at the initiation of therapy are a significant risk factor for the subsequent development of severe thrombocytopenia.

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Topic: Infections and prevention

000510

From prediction to practice: a retrospective review of scoring systems in the management of patients with acute pancreatitis

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000510***.

Introduction. Acute pancreatitis refers to the inflammation of the pancreas, characterized by varying degrees of autodigestion, edema, and necrosis (1). It is one of the most common gastrointestinal causes for admission to the intensive care unit (ICU), and is associated with significant morbidity and mortality. The development of organ failure remains the primary determinant of patient prognosis, with the severity and duration of organ failure playing a crucial role in outcomes. The Revised Atlanta Classification categorises the severity of acute pancreatitis into mild (no organ failure), moderately severe (transient organ failure that resolves within 48 h) and severe (persistent organ failure > 48 h) (2).
Specific scoring systems such as Glasgow Imrie score, and BISAP (Bedside Index for Severity of Acute Pancreatitis) have often been utilised to risk stratify patients with acute pancreatitis. (3,4). Glasgow Imrie score takes into account 8 variables and is calculated at 48 h of admission, whereas BISAP takes into account 5 variables and is usually measured on admission and a BISAP > 3 is associated with higher risk of complications (4).
By reviewing the Glasgow Imrie score, BISAP score, along with APACHE II and C-reactive protein (CRP) in patients admitted with acute pancreatitis in ICU, this study aimed to appraise the practice of using scoring systems and their usefulness in predicting persistent organ failure.
Methods. This retrospective review focused on patients admitted with acute pancreatitis to the Intensive Care Unit (ICU) of a District General Hospital between October 2022 and October 2024. The demographic data, aetiology of acute pancreatitis, incidence and severity of organ failure, length of stay in the Intensive Care Unit and hospital, as well as ICU mortality rates was noted. Patients were classified as having persistent organ failure if the organ failure lasted more than 48 h. APACHE II, Glasgow Imrie Score, BISAP score were calculated retrospectively and were compared between the two patients groups.
Results. A total of 30 patients were admitted with acute pancreatitis during the study period. The mean age of the cohort was 59 years, and

nearly three-quarters (73%) were male. Gallstones were the primary etiology for over half of the patients. Considering organ failure, 19 patients (63%) were classified as having persistent organ failure, while 11 patients (37%) with transient organ failure. There was a clinically and statistically significant difference in the length of stay between the patient groups. While patients with persistent organ failure had a median ICU stay of 15 days, it was 5 days in the transient organ failure group ($p < 0.001$). Similarly, the median total length of hospital stay was 25 days for patients with persistent organ failure and 12 days for those with transient organ failure ($p = 0.005$). The overall mortality was 9%.

Interestingly, when it came to differentiating or predicting persistent organ failure, the performance of the scoring systems was not statistically significant, possibly due to a small sample size. Glasgow Imrie score had the best discriminatory power with a value of 2.8 ± 1.7 in patients with persistent organ failure and 1.8 ± 1.6 in patients with transient organ failure and a p-value of 0.24. This was followed by APACHE II with a p value of 0.24. In comparison BISAP score showed poor discrimination which could be alluded to the low mean score on admission 1.7 ± 1.5. However, procalcitonin values were higher in persistent organ failure group in comparison to the transient group (6.4 versus 1.9), although there was no statistical significance.

Conclusions. Early identification of patients at risk of severe acute pancreatitis can help reduce morbidity and mortality, particularly given the differences in length of stay. While our study found no significant difference in the scoring systems' ability to predict persistent organ failure, the Glasgow Imrie score was the most promising and warrants further integration into clinical practice at the bedside. There is, however, a need for unique models to further enhance prognostic accuracy in this patient population.

Table 1 Outcomes in patients with acute pancreatitis

	All patients (n=30)	Persistent Organ failure (n = 19)	Transient Organ failure (n = 11)	p value
ICU Mortality	4 (9%)	3 (16%)	1 (9%)	1.00
ICU Length of stay	12 [5, 16]	15 [12, 23]	5[4,7]	**<0.001**
Hospital-length of stay	20 [12, 19]	25 [14, 49]	12 [7, 19]	**0.005**

Summary statistics are median [inter-quartile range] or number (percentage)

Table 2 Comparison of various scoring systems in acute pancreatitis

	All patients (n=30)	Persistent Organ failure (n = 19)	Transient Organ failure (n=11)	p value
Amylase	1486 [661, 2963]	1601 [661, 3087]	1465 [504, 2500]	0.64
CRP (admission)	19 [6, 79]	26 [4, 79]	13 [7, 239]	0.65
PCT	5.3 [1.1, 12.3]	6.4 [0.9, 17.4]	1.9 [1.4, 7.9]	0.33
APACHE II	16.7 ± 6.8	17.9 ± 7.5	14.8 ± 5.0	0.24
Glasgow Imrie score	2.4 ± 1.7	2.8 ± 1.7	1.8 ± 1.6	0.15
BISAP (Admission)	1.7 ± 1.5	1.7 ± 1.5	1.7 ± 1.5	0.98
BISAP ICU	2.6 ± 1.4	2.7 ± 1.2	2.5 ± 1.9	0.80

Summary statistics are mean ± standard deviation, median [inter-quartile range] or number (percentage)

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Topic: Health Services Research and Outcome

000512

An investigation into the early mobilisation of critically ill patients in a tertiary hospital in South Africa

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000512***.

Introduction. Early mobilisation (EM) of critically ill patients in intensive care units (ICUs) is recognised for its potential benefits in improving patient outcomes. There has been a paradigm shift towards incorporating EM as a standard practice in ICUs to mitigate the complications associated with immobility. The implementation of EM remains inconsistent globally, with limited evidence on its practice in South African ICUs. This study aims to address this gap by examining mobility practices and barriers to EM in a South African tertiary hospital setting.

Objectives. This study aimed to describe mobility practices and examine the facilitators, barriers and knowledge of staff regarding EM in ICUs at a tertiary hospital in South Africa.

Methods. An analytical cross-sectional observational study was conducted across four ICUs. Thirty patient folders were reviewed daily over five days to identify mobility opportunities. A self-designed review form, incorporating safety criteria, was used to assess the suitability of these opportunities. Additionally, 26 nurses and 16 physiotherapists completed self-administered questionnaires to assess their knowledge and perceived barriers to EM.

Results. The study involved 30 patients with a mean length of stay of 15 days. Of 107 potential mobility events, 77 were deemed safe for mobilisation, with in-bed activities being more common than out-of-bed activities. Staff demonstrated good knowledge of EM benefits but scored lower on safety criteria. Key barriers included staffing shortages, excessive sedation and the need for physician orders to mobilise patients.

Conclusions. This study highlights conservative mobility practices and significant barriers to EM in a tertiary hospital ICUs. Targeted educational interventions and organisational changes are necessary to enhance EM practices and improve patient outcomes.

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Topic: Nursing care and physiotherapy

000513

Agreement between central venous and right atrial pressure in the critically ill: a prospective study of optimal external reference points

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000513***.

Introduction. Accurate estimation of venous return is critical for assessing hemodynamic status in critically ill patients, as it directly influences venous return (VR) and cardiac output[1, 2]. VR depends on the pressure gradient between mean systemic filling pressure and right atrial pressure (RAP), making precise RAP measurement essential [2]. In clinical practice, central venous pressure (CVP) serves as a surrogate for RAP[3]; however, its accuracy is dependent on appropriate transducer levelling relative to an external anatomical reference[4, 5]. Despite its clinical significance, there is currently no consensus on the optimal external reference point for CVP measurement[4, 6], and incorrect levelling may result in clinically significant errors[7, 8]. This study investigates the accuracy of CVP measurements using three commonly utilized external reference points, comparing them to RAP values obtained via a solid-state catheter in the right atrium across three different body positions.
Objectives. To assess the agreement between CVP and RAP using three external CVP reference points, 5 cm below the sternal angle, one-third, and one-half of the anteroposterior chest diameter at the fourth intercostal space, across supine, semi-recumbent, and Trendelenburg positions in critically ill patients.
Methods. In this prospective observational study, 16 mechanically ventilated critically ill patients were included. RAP was measured using a solid-state catheter with its tip positioned in the mid-right atrium near the tricuspid valve. CVP was recorded via a central venous catheter placed in the superior vena cava or right atrium, with the pressure transducer sequentially zeroed at three anatomical landmarks: (1) one-half of the anteroposterior (AP) chest diameter in the fourth intercostal space (CVP-AP½), (2) one-third of the AP diameter in the fourth intercostal space (CVP-AP1\2), and (3) 5 cm below the sternal angle (CVP-StA) (Fig. 1) Measurements were obtained in supine, semi-recumbent (30°), and Trendelenburg (– 10°) positions (Fig. 1). Agreement between CVP and RAP was assessed using Bland–Altman analysis, limits of agreement (LoA) intraclass correlation coefficients (ICC), and Wilcoxon signed-rank tests.
Results. A total of 16 patients were included, yielding 144 paired RAP–CVP measurements across the three body positions. The differences between CVP and RAP are visualised using Bland–Altman plots (Fig. 2). Among the measurement methods, CVP-AP1\2 demonstrated the closest agreement with RAP across all positions. In the supine position, the CVP–RAP mean difference (M) was –0.56 mmHg (limits of agreement [LoA]: 0.40 to –1.52 mmHg; intraclass correlation coefficient [ICC]: 0.88). In the semi-recumbent position, M was –0.11 mmHg (LoA: 2.05 to –2.27 mmHg; ICC: 0.79), and in the Trendelenburg position, M was –0.88 mmHg (LoA: 0.52 to –2.27 mmHg; ICC: 0.90) (Table 1).
In contrast, CVP-AP½ tended to overestimate RAP, particularly in the supine position (M: 1.49 mmHg; LoA: 2.9 to –0.09 mmHg; ICC: 0.59) and the semi-recumbent position (M: 1.75 mmHg; LoA: 4.41 to –0.91 mmHg; ICC: 0.50). CVP-StA, using the sternal angle as a reference, showed the poorest agreement, especially in the semi-recumbent position (M: –2.83 mmHg; LoA: 1.3 to –7.9 mmHg; ICC: 0.18) (Table 1).
Spearman's correlation analysis revealed no significant association between the CVP–RAP differences (for CVP-AP1\2and CVP-AP1\2) and patient characteristics including BMI, height, AP diameter, weight, or LVEF, in any position. However, when using CVP-StA in the semi-recumbent position, AP diameter significantly influenced the CVP–RAP difference ($p = 0.044$).
Conclusions. Our results suggest that levelling the CVP pressure transducer at 1\2of the AP chest diameter in the fourth intercostal space will provide the most accurate estimation of RAP and minimizes variation in CVP readings across supine, semi-recumbent, and Trendelenburg positions. This approach also enhances consistency when comparing CVP measurements between individuals. Conversely, levelling the CVP transducer to 5 cm below the sternal angle should be avoided in clinical practice, as it introduces significant measurement variability and may lead to inaccurate CVP measurements in ICU and perioperative settings.

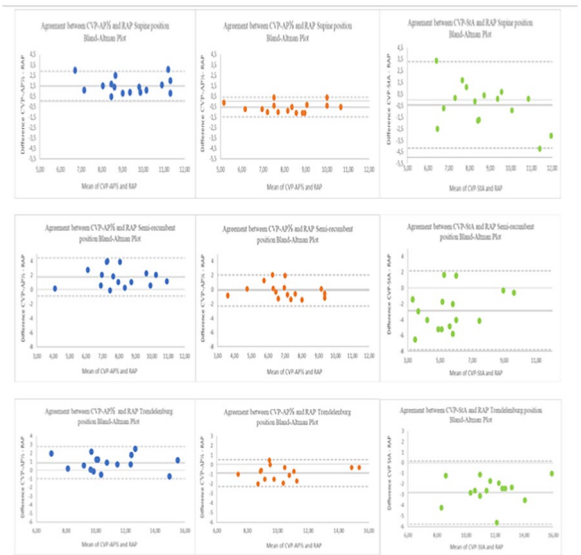


Fig. 2 (abstract 000513) Bland–Altman plots of difference between RAP and CVP (CVP-AP1\2, CVP-AP1\2and CVP-StA) in supine, semi-recumbent and Trendelenburg position.

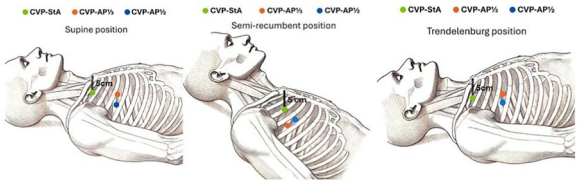


Fig. 1 (abstract 000513) The three CVP reference points described above. 5 cm below the sternal angle (CVP-StA), 1\2 of the AP diameter of the chest in the fourth intercostal space (CVP-AP½) and 1\2 of the AP diameter of the chest in the fourth intercostal space (CVP-AP1\2).

Table 2 Wilcoxon signed rank test is used to test the difference. For continuous variables, methods: mean (SD) is presented. For continuous variables difference: mean (95% CI, limits of agreement) / (SD) / [95% CI for the mean] is presented

Variable	Method RAP Mean (SD) n=16	Method CVP Mean (SD) n=16	Difference (Method RAP – Method CVP) Mean (95% CI Limits of Agreement) (SD) [95% CI for mean]	Systematic changes p-value	Intraclass Correlation Coefficient (ICC) Shrout-Fleiss reliability: random set
RAP vs CVP-AP½ Supine	8.56 (1.51)	10.1 (1.4)	-1.49 (-2.90; -0.07) (0.72) [-1.87; -1.10]	<.0001	0.588
RAP vs CVP-AP½ Supine	8.45 (1.46)	7.89 (1.48)	0.563 (-0.397; 1.522) (0.490) [0.302; 0.823]	0.0009	0.883
RAP vs CVP-StA Supine	8.48 (1.48)	8.94 (2.33)	-0.456 (-4.174; 3.262) (1.897) [-1.467; 0.555]	0.4867	0.530
RAP vs CVP-AP½ Semi-recumbent	7.09 (1.83)	8.84 (1.82)	-1.75 (-4.41; 0.91) (1.36) [-2.47; -1.03]	<.0001	0.501
RAP vs CVP-AP½ Semi-recumbent	7.03 (1.78)	6.92 (1.53)	0.113 (-2.045; 2.270) (1.101) [-0.474; 0.699]	0.4874	0.790
RAP vs CVP-StA Semi-recumbent	7.05 (1.81)	4.23 (2.52)	2.83 (-2.17; 7.82) (2.55) [1.47; 4.18]	0.0011	0.182
RAP vs CVP-AP½ Trendelenburg	10.4 (2.4)	11.3 (2.3)	-0.888 (-2.747; 0.972) (0.949) [-1.393; -0.382]	0.0022	0.857
RAP vs CVP-AP½ Trendelenburg	10.5 (2.3)	9.66 (2.48)	0.875 (-0.523; 2.273) (0.713) [0.495; 1.255]	0.0005	0.899
RAP vs CVP-StA Trendelenburg	10.7 (2.4)	13.5 (2.9)	-2.80 (-5.78; 0.18) (1.52) [-3.61; -1.99]	<.0001	0.546

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9 The Local Research and Development Council Gothenburg and Södra Bohuslän

Topic: Cardiovascular issues in ICU

000514

Energy metabolism of the heart in sepsis: a three-tracer's PET cardiac imaging—the eMESH (energy MEtabolism of Septic Heart) study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000514***.

Introduction. Physiologically, fatty acids (FAs) are the primary source of energy in the adult heart, with glucose (G) contributing minimally. In advanced, but not early, stages of heart failure, the heart typically shifts towards higher glucose utilization and decreased FA oxidation. The energy metabolism profile of the heart in patients admitted with septic shock, with or without cardiac contractile impairment (i.e., Sepsis-Induced Myocardial Dysfunction, SIMD), is not well established. Most of the data come from preclinical studies, with the energy metabolism of the septic heart depicted as a FA/G bioenergetic "shutdown" accompanied by mitochondrial exhaustion.
Objectives. To compare adult patients admitted to the intensive and coronary care units for sepsis or acute heart failure (AHF), who were divided into two groups: i) septic shock with preserved left ventricular ejection fraction (LVEF) (≥ 45%) or de novo LVEF < 45% (or a ≥ 20% drop from a previous low LVEF documented within the last 2 years), and ii) AHF with de novo LVEF ≤ 40% (HFrEF). Patients could have been infused with vasoactive drugs or weaned off them no later than 8 h before functional imaging. The use of FA-rich drugs, stimulants that enhance energy tracer uptake (propofol, etomidate, insulin), or dextrose > 5%, was prohibited.
Methods. Recording and comparison of demographic and general characteristics; cardiac biomarkers (HS troponin T [Tpn-T], NT pro-BNP, Galectin-3 [Gal-3]); echocardiography; and quantification of heart energy metabolism using one session of PET imaging with three different tracers: glucose (FDG), palmitate, and acetate.
Time window for inclusion: 48 h from admission. Sepsis was defined according to the Sepsis-3 criteria, and AHF with HFrEF was defined according to the ACC guidelines.
Results. 19 out of 24 patients were recruited (12 with sepsis, 7 with AHF). Age: 67 [58–77]; sex: 63.2/36.8% (M/F). On admission, APACHE II scores were similar: 26 [21–35] in sepsis and 22 [20–29] in AHF. SOFA scores were slightly higher in sepsis: 8 [5–13] vs. 3 [1–9] in AHF (p = 0.0464). Biomarkers NT pro-BNP and Gal-3 were indiscriminately elevated, whereas Tpn-T levels were significantly higher in AHF (423 [74–4523] vs. 36 [19–57] ng/L in sepsis, p = 0.0091).
While myocardial external efficiencies (MEE) were slightly decreased in both groups, myocardial oxygen consumption (MVO2) and Work Metabolic Index (WMI) shifts were distinctive: i) increased MVO2 in sepsis (0.167 [0.116–0.218] vs. 0.092 [0.062–0.101] mL O2/min/g in AHF, p < 0.0001), ii) enhanced WMI in AHF (6.51 [4.51–8.77] vs. 2.64 [2.15–5.49] mmHg· mL/m^2, p = 0.0135). Myocardial FA uptake was lower in AHF: 0.1651 [0.085–0.224] vs. 0.2527 [0.182–0.284] µmol/min/g in sepsis (3 missing data points, p = 0.0599), and the esterified/oxidized FA ratio significantly increased with reduced LVEF (septic shock with de novo impaired LVEF: 33.4 [21.1–141.3]%—1 missing, AHF: 43.2 [39.3–187.9]%—2 missing, p = 0.0003 and < 0.0001 vs. septic shock without impaired LVEF). In parallel, myocardial glucose uptake was clearly

enhanced in septic shock with de novo impaired LVEF: 27.6 [17.6–37.7] vs. 1.28 [0.114–3.95] µmol/min/100g in septic shock without impaired LVEF, and 3.088 [1.33–12.06] µmol/min/100g in AHF ($p = 0.0303$ and 0.041, respectively). Moreover, glucose, but not FA, utilization by the heart was negatively correlated with contractile function ($R^2 = 0.679$, $n = 12$, $p = 0.0018$) only in septic patients.
Conclusions. Patients with sepsis-induced myocardial dysfunction exhibit a distinctive energy metabolism profile, characterized by a low work metabolic index, an elevated esterified/oxidized FA ratio, and an enhanced glucose utilization, all of which are linked to contractile impairment. ClinicalTrials.gov Identifier: NCT05202938.

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2 CRC-CHUS-projet structurant grant 2022–24, Dept de Médecine, FMSS, CHU Sherbrooke.

Topic: Sepsis

000516
Urea-to-creatinine ratio and nutritional status in pediatric critical illness: insights from a five-year observational study
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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000516***.

Introduction. Malnutrition is a common and serious issue among critically ill children, often resulting in significant muscle mass loss due to increased protein catabolism, reduced protein synthesis, or both. As urea and creatinine are end-products of nitrogen metabolism, the urea-to-creatinine ratio (UCR) has been proposed as a potential biomarker of catabolic activity. However, evidence supporting its use in pediatric populations remains limited.
Objectives. This study aimed to evaluate the utility of UCR as a biomarker of sarcopenia in critically ill pediatric patients by examining its association with nutritional status, nutritional support, and clinical outcomes.
Methods. This is a retrospective, single-center observational study of critically ill patients aged < 18 years hospitalized for more than 72 h in an academic PICU from 2019 to 2024. Demographics, nutritional status, energy/protein intake, and UCR on PICU days 1–3-5–7-14–21, as well as outcome endpoints, were recorded.
Results. The study included 262 patients, boys 161 (61.5%), median age 5.3 (IQR 1.6–12.2), BMI z-score 0.06 (IQR-1.25–1.32). Enteral nutrition started within 48 h in > 90% of patients. Energy coverage was longitudinally increased, reaching 63% (recommended 70%) on Day 7 ($p = 0.005$). Independent factors (multiple linear regression analysis) for increased energy adequacy (according to Schofield equation) were the younger age ($p < 0.001$), undernutrition ($p < 0.001$), mechanical ventilation ($p < 0.001$), and complex comorbidities ($p = 0.002$). Younger age was the only independent predictor of achieving adequate protein intake (≥ 1.5 g/kg of ideal body weight per day) during the first 7 days of PICU stay ($p = 0.004$). The UCR showed a downward trend from Day 1 [44.5 (IQR 32.6–59.6)] to Day 5 [38.2 (IQR 25.9–54.7)], followed by an upward trend reaching Day 21 [45.8 (IQR 30.2–65.9)], suggesting ongoing catabolism in patients with prolonged PICU stay, although the changes were not statistically significant. Over time, no association was found between energy or protein adequacy and UCR. Furthermore, 28-day mortality, duration of mechanical ventilation, and PICU length of stay were not associated with nutritional status, energy intake, or UCR.
Conclusions. Nutritional status, anthropometric measurements, and nutritional support during PICU stay were not associated with UCR values or clinical outcomes. These findings do not support the use of the urea-to-creatinine ratio as a reliable biomarker of catabolism in critically ill children. Further prospective, multicenter studies are warranted to clarify the relationship between nutritional intake, UCR dynamics, and clinical outcomes in this population.

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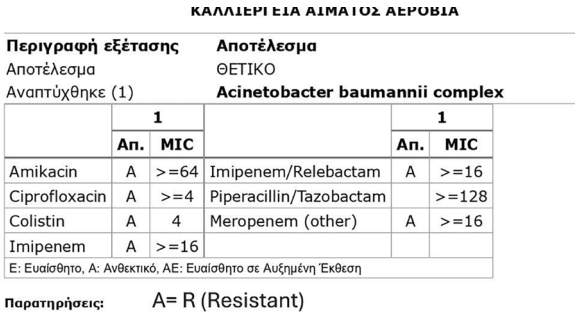
Topic: Metabolism, endocrinology, liver failure and nutrition

000517
Management of PDR Acinetobacter baumannii blod stream infection in the ICU
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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000517***.

Introduction. Acinetobacter baumannii infections emerge as a critical problem in Greece and countries around the Mediterranean due to increased resistance and lack of therapeutic alternatives. The in-hospital all cause mortality from Acinetobacter spp infections can reach up to 44%, overemphasizing the need for effective therapeutic solutions.
Objectives. The aim of this preliminary, ongoing study is to investigate the efficacy and safety of three antimicrobial combinations of colistimethate in patients with Pan Drug Resistant Acinetobacter baumannii. The primary objective was the sterilization of blood cultures and potential major side effects in 14 days.
Methods. 39 patients were included in this study (24 male, 15 female), with median age of 59, from January 2023 to December 2024.
12 patients suffered from traumatic brain injury, 10 were major trauma patients, 7 patients suffered from intracerebral and subarachnoid hemorrhage, 5 patients underwent abdominal surgery and 5 suffered from acute respiratory failure.
All 39 patients presented with PDR Acinetobacter baumannii blood stream infections during their hospitalization (Fig. 1). Antimicrobial synergy was tested in the microbiology lab and the combinations that were found to be in vitro effective were: colistimethate + rifampicin, colistimethate + daptomycin and colistimethate + tigecycline.
20 patients received colistimethate + rifampicin (Group 1).
11 patients received colistimethate + daptomycin (Group 2).
8 patients received colistimethate + tigecycline (Group 3).
Results. Group 1: 14 out of 20 patients presented with sterile blood cultures by the 14th day. The synergistic effect of colistimethate + rifampicin was effective in 70% of the patients.
Group 2: 6 out if 11 patients presented with sterile blood cultures by the 14th day.
The synergistic effect of colistimethate + daptomycin was effective in 54% of the patients.
Group 3: 3 out of 8 patients presented with sterile blood cultures by the 14th day. The synergistic effect of colistimethate + tigecycline was effective in 37% of the patients.
The incidence of **acute kidney injury** between the three groups were found similar [**Group 1**:5 out of 20 patients (25%), **Group 2**: 3 out of 11 patients (27%) and **Group 3**: 2 out of 8 patients (25%)]. Nevertheless in **Group 3**, 4 out of 8 patients (50%) suffered from coagulation disorders (thrombocytopenia, hypofibrinogenemia) in contrast with

none of the patients from Group 1 and 2. Last but not least, 2 out 20 patients (10%) from **Group 1** suffered from elevated liver enzymes(2 to threefold) and 1 out of 11 patients (9%) from **Group 2** suffered from elevated CPK.

Conclusions. The combination of colistimethate + rifampicin seems to be more effective and relatively safe in patients with PDR Acinetobacter baumannii. Nevertheless, novel therapeutic alternatives have thus become a necessity.



ΚΑΛΛΙΕΡΓΕΙΑ ΑΙΜΑΤΟΣ ΑΕΡΟΒΙΑ

Περιγραφή εξέτασης			Αποτέλεσμα		
Αποτέλεσμα			ΘΕΤΙΚΟ		
Αναπτύχθηκε (1)			**Acinetobacter baumannii complex**		
	1			1	
	Απ.	MIC		Απ.	MIC
Amikacin	A	>=64	Imipenem/Relebactam	A	>=16
Ciprofloxacin	A	>=4	Piperacillin/Tazobactam		>=128
Colistin	A	4	Meropenem (other)	A	>=16
Imipenem	A	>=16			

Ε: Ευαίσθητο, Α: Ανθεκτικό, ΑΕ: Ευαίσθητο σε Αυξημένη Έκθεση

Παρατηρήσεις: A= R (Resistant)

Fig. 1 (abstract 000517)

Reference

1 European Center for Disease (ECDC)—Laboratory manual for the ECDC genomic-based survey of carbapenem-resistant Acinetobacter baumannii

Topic: Sepsis

000518

Reliability of multimodal large language models in evaluating correct placement of central venous catheters in critically ill patients

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000518***.

Introduction. Chest radiography is the standard practice to confirm correct positioning of central venous catheters (CVC). Advances in multimodal large language models (MLLMs) that merge vision and language understanding have sparked interest in their use for interpreting medical images.

Objectives. This study aimed to evaluate the reliability of three MLLMs in assessing CVC placement in ICU patients.

Methods. We retrospectively collected chest X-rays of ICU patients with newly inserted CVCs (July–December 2024). Each image was reviewed by four ICU physicians, one radiologist and three MLLMs (GPT 4.5, Claude 3.7 Sonnet, Gemini 2.5 Pro). They evaluated three parameters: CVC access route (jugular/subclavian), CVC position acceptability and pneumothorax presence. We used Fleiss' kappa for agreement among human reviewers and Cohen's kappa for pairwise comparisons. Image quality was evaluated using a point system based on X-ray properties. A score ≥ 2 indicated good image quality.

Results. We collected 94 unique X-rays (55 of good quality). Human reviewers demonstrated almost perfect agreement for CVC access route (kappa = 0.95,95%CI 0.89–1.00), moderate agreement for CVC position (kappa = 0.47,95%CI 0.41–0.54), and fair agreement for pneumothorax detection (kappa = 0.36,95%CI 0.30–0.42). Agreement between human experts' consensus and MLLMs was very poor (Table 1). Assessment distribution patterns are shown in Table 2. Image quality affected MLLM performance variably. Human expert agreement remained consistently high regardless of quality. All MLLMs exhibited systematic differences from human experts in CVC access route classification and two of them in position acceptability.

Table 1 (abstract 000518) Agreement between MLLMs and human consensus

	MLLM	Cohen's Kappa (95% CI)	Accuracy	Sensitivity	Specificity
CVC access route	ChatGPT	-0.14(-0.35,0.08)	46.8%	50.6%	18.2%
	Claude	-0.06(-0.2,0.07)	28.7%	25.3%	54.5%
	Gemini	0.02(-0.21,0.24)	56.4%	57.8%	45.5%
CVC position	ChatGPT	0.00(-0.3,0.3)	69.1%	100%	0%
	Claude	-0.01(-0.28,0.27)	64.9%	89.2%	10.3%
	Gemini	-0.16(-0.40,0.09)	52.1%	67.7%	17.2%
Pneumothorax	ChatGPT	-0.01(-1.00,1.00)	96.8%	0%	98.9%
	Claude	-0.03(-0.83,0.77)	93.6%	0%	95.7%
	Gemini	-0.01(-1.00, 1.00)	96.8%	0%	98.9%

Table 2 (abstract 000518) Assessment distribution across image quality groups

	Quality	Assessment	Human consensus	ChatGPT	Claude	Gemini
CVC access route	Good	Jugular	92.7%	54.5%	23.6%	58.2%
		Subclavian	7.3%	45.5%	76.4%	41.8%
	Poor	Jugular	82.1%	52.5%	32.5%	57.5%
		Subclavian	17.9%	47.5%	67.5%	42.5%
CVC position	Good	Acceptable	70.9%	100%	94.5%	78.2%
		Not acceptable	29.1%	0%	5.5%	21.8%
	Poor	Acceptable	66.7%	100%	82.5%	65%
		Not acceptable	33.3%	0%	17.5%	35%
Pneumothorax	Good	Present	0%	0%	3.6%	0%
		Absent	100%	100%	96.4%	100%
	Poor	Present	5.1%	2.5%	5%	2.5%
		Absent	94.9%	97.5%	95%	97.5%

Conclusions. This study demonstrates that current MLLMs perform poorly in evaluating CVC placement on chest radiographs. The negative kappa values for MLLMs-human agreement indicate performance worse than chance, raising significant concerns about their reliability.

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Topic: Information systems and Data Science

000519

A pilot study comparing the automated echocardiographic measurement of cardiac output to transpulmonary thermodilution and manual measurement in a tertiary intensive care unit.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000519***.

Introduction. Hemodynamic monitoring is pivotal in the management of the critically ill unstable patient. Transpulmonary thermodilution (TPTD) by pulmonary arterial catheter and Pulse Contour Cardiac Output (PiCCO) are widely used for hemodynamic monitoring in the intensive care unit(1), but are invasive and time-consuming to set up. Transthoracic echocardiography (ECHO) is another modality that is increasingly being used for initial shock and CO assessment as it is non-invasive and easily accessible in most units. Technological advancement has enabled the automated ECHO measurement of CO (aCO), further expediting hemodynamic monitoring and management of critically ill patients. Previous studies have demonstrated reasonable agreement between manual ECHO measurement of CO (mCO) and PiCCO (pCO) (2–4), and between aCO and mCO measurements(5). In this study, we aim to assess the agreement between these three parameters.
Methods. We conducted a single-centre, prospective, observational study in a tertiary intensive care centre. Patients with arrhythmia were excluded. PCO measurements by TPTD (PiCCO) were first performed, followed by aCO and mCO measurements by a trained clinician who was blinded to the results of pCO. During the measurement period, all vasoactive agents were kept unchanged, and no additional fluid therapy were administered. The ECHO CO was measured as per established protocol. Results were analysed according to published methods of Bland–Altman limits of agreement and percentage error (PE)(6).
Results. We included 14 adult patients, with repeat measurements performed in the some of the patients provided a significant hemodynamic change had occurred, yielding 21 datasets. Mean CO for pCO, aCO and mCO were 6.94, 6.43 and 6.56L/min. Both aCO and mCO measurements have a small mean difference in comparison with PCO, but demonstrate wide 95% limits of agreement. PE for aCO and mCO as compared to pCO were 48.6% and 41.2%, respectively. There was, however, a small mean difference between aCO and mCO measurements (-0.13L/min PE 16.6%).

Table 1. (abstract 000519) Results analysis

Measurements	Mean difference (L/min)	Standard deviation (L/min)	95% Limits of agreement (L/min)	Percentage error (%)
Automated CO & PiCCO CO	-0.51	1.66	(-3.76, 2.74)	48.6
Automated CO & Manual CO	-0.13	0.55	(-1.21, 0.95)	16.6
Manual CO & PiCCO CO	-0.39	1.42	(-3.17, 2.39)	41.2

Conclusions. Both aCO and mCO provide close values overall to pCO, with mCO being the more accurate of the two. However, both demonstrate high 95% limits of agreement, and the PE of both are above Critchley's PE (6, 7) cutoff of 30%. The trending ability of aCO measurements needs to be further researched.

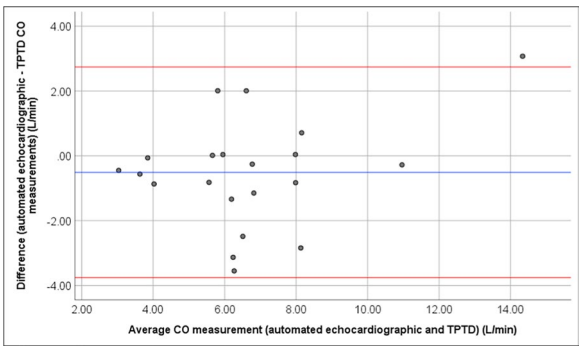


Fig 1 (abstract 000519) Bland–Altman plot for automated echocardiographic versus transpulmonary thermodilution (TPTD) cardiac output measurement.

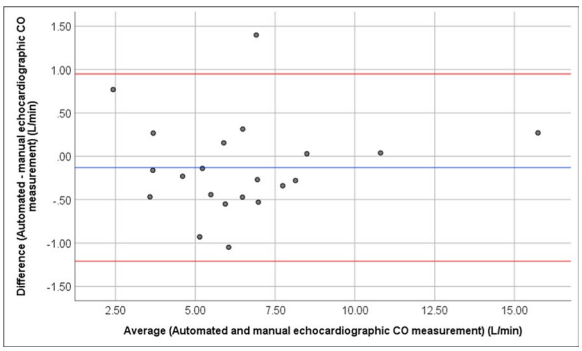


Fig. 2 (abstract 000519) Bland–Altman plot for automated versus manual echocardiographic cardiac output measurement

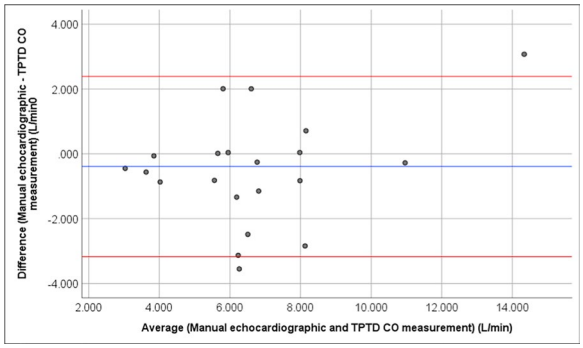


Fig. 3 (abstract 000519) Bland–Altman plot for manual echocardiographic versus transpulmonary thermodilution cardiac output measurement

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Topic: Cardiovascular issues in ICU

000520

Frailty and fate: exploring outcomes after intensive care in patients aged more than 80 years

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000520***.

Introduction. Frailty is a state of increased vulnerability resulting from a decline in reserve across multiple physiological systems, increasing susceptibility to adverse events and is an inevitable consequence of aging (1). Currently, the proportion of "very old intensive care patients" (VIPs) admitted to critical care is estimated at 15%, and this figure is expected to rise in the coming years (2). This change in demographic composition of critical care population presents multiple challenges—older patients with multiple chronic conditions who face higher risks of mortality and morbidity. Furthermore, studies such as VIP2 have demonstrated that frailty assessment using the clinical frailty scale is able to predict short-term mortality in elderly patients admitted to intensive care unit, and is similar to established scoring systems like APACHE and SOFA (3).
This study aimed to evaluate the association between the Clinical Frailty Scale (CFS) of elderly patients aged 80 years or more at admission with the level of dependence/frailty and mortality at 6 months and 12 months after discharge from intensive care unit.
Methods. This was a retrospective analysis of 'very old intensive care patient' admissions (aged ≥ 80 years) in the intensive care unit of a district general hospital. Admissions for both medical and surgical (emergency and elective) causes from January to December 2023 were included in the study. The Clinical Frailty Scale (CFS) using the Rockwood Scale was recorded at admission, with frailty defined as a Clinical Frailty Scale of ≥ 5. Outcome variables assessed included length of stay in the intensive care unit (ICU), mortality in the intensive care unit and at 6-months and 12 months as well as the Clinical Frailty Scale (CFS) at 6 months and 1 year.

Results
Among the total of 876 patients admitted to the intensive care unit in 2023, 120 individuals were aged ≥ 80 years and enrolled in the study. Retrospective data were obtained from electronic medical records. Of the 120 cases, 45 were medical and 75 surgical admissions, including 34 emergency surgeries. Based on the clinical frailty scale at admission, 68 patients were categorised as frail (CFS ≥ 5) and 52 as non-frail. Admission factors such as the nature and reason for admission, incidence of sepsis were similar between the groups.

The overall ICU mortality was 15% for the cohort which increased to 35% (42 patients) at the 12 months timepoint. Six-month mortality was significantly higher among patients identified as frail at admission (35%) compared to non-frail patients (19%). At 12 months, mortality further increased to 43% in the frail group and 25% in the non-frail group ($p = 0.04$). There was, however, no significant difference between frail and non-frail groups in the ICU length of stay which is possibly reflective of the advance decision-making and relatively the larger number of elective surgical admissions.
Of the 78 survivors at 12 months, Frailty scale was available for only 38 patients at all time points, i.e., at admission, 6 months and 12 months due to the retrospective nature of data collection. A significant decline in functional status was observed in all these patients following an intensive care admission, most notably in emergency surgical admissions. The incidence of frailty increased from 50% at admission to 68% at 6 months and further increased to 76% at 12 months, which is clinically and statistically significant ($p < 0.001$).
Conclusions. Frailty is an independent risk factor for poor outcomes in both short-term and long-term mortality and functional decline, in very old intensive care patients and particularly more in emergency surgical admissions. It is essential to consider frailty in the risk stratification especially in preassessment of surgical patients to support informed, shared decision-making with patients and their families. Larger sample size studies are required to further delineate the effect of frailty in the subgroups of surgical and medical admissions to intensive care.

Table 1 Comparison of admission factors between frail and non-frail patients

Variable	Category	Non-frail (N=52)	Frail (N=68)	P-value
Age	-	84 [82, 86]	84 [81, 86]	0.99
Sex	Female	22 (42%)	31 (46%)	0.72
	Male	30 (57%)	37 (54%)	
Reason admission	Medical	20 (38%)	25 (37%)	0.85
	Surgical	32 (62%)	43 (63%)	
Nature admission	Elective	15 (29%)	20 (30%)	0.96
	Emergency	36 (71%)	47 (70%)	
Sepsis	No	37 (73%)	38 (56%)	0.06
	Yes	14 (27%)	30 (44%)	

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value

associated with *g, SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

Table 2 Comparison of mortality following ICU admission

Outcome	Non-Frail(n=52) n (%)	Frail(n=68) n (%)	P-value
ICU mortality	8 (15%)	10(15%)	0.92
Hospital mortality	8(15%)	18(26%)	0.14
6-month mortality	10(19%)	24(35%)	0.05
12-month mortality	13(25%)	29(43%)	**0.04**

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g, SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

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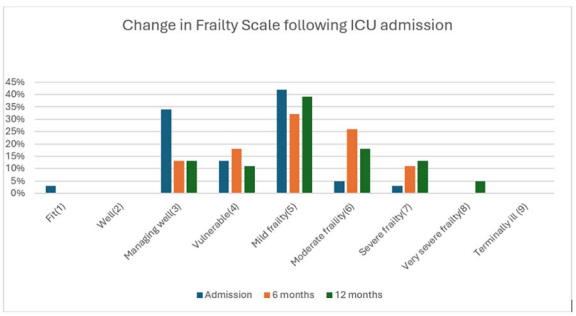


Fig 1 (abstract 000520) Change in frailty status at admission, 6 months and 12 months

Table 3 Change in Clinical frailty scale at admission, 6 months and 12 months

Variable	N	Category	Admission	6 months	12 months
			n (%)	n (%)	n (%)
CFS Score	38	Fit (1)	1(3%)	0(0%)	0(0%)
		Well (2)	0(0%)	0(0%)	0(0%)
		Managing well (3)	13(34%)	5(13%)	5(13%)
		Vulnerable (4)	5(13%)	7(18%)	4(11%)
		Mild frailty (5)	16(42%)	12(32%)	15(39%)
		Moderate frailty (6)	2(5%)	10(26%)	7(18%)
		Severe frailty (7)	1(3%)	4(11%)	5(13%)
		Very severe frailty (8)	0(0%)	0(0%)	2(5%)
		Terminally ill (9)	0(0%)	0(0%)	0(0%)
p- value				<0.001	<0.001
Frailty (CFS ≥5)	38	Yes	19(50%)	26(68%)	29(76%)
		No	19(50%)	12(32%)	9(24%)
p- value				0.02	0.002

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g, SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

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Topic: Health Services Research and Outcome

000521

What is the best tool for predicting prognosis in critically ill patients with acute pancreatitis?

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000521***.

Introduction. Acute pancreatitis (AP) varies in severity, ranging from mild cases to critical conditions associated with high mortality and multiple organ dysfunction. Several prognostic scores have been developed to stratify the severity of AP, including BISAP, Ranson, Glasgow-Imrie, Balthazar, SOFA, and APACHE II, each with specific characteristics and criteria.
Objectives. To compare the discriminatory power of different scoring systems in predicting hospital mortality in patients with acute pancreatitis admitted to the intensive care unit (ICU).
Methods. This is a retrospective cohort study including patients hospitalised with acute pancreatitis and admitted to the ICU of a secondary care hospital between 2022 and 2024. Clinical characteristics of the patients were collected, and BISAP, Ranson, Glasgow-Imrie, Balthazar, SOFA, SAPS II, and APACHE II scores were calculated on ICU admission. The predictive power of each score was assessed through the analysis of the area under the receiver operating characteristic (AUROC) curve.
Results. A total of 71 patients were included, with a mean ± SD age of 62 ± 15 years; 58% (n = 41) were male. In our sample, 37% (n = 26) was attributed to lithiasis, 23% (n = 16) idiopathic, 20% (n = 14) alcoholic, 14% (n = 10) due to hypertriglyceridaemia, and 9% (n = 6) post-ERCP. Relatively to the prognostic scores, BISAP 2.4 ± 1.4 (mean ± SD), Ranson 1.8 ± 1.1 at 24h and 3 ± 1.6 at 48h, Glasgow-Imrie 3.6 ± 1.8, Balthazar 2.3 ± 2, SOFA 6.5 ± 3.8, SAPS II 39 ± 20, and APACHE II 17 ± 9. The discrimination value of each score is shown in Table 1.
ICU mortality was 27% (n = 19) and hospital mortality was 31% (n = 22).

Table 1- (abstract 000521) The AUROC curve and 95% confidence interval for each score in the prediction of hospital mortality

Score	AUROC curve	95% CI
BISAP	0,597	0,455 – 0.740
RANSON_24	0,603	0,459 – 0.747
RANSON_48	0,590	0,429 – 0.751
GLASGOW_IMRIE	0,651	0,510 – 0.793
BALTHAZAR	0,527	0,361 – 0.693
SOFA	0,765	0,649 – 0.881
SAPS II	0,806	0,679 – 0.934
APACHE II	0,846	0,734 – 0.957

Conclusions. In our population, ICU prognostic scores (SOFA at admission, SAPS II, and APACHE II) predicted hospital mortality more accurately than specific acute pancreatitis stratification scores such as BISAP, Ranson, Glasgow-Imrie, and Balthazar.

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Topic: Health Services Research and Outcome

000522

ICU mortality in acute pancreatitis: identification of key risk factors

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000522***.

Introduction. Acute pancreatitis (AP) occurs in varying degrees of severity, from mild to severe cases associated with high mortality and multiple organ failure. Early identification of risk factors for ICU mortality allows for a more targeted treatment strategy, better resource allocation and the possibility to improve patient outcomes.

Objectives. To identify independent risk factors at admission related with ICU mortality.

Methods. Retrospective cohort study of all patients hospitalised with acute pancreatitis and admitted to the ICU of a secondary care hospital between 2022 and 2024. Clinical data, comorbidities, laboratory results and severity scores were analysed. The primary endpoint was ICU mortality.

Results. A total of 71 patients were included in the study, with their characteristics outlined in Table 1. The ICU mortality rate was 27% (n = 19).

Table 1. (abstract 000522) Clinical and demographic characteristics of the 71 patients included in the study.

Characteristic	Total (n = 71)	Dead (n = 19)	Crude OR	P value
Age, mean ± SD	62 ± 15	70 ± 11	1.055	0.014
Male, n (%)	41 (58)	12 (63)	1.360	0.578
Frailty score, median (IQR)	1 (1–2)	2 (1–3)	1.675	0.028
Charlson, median (IQR)	3 (2–5)	4 (3–5)	1.091	0.432
BISAP score, mean ± SD	2.4 ± 1.4	2.8 ± 1	1.388	0.122
Ranson 24h, mean ± SD	1.8 ± 1.1	2.2 ± 1.1	1.680	0.042
Ranson 48h, mean ± SD	3 ± 1.6	3.4 ± 1.8	1.193	0.325
Glasgow-Imrie score, mean ± SD	3.6 ± 1.8	3.9 ± 1	1.126	0.416
Balthazar score, mean ± SD	2.3 ± 2	2.4 ± 2.1	1.022	0.884
SOFA score at admission, mean ± SD	6.5 ± 3.8	9.4 ± 3.2	1.432	< 0.001
SAPS II score, mean ± SD	39 ± 20	58 ± 20	1.094	< 0.001
APACHE II score, mean ± SD	17 ± 9	26 ± 6	1.252	< 0.001
Etiology, n (%)	26 (37)	4 (21)	0.364	0.108
Lithiasis	14 (20)	4 (21)	1.120	0.864
Alcohol	10 (14)	1 (5)	0.265	0.224
Hypertriglyceridemia	6 (9)	1 (5)	0.522	0.565
Post-ERCP	16 (23)	9 (47)	5.786	0.004
Idiopathic	1(1)	0(0)		
Medication				
Dysfunctions, n (%)	34 (48)	16 (84)	10.074	< 0.001
Neurologic	39 (55)	16 (84)	6.725	0.001
Cardiovascular	53 (75)	17 (90)	3.778	0.099
Respiratory	48 (68)	18 (95)	13.200	0.015
Renal	39 (55)	10 (53)	0.881	0.814
Hepatic	27 (38)	8 (42)	1.263	0.669
Coagulopathy				

When adjusted for age, Frailty score, idiopathic pancreatitis, and dysfunctions (neurologic, cardiovascular, respiratory, renal), the final model retains Frailty score and neurologic dysfunction with adjusted OR (95% CI) of 2.006 (1.063–3.785) and 12.637 (2.796–57.107).

Conclusions. In our population, older age, higher frailty score, higher Ranson score at 24 h, higher prognostic ICU scores, idiopathic pancreatitis, neurological, cardiovascular and renal dysfunction were associated with higher ICU mortality. In these patients nor progression of necrosis, infection, non-conservative treatment or antibiotic therapy were associated with this outcome.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000523

Association between the diagnosis of diffuse parenchymal lung diseases diagnosis and oxygenation-based severity classification in acute respiratory distress syndrome

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000523***.

Introduction. Acute respiratory distress syndrome (ARDS) is classified based on oxygenation, and severe hypoxemia is associated with increased mortality. However, approximately one-third of mechanically ventilated patients diagnosed with ARDS have newly developed or exacerbated diffuse parenchymal lung diseases (DPLD)1.
Objectives. We conducted a post hoc analysis of a multicenter retrospective cohort study to evaluate whether the association between ARDS severity and in-hospital mortality differs depending on the diagnosis of DPLD.
Methods. We included mechanically ventilated patients diagnosed with moderate or severe ARDS based on the Berlin definition at 10 hospitals in Japan between December 2017 and December 2019. Patients were categorized as having severe (P/F ≤ 100) or moderate (P/F 101–200) ARDS according to the lowest P/F ratio within 48 h of mechanical ventilation. The primary outcome was in-hospital mortality. Based on expert diagnosis, patients were classified into three DPLD categories: classic ARDS, idiopathic pulmonary fibrosis (IPF), and non-IPF DPLD. We assessed the association between severity classification and in-hospital mortality across DPLD categories, and evaluated the interaction between ARDS severity and DPLD category.
Results. Among 274 patients, 167 were classified as having severe ARDS and 107 as moderate. In the severe ARDS group, 64.5% had classic ARDS, 10.3% had IPF, and 25.2% had non-IPF DPLD. In the moderate group, the proportions were 68.3%, 6.0%, and 25.7%, respectively. Among 183 patients with classic ARDS, in-hospital mortality was significantly higher in patients with severe ARDS compared to moderate ARDS (62.3% vs. 42.1%, P = 0.006). However, no significant difference in mortality between severe and moderate ARDS was observed in patients with non-IPF DPLD (70 patients; 40.7% vs. 34.9%, P = 0.80) and IPF (21 patients; 63.6% vs. 60%, P = 1.00). In patients with classic ARDS, severe cases had higher odds of in-hospital mortality compared to moderate cases (odds ratio [OR] 1.90, 95% confidence interval [CI] 1.03–3.50; interaction P = 0.04). In contrast, the association was not significant in IPF (OR 0.75, 95% CI 0.12–4.66; interaction P = 0.76) or non-IPF DPLD (OR 1.58, 95% CI 0.60–4.16; interaction P = 0.36).
Conclusions. Our findings highlight the importance of diagnosing the underlying cause of ARDS when interpreting P/F-based severity classification. Mechanically ventilated patients with IPF may have a high risk of mortality regardless of oxygenation status.

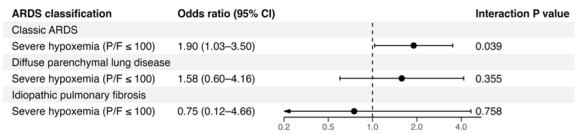


Figure (abstract 000523) Forest plot showing the odds ratio for in-hospital mortality in patients with severe hypoxemia (P/F ≤ 100). Abbreviation: ARDS, acute respiratory distress syndrome.

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Topic: Acute respiratory failure and mechanical ventilation

000524

Effect of total intravenous anaesthesia with propofol and dexmedetomidine versus inhalational anaesthesia on perioperative inflammation in oral cancer surgery: a randomised controlled trial.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000524***.

Introduction. Surgical inflammation may impair recovery and delay oncological therapy in cancer patients. Propofol and dexmedetomidine have potential anti-inflammatory properties, but their clinical impact compared to inhalational agents remains unclear. This study investigated the effect of these anaesthetic techniques on perioperative inflammation and postoperative outcomes in oral cancer surgery.
Hypothesis: Combination of dexmedetomidine and propofol (TIVA), will work as anti-inflammatory agent and causes less perioperative inflammation when compared with inhalational agents. This perioperative inflammation is also associated with decreased postoperative analgesic requirement.
Objectives. This study aims to assess the impact of different modes of anaesthesia on perioperative inflammation and post-operative pain in patients undergoing oral cancer surgery. Due to scarcity of evidence concerning these perioperative phenomena and anesthesia modes, this study was planned. Primary outcome was to compare difference in change of TNF alpha at postoperative day 1 and day 3, in both the groups. Secondary outcomes was to compare changes in level of IL-6, IL l0 and IL13 in blood in both the groups at day 1 and day 3. Postoperative pain scores till 48 h, duration of hospital stay and day of return to intended oncological therapy (RIOT) in both the groups were also compared.
Methods. The study was conducted after approval from ethics committee and registration at clinical trial registry-India. Total 66 patients of American Society of Anaesthesiologists (ASA) physical status grade I to III, aged 25 to 65 years, with oral cancer, randomized into two groups. Preoperative biomarkers IL-6, IL-10, IL-13, and TNF-α were recorded. Patients in group A received TIVA with dexmedetomidine infusion(0.5mcg/kg/hr infusion) to maintain a Bi spectral index value 40–60 and group B received inhalational agents (Minimum alveolar concentration of 1.0) for maintenance. Rest all anaesthesia technique was similar as per the standard protocol. Biomarkers were again recorded on postoperative day 1 and day 3. Postoperative pain scores, total analgesic consumption in 48 h, day of discharge and day of RIOT were also noted. Quantitative variables are presented as median (IQR) or mean (SD). Chi-square test was applied for qualitative data. Unpaired Student's t test was applied for comparing quantitative data. The results were significant if P value was < 0.05.
Results. IL6, IL 10, TNF alpha and IL 13 were comparable on post-operative day 1 and day 3 in TIVA and inhalational agents group. Postoperative pain scores were also comparable in both the groups. Analgesic consumption at 24 h (p = 0.305) and 48 h (p = 0.147) was also comparable. Most of the patients were discharged by day 3 (57%) in both the groups. Day of discharge (p value = 0.783) and RIOT (p value = 0.235) were also comparable.
Conclusions. The study shows that TIVA and inhalational agents produce similar effects on perioperative immune markers (TNF alpha, IL 6, IL13 and IL 10) in oral cancer patients. No significant difference was observed in pro and anti-inflammatory markers, day of discharge or RIOT.

Relevance to patient care: This study suggests that anaesthetic technique does not influence immunosuppression, postoperative pain scores, analgesic requirements and patients recovery. Both anaesthesia technique had equivalent short term perioperative outcomes, suggesting that it may not influence early perioperative course in oral cancer surgery. Anaesthesia technique can be chosen based on patient profile, comorbidities, and surgical requirements.

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2 AIIMS, Jodhpur

Topic: Perioperative care

000526

Intermittent titration of positive end-expiratory pressure is beneficial during extended prone position in acute respiratory distress syndrome.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000526***.

Introduction. Extended prone position ventilation (PPV > 24 h), widely adopted during COVID-19, showed decreased mortality in moderate to severe acute respiratory distress syndrome (ARDS) [1–2]. However, it remains incompletely characterized for synergistic integration with lung-protective strategies.

Objectives. In a previous study, the feasibility of prolonged PPV with dynamic titration of positive end-expiratory pressure (PEEP) was demonstrated [3]. The present study aimed to compare physiological responses between conventional prone sessions (16 h with initial PEEP titration) and prolonged sessions (24-48 h with 6-hourly PEEP adjustments).

Methods. A single-center comparative physiology study (prospective vs. historical cohort) was conducted in our ICU. This ICU-based study enrolled moderate-severe ARDS patients ($PaO2/FiO2 \leq 150$ mmHg). The prospective cohort (n = 29) received dynamic PEEP tuning during 24-48 h prone positioning (DP-group). The historical controls (n = 16) underwent 16 h prone with PEEP titrated once during the supine position (FP-group). The PEEP was titrated based on ventilation homogeneity assessed by electrical impedance tomography.

Results. Both groups exhibited progressive PaO2/FiO2 elevation, reaching 236.9 ± 65.5 mmHg (DP-group) and 226.8 ± 89.5 (FP-group) at 16 h (both p = 0.01 *vs*. supine). However, only DP-group maintained improvement to 258.2 ± 77.3 mmHg at 48 h (p = 0.035 *vs*. 16 h). Earlier oxygenation enhancements emerged in DP-group (ΔPaO2/FiO2 at 2 h: 71.5 ± 58.6 *vs*. 27.9 ± 63.4 mmHg, P = 0.025). Dynamic PEEP significantly improved regional compliance balance (global ventilation heterogeneity 0.39 ± 0.07 *vs*. 0.49 ± 0.10, DP *vs*. FP-group, p < 0.001).

Conclusions. In moderate-to-severe ARDS patients, implementing a combination of dynamic PEEP titration and prolonged prone positioning (24–48 h) proves practical. This innovative strategy could augment the benefits of lung-protective ventilation.

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Topic: Acute respiratory failure and mechanical ventilation

000527

From complications to confidence: mastering PICC line management in critical care through comprehensive guideline

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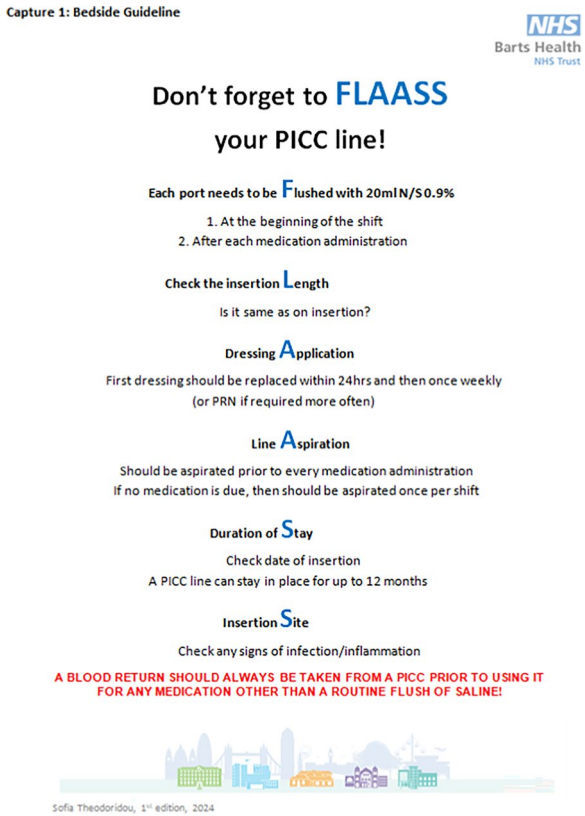
Introduction. A Peripherally Inserted Central Catheter (PICC) is a long term central access device [1, 4] which is used for chemotherapy, long term antibiotic administration, parenteral nutrition and for blood sampling. It is a long hollow tube made of silicone or polyurethane [1], is inserted in the ante-cubital fossa under ultrasound guidance and terminates in proximity to the cavoatrial junction [1, 2]. In the ICU, it can also be used for the administration of centrally delivered medications [3]. However, long-term catheters require daily assessment in order to prevent and manage complications [5], such as thrombosis, obstruction and catheter-related bloodstream infections (CRBSIs) [2].

Objectives. A clinical audit was conducted in the Intensive Care Unit of a London university hospital following frequent complications with PICC lines. This quality improvement project aimed to assess the staff knowledge in managing these Central Venous Access Devices (CVADs) and to provide education and training to healthcare professionals to enhance their use.

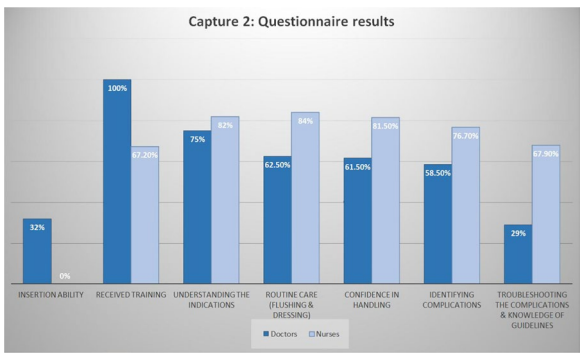
Methods. Initially, we developed anonymous questionnaires for ICU doctors and nurses to assess their knowledge and confidence in handling PICC lines. Following this, we delivered presentations and bedside teaching for doctors, CCOT nurses, and ICU nurses. We also created a PICC line bedside guideline with the acronym "FLAASS" (Capture 1) to facilitate quick assessment of the patient's PICC line. This guideline was placed at every bed space to enable daily evaluations of the CVAD, helping to prevent complications or address them early.

Results. The initial questionnaire revealed that many staff members lacked confidence and some had not received proper training (Capture 2). Additionally, many, both nurses and doctors, were uncertain about how to manage complications (Capture 2). After regular teaching sessions and daily assessment of PICC lines using the provided guideline (capture 1), staff members became more confident and were able to educate each other. As a result, we observed that complications, such as obstructions, were addressed more quickly, allowing the PICC lines to remain in place for longer periods.

Conclusions. In conclusion, PICC line placement in the ICU should be considered when a long-term intravenous access is required. However, due to increased risk of CVADs associated complications, proper education and training of staff facilitates better outcomes, allowing the line to remain in situ for a prolonged duration.



Capture 1 (abstract 000527) Bedside guideline



Capture 2 (abstract 000527) Questionnaire results

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Topic: Health Services Research and Outcome

000529

Cardiac output measurement in patients with circulatory failure via hands-free carotid ultrasound: validation of accuracy, precision, and trending ability

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000529***.

Introduction. Monitoring cardiac output (CO) is crucial for managing hemodynamics in patients with circulatory failure. The CADFlow system (Sensus Medical, China) is an innovative hands-free continuous auto-Doppler flow monitor that provides ongoing CO assessments by measuring the carotid velocity–time integral (cVTI) and calculating the cross-sectional area from the diameter of the carotid artery, assuming a 10% ratio of carotid to total CO. This study aimed to evaluate the accuracy, precision, and ability of CADFlow to track changes in cardiac index (CI) during fluid challenges (FC) in patients with circulatory failure, using transpulmonary thermodilution (TPTD) as a reference method.
Methods. This prospective bicentric study was conducted from October 2024 to January 2025. Adults experiencing circulatory failure (mean arterial pressure < 65 mmHg or requiring vasopressors) and needing a fluid challenge were enrolled if a PiCCO device was in place. CI was simultaneously measured by both CADFlow (CI-CAD) and TPTD (CI-TPTD) before and after administering a 500 mL infusion of Ringer's lactate. The intra- and inter-observer variability during probe placement, as well as the least detectable change (LSC) during continuous monitoring, were recorded to evaluate reproducibility. The agreement between the two methods was analyzed using Pearson's correlation and Bland–Altman plots, assessing bias, limits of agreement (LoA), and percentage error (PE). The ability to detect trends was examined using Pearson's correlation, Bland–Altman plots, four-quadrant plots, and polar plots. Receiver operating characteristic (ROC) curves were employed to assess the capacity of CI-CAD to detect CI-TPTD increases of $\geq$ 15%.
Results. A total of 40 patients with circulatory failure (93% with septic shock; median SOFA score of 8, APACHE II score of 19) were included in the study. Among these, 85% required invasive mechanical ventilation, 88% received norepinephrine, and the 28-day mortality rate was 30%. The intra- and inter-observer reproducibility of CI-CAD measurements was found to be excellent, with intraclass correlation coefficients (ICC) of 0.93 and 0.91, respectively. Continuous monitoring revealed a low LSC of 1.1% for CI-CAD. Among the 80 paired measurements, CI-CAD displayed a moderate correlation with CI-TPTD ($r = 0.67$, $p < 0.01$), showing a bias of 0.18 L/min/m^2 but wide limits of agreement (-1.50 to + 1.86 L/min/m^2, PE = 50%). In terms of ΔCI data, CADFlow demonstrated outstanding trending capability, showing a strong correlation between changes in ΔCI-CAD and ΔCI-TPTD (Pearson's $r = 0.91$, $p < 0.01$) and minimal bias in the Bland–Altman analysis (-0.07 L/min/m^2; LoA: -0.46 to + 0.61 L/min/m^2). Excluding a

central zone with a radius of 0.15 L/min/m^2 (5% of the mean CI-TPTD), four-quadrant plot analysis confirmed 95% concordance in trending direction, while polar plot analysis yielded a polar angle of -4.26° (with radial limits of ± 22.3°). For detecting ΔCI-TPTD increases of ≥ 15%, CADFlow achieved 96% sensitivity and 100% specificity, with an area under the curve (AUC) of 0.98. Subgroup analyses indicated reduced agreement in patients with low CI (< 3 L/min/m^2, PE = 66%), high norepinephrine equivalence (≥ 0.29 mcg/kg/min, PE = 54%), and carotid plaques (intima–media thickness ≥ 1.3 mm, PE = 66%). Nonetheless, trending performance remained robust across all subgroups (Pearson's r > 0.89 and concordance > 94% in the four-quadrant plot).
Conclusions. In patients with circulatory failure, CADFlow demonstrates excellent performance in tracking changes in cardiac index during fluid challenges. In contrast, static CI-CAD measurements exhibit moderate accuracy and precision compared to CI-TPTD. These findings suggest that while CADFlow may not be a direct replacement for TPTD, it provides significant value in functional hemodynamic monitoring by reliably tracking dynamic changes in CI.

Topic: Cardiovascular issues in ICU

000530

Self-extubation in critically ill patients: from the French OUTCOME-REA network

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000530***.

Introduction. Self-extubation is a common complication in intubated patients in the intensive care unit (ICU) and is associated with a high rate of weaning failure. The aim of this study was to identify predictors of weaning failure following self-extubation and to evaluate the prognosis of these patients.
Methods. Data were extracted from the French ICU database, OutcomeRea™. The objective of the study was to identify factors associated with weaning failure, defined as reintubation or death within 48 h of self-extubation. The association between weaning failure after self-extubation and mortality, ICU stay duration, and the occurrence of nosocomial pneumonia was also assessed.
Results. During the study period between November 1996 and May 2022, 12,917 patients were intubated in the ICU. Of these, 701 patients experienced self-extubation without therapeutic limitations before extubation, and 276 (39.4%) of these patients experienced weaning failure. In an adjusted analysis, an increase in the non-neurological SOFA score the day before self-extubation (OR, 1.15 [1.01; 1.31], p = 0.04), the length of invasive ventilation before self-extubation (3–7 days, OR, 1.32 [0.81; 2.14]; > 7 days, OR, 1.84 [1.04; 3.25]; p < 0.01), and enteral nutrition on the day of self-extubation (OR, 2.23 [1.54; 3.22], p < 0.01) were found to be associated with a higher risk of weaning failure. After adjusting for confounders, reintubation within 48 h following self-extubation was associated with increased 28-day mortality (HR = 3.03 [1.79; 5.12]; p < 0.01) and 90-day mortality (HR = 2.86 [1.86; 4.4]; p < 0.01), an increased risk of nosocomial pneumonia (sdHR, 18.28 [7.70; 43.42]; p < 0.01), and a 13-day increase in ICU length of stay (p < 0.01).
Conclusions. Enteral nutrition on the day of self-extubation, prolonged invasive mechanical ventilation prior to extubation, and a high non-neurological SOFA score were all associated with weaning failure following self-extubation. Self-extubation failure was also associated with an increased risk of mortality, nosocomial pneumonia, and extended ICU length of stay.

Topic: Acute respiratory failure and mechanical ventilation

000531

Investigating the clinical outcomes of continuous infusion of sedative agents in critically ill patients with invasive mechanical ventilation in Taiwan

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000531***.

Introduction. Optimal sedation strategies are essential for mechanically ventilated ICU patients. Current guidelines favor non-benzodiazepine (non-BZD) sedatives, such as dexmedetomidine (DEX) and propofol (PPF), over benzodiazepines (BZDs). However, real-world data in Taiwan remain scarce.
Objectives. To evaluate the clinical and economic impact of non-BZD versus BZD continuous sedation in ICU patients requiring invasive mechanical ventilation.
Methods. This retrospective cohort study used data from the National Taiwan University Hospital Integrated Medical Database (2011–2019). Adults receiving mechanical ventilation and continuous sedation within 48 h of intubation were included. Propensity score matching (1:1) was performed. Primary outcomes included ICU length of stay (LOS), time to extubation, mortality, and hospitalization costs. Subgroup analyses compared DEX and PPF to BZDs.
Results. Among 2,454 eligible patients, 625 matched pairs were analyzed (Fig. 1). Compared with BZDs, non-BZDs significantly reduced ICU LOS (9.71 vs. 11.78 days, p < 0.0001), time to extubation (4.33 vs. 6.50 days, p = 0.0051), and hospitalization costs (629,319 vs. 781,014 NTD, p < 0.0001), without affecting 90-day mortality (38.7% vs. 40.0%, p = 0.6442)(Table 1). DEX showed the greatest reduction in ICU LOS (8.89 vs. 12.65 days, p = 0.0037) and time to extubation (3.35 vs. 6.50 days, p = 0.0011), while PPF mainly provided cost savings (611,654 vs. 733,036 NTD, p = 0.0016).

Table 1: (abstract 000531) Clinical outcome in patients using non-BZD and BZD

	Non-BZD (n = 625)	BZD (n = 625)	HR	P value
Mortality				
90-day mortality	242 (38.72%)	250 (40.00%)	0.948 (0.756–1.189)	0.6442
Hospital mortality	202 (32.32%)	210 (33.60%)	0.942 (0.742–1.196)	0.6264
ICU mortality	164 (26.24%)	170 (27.20%)	0.947 (0.728–1.233)	0.6872
Length of stay				
Hospital LOS (days)	24.87 (13.36–49.82)	24.31 (13.43–51.37)		0.5810
ICU LOS (days)	9.71 (4.87-1.758)	11.78 (5.96–20.40)		**< 0.0001***
Time to extubation (days)	4.33 (1.75–10.03)	6.50 (2.81–11.90)		**0.0051***
Tracheostomy rate (%)	82 (12.65%)	91 (14.04%)	0.871 (0.618–1.228)	0.4320
Hospitalization expenditure (NTD)	629,319 (375,328–1,052,284)	781,014 (436,672–1,414,415)		**< 0.0001***

BZD: benzodiazepine, HR: hazard ratio, LOS: length of stay, NTD: new Taiwan dollars, *p < 0.05.

Conclusions. Non-BZD sedatives, especially DEX, were associated with shorter ICU stays, faster extubation, and reduced costs without increasing mortality. These findings support the preferential use of non-BZDs for ICU sedation in Taiwan.

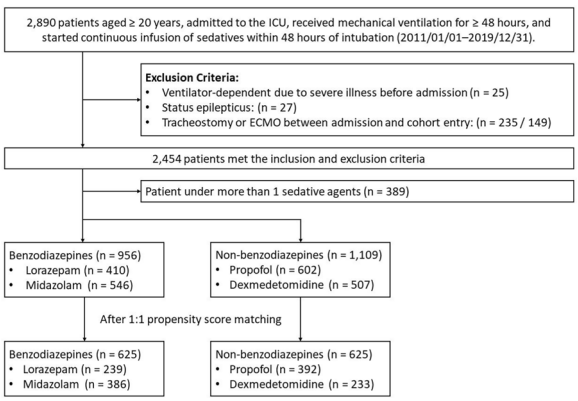


Fig. 1 (abstract 000531) Patient selection flowchart.

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2. This study was supported by research grants from National Taiwan University Hospital (NTUH 113-S0214).

Topic: Sedation, analgesia and delirium

000532

" Paracetamol challenge: inspiration drives change"

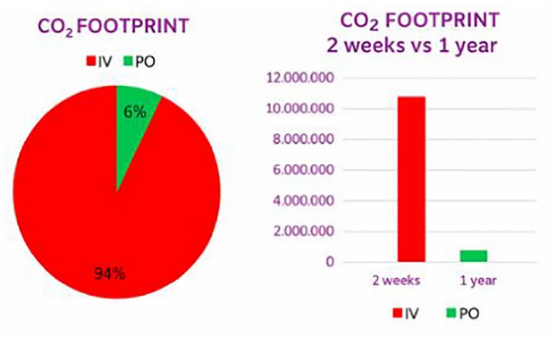
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Intensive Care Medicine Experimental, ***2025***;13(1): ***000532***.

Introduction. The healthcare sector, particularly Intensive Care Units (ICUs), is among the leading contributors to CO_2 emissions. These emissions significantly impact global climate change and affect future generations' health. Revising and innovating multiple aspects of the care pathway, such as the rational use of pharmaceuticals, represents a critical step toward energy efficiency and greater sustainability.
The "PARACETAMOL CHALLENGE" project, inspired by a study conducted in the Netherlands and informed by the experiences of other European hospitals, constitutes a critical and structured analysis of paracetamol (acetaminophen) usage within our hospital one of the most frequently prescribed and administered drugs in therapeutic protocols. A Dutch study found that 1 g of paracetamol produces 310–628 g of CO2, while a tablet generates just 38 g (1)(2).
Objectives. This study seeks to optimize paracetamol use in hospitalized patients by assessing its risks and benefits, improving clinical appropriateness, and reducing environmental impact. The goal is to raise awareness, enhance team skills, and develop a care bundle for better patient management.
Methods. A team of nurses, doctors, and pharmacists led the project in three phases: data collection, analysis, and knowledge assessment. Two nurses gathered data from the EMR of patients in intensive care, cardiothoracic, and abdominal units, focusing on the route of paracetamol administration and whether patients could have taken oral paracetamol instead of intravenous (IV), provided they were able to eat. In Phase 1 (Nov 4–17, 2024), data on paracetamol use and patient feeding status were collected.
Phase 2 involved analyzing the data and sharing the results with the team to foster better communication between nurses and prescribing doctors about when patients could safely switch to oral paracetamol.
A poster and survey were distributed to evaluate awareness of the Paracetamol Challenge. A webinar was also planned to address the environmental impact of paracetamol use.
Results. Data collected over two weeks in November revealed that 1,123 paracetamol IV units were administered, with 55.48% (623) potentially avoidable and 44.42% (500) clinically appropriate. IV administration resulted in 392,344 g of CO2, compared to just 23,674 g for oral administration. The cost of IV bottles was €255.43, while oral administration would have cost only €18.64. (3).
Alongside, the environmental impact analysis revealed that oral administration of paracetamol resulted in approximately 24,000 g of CO_2 emissions during the select period, whereas IV ones accounted for approximately 400,000 g.
When extrapolated on an annual basis, the adoption of oral administration could substantially reduce the CO_2 footprint, yielding a savings of over 10,000,000 g of CO_2.
Adherence in the ICU was higher, with 67.68% of administrations deemed appropriate, while cardiothoracic and abdominal departments had 24.48% and 29.17% appropriate, respectively.
Overall, the webinar garnered 65 responses, with nursing staff accounting for 66% of participants.

Conclusions. Projected over a year, the study highlights significant environmental and economic savings. By promoting sustainable practices in healthcare, it can reduce CO2 emissions and operating costs. The "Paracetamol Challenge" aims to foster a multidisciplinary team that empowers nurses to assess the route of administration, while encouraging collaboration and respect for the environment.

Period considered	IV cost	Tablet cost	Total savings
2 weeks	255,43 €	18,64€	236,75€
1 year (projection)	7152,04 €	523,04€	6629 €

Expenditure results: comparison between IV form and tablet (PO).



Period	EV (g)	PO (g)	Total CO_2 Footprint (g)
2 weeks	391,244	23,674	367,570
1 year	10,954,832	662,872	10,291,960

Analysis

- **2 Weeks:** During this short period, the EV emissions stood at 391,244 grams, while passenger or other emissions were 23,674 grams, contributing to a total CO_2 footprint of 367,570 grams.
- **1 Year:** Over the course of a year, EV emissions increased significantly to 10,954,832 grams, and PO emissions reached 662,872 grams, resulting in a total CO_2 footprint of 10,291,960 grams.

Co2 Footprint results: comparison between IV form and tablet (PO)—(2 weeks vs 1 year projection)



Italian version of the poster shared among ISMETT staff

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6 We thank all ISMETT staff involved, MAGNET program and all the cited authors for the data provided.

Topic: Nursing care and physiotherapy

000533

Diagnostic accuracy of dynamic ultrasound indices versus bioreactance—noninvasive cardiac output monitoring for fluid responsiveness in shock

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000533***.

Introduction. Measurements taken using a bioreactance-based, non-invasive hemodynamic monitoring method have shown that the increase in stroke volume index (ΔSVI) resulting from the passive

leg raising (PLR) manoeuvre can serve as a reliable and reproducible dynamic index for predicting volume responsiveness.
Objectives. The primary aim of this study was to assess the reliability of ultrasound-based fluid responsiveness parameters in comparison to bioreactance-based monitoring measurements for determining the fluid responsiveness of patients in shock.
Methods. The study included intubated, sedated, and mechanically ventilated patients aged 18–90 with shock admitted to the medical intensive care unit from March 2023 to April 2025. The vena cava inferior (VCI) distensibility index, left ventricular out-flow tract (LVOT) velocity time integral (VTI), cardiac index (CI), respiratory phasic variability of LVOT-VTI, corrected carotid flow time (cCFT), and respiratory phasic variability of the maximum carotid flow value were measured and recorded by an experienced sonographer. The pulse pressure variation (PPV) of the patients was obtained through invasive arterial monitoring. Afterwards, the Starling® monitor was connected to the patients, and CI was measured. PLR manoeuvre was performed, and ΔSVI was recorded. Fluid responsiveness was determined based on the ΔSVI.
Results. A total of 39 patients were included in the study. The median age was 70 years [60–77], and 51.3% (n = 20) of the patients were male. The median APACHE II score was 29.5 [22.7–33.2], APACHE PMR was 67.2% [47.8–83.0], and the SOFA score was 12 [11–13]. The distribution of shock types, according to the monitor's measurements, was as follows: distributive shock in 26 patients (66.7%), hypovolemic shock in 9 patients (23.1%), cardiogenic shock in 2 patients (5.1%), and obstructive shock in 2 patients (5.1%). Volume responsiveness, as determined by ΔSVI with PLR using the monitor, was present in 53.8% (n = 21) of patients. (Table 1) A strong correlation was observed between CI measurements obtained using LVOT-VTI and the monitor, with a Spearman's rank correlation coefficient of 0.835 (p < 0.001). However, no significant correlation was found between CI and the cCFT, with a Spearman's rank correlation coefficient of 0.156 (p = 0.395). The sensitivity and specificity values for predicting volume responsiveness were highest for PPV, with a sensitivity of 94.4% and a specificity of 70.5%. LVOT-VTI variability also demonstrated high sensitivity (85.0%) but slightly lower specificity (66.6%). Kappa measures of agreement were 0.538 for PPV and 0.463 for LVOT-VTI variability (p = 0.01 and p = 0.003, respectively). Cronbach's alpha indicated the highest internal consistency for PPV (0.728), followed by LVOT-VTI variability (0.656), CF variability (0.568), and VCI distensibility (0.559). (Table-2) LVOT-VTI variability and PPV demonstrated the highest predictive ability for volume responsiveness, with area under the curve (AUC) values of 0.847 (95% CI: 0.726–0.968, p < 0.001) and 0.832 (95% CI: 0.679–0.985, p = 0.001), respectively. CF variability showed moderate correlation (r = 0.36, p = 0.03) with an AUC of 0.754 (95% CI: 0.587–0.921, p = 0.01), while VCI distensibility demonstrated a weaker correlation (r = 0.21, p = 0.20) with a lower AUC of 0.676 (95% CI: 0.495–0.857, p = 0.06). (Table 3) (Fig. 1) ICU mortality was 48.7% (n = 19), and the standardized mortality ratio (SMR) was calculated as 72.4%. Median ICU length of stay (LOS) was 14 days [IQR: 7–26], and median hospital LOS was 29 days [IQR: 7–45].
Conclusions. This study's findings suggest that LVOT-VTI variability is a reliable dynamic indicator for predicting volume responsiveness in critically ill patients, showing superior diagnostic performance compared to VCI distensibility and CF variability.

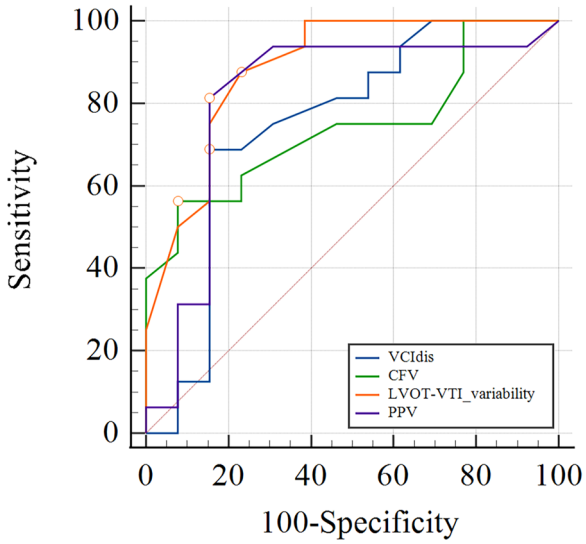


Figure 1 (abstract 000533) ROC curve analysis

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Topic: Imaging in intensive care

000534

Validation of United States CDC's adult sepsis events (eSOFA) in emergency department patients across multiple centers in Korea

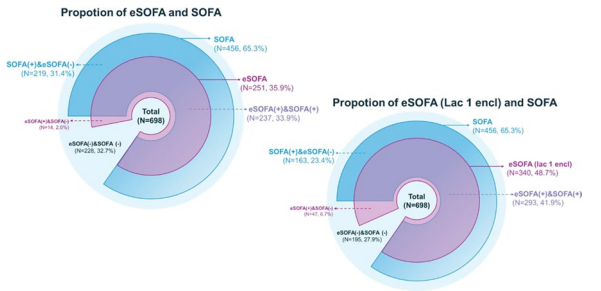
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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000534***.

Introduction. The adult sepsis event (ASE) definition, developed by the U.S. Centers for Disease Control and Prevention (CDC), is an electronic surveillance tool intended to enable consistent sepsis monitoring across various hospital settings. ASE is based on the electronic Sequential Organ Failure Assessment (eSOFA) criteria, which utilize structured electronic health record data to retrospectively detect sepsis for surveillance purposes. Although the eSOFA criteria were developed to be applicable across multiple clinical environments, validation studies to date have focused primarily on inpatient populations. This study aims to apply the eSOFA criteria in the emergency department (ED) setting and evaluate their diagnostic performance compared with the Sepsis-3 SOFA criteria in patients with suspected infection.
Objectives. To assess the diagnostic performance of the ASE-based eSOFA criteria compared to Sepsis-3 SOFA definitions in emergency department patients with suspected infection, and to evaluate the clinical utility of incorporating isolated serum lactate elevation into the eSOFA framework.
Methods. A retrospective review was conducted on patients aged 19 years or older who presented to the emergency departments of three medical institutions from September 1 to September 30, 2023, with suspected infections. Blood cultures were drawn for all enrolled patients (n = 698). Patients were classified according to Sepsis-3

criteria if their SOFA score increased by ≥ 2 points from baseline. eSOFA classifications required concurrent organ dysfunction within two days before or after blood culture collection, defined by criteria such as new vasopressor initiation, new invasive mechanical ventilation, renal or liver function deterioration, thrombocytopenia, or lactate ≥ 2.0 mmol/L. An expanded eSOFA definition included patients with isolated lactate ≥ 2.0 mmol/L. Statistical analyses included calculation of sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and the area under the ROC curve (AUROC).

Results. Among 698 patients, 456 (65.3%) met Sepsis-3 criteria, 251 (35.9%) met ASE-defined eSOFA, and 340 (48.7%) met expanded eSOFA criteria. Patients fulfilling both SOFA and eSOFA showed the highest mortality (19.8%). Mortality was 19.5% in eSOFA-positive patients, 17.4% in expanded eSOFA-positive patients, and 13.3% in SOFA-positive patients. ASE-defined eSOFA had a sensitivity of 52.0%, specificity of 94.2%, PPV of 94.4%, and AUROC of 0.730. Expanded eSOFA improved sensitivity to 64.3% but reduced specificity to 80.6%, with AUROC 0.720. Mortality increased stepwise with the number of dysfunctional organs across all criteria. Inclusion of lactate alone identified additional high-risk patients missed by SOFA.

Conclusions. Our study shows that eSOFA moderately agrees with Sepsis-3 SOFA in identifying sepsis in the emergency department. Although it identifies fewer patients, those selected by eSOFA have similar or higher mortality, indicating effective detection of high-risk cases. Adding lactate ≥ 2.0 mmol/L increases sensitivity but lowers specificity, requiring careful consideration. eSOFA can be a useful adjunct tool, with lactate use tailored to local resources and patient needs.



Comparison of adult sepsis event (ASE)-defined eSOFA and SOFA (≥ 2) criteria with and without isolate lactate elevation

Topic: Sepsis

000535

Quality of life after awake veno-arterial extracorporeal membrane oxygenation implementation for refractory cardiogenic shock

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000535***.

Introduction. Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) is a life-support therapy that may be used to treat patients with a refractory cardiogenic shock (RCS) [1]. Usually, ECMO implementation is performed under general anesthesia (GA) and requires mechanical ventilation. Unfortunately, complications of mechanical ventilation are well known, such as lung trauma or ventilator-associated pneumonia (VAP) [2,3]. In addition, GA can worsen hemodynamic outcomes in patients that already encounter hemodynamic instability. Awake ECMO implementation is an alternative strategy that may lead to better clinical outcomes [4]. As it is an invasive procedure performed while the patient is still conscious, there are concerns about the psychological disorders and quality of life (QoL) after intensive care unit (ICU) stay. In fact, testimonies show that this technique could leave long-term traumatic memories [5].

The aim of this study was to assess the impact of Awake ECMO procedure on QoL after surviving an intensive care unit (ICU) stay.

Methods. This retrospective cohort study was conducted between the 1st of January, 2020 the 31st of December, 2024 in a single-center cardiac surgery ICU. Consecutive patients over 18 years old who required an ECMO implementation for RCS were included. Data concerning comorbidities, anesthesia strategy during ECMO implementation, ICU stay and outcomes after ICU discharge were collected. Two groups were defined according to anesthesia strategy during ECMO implementation: GA group and Awake group. Data on QoL and psychological disorder after ICU stay were assessed in a face-to-face or telephonic post-ICU consultation, with the Hospital Anxiety and Depression (HAD) scale [6], the Post Traumatic Stress Disorder Checklist for Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (PCL-5) [7] and the Short Form-12 Items (SF-12), split in Physical Component Score (PCS) and Mental Component Score (MCS)[8].

The study was approved by a local Ethics Committee (IRBN532025/CHUSTE).

Results. During study period, 206 patients underwent VA-ECMO (Fig. 1). A total of 45 patients were included. Among the 23 survivors, 13 (57%) were included in the GA group and 10 (43%) in the Awake group. 17 patients (10 in the GA group and 7 in the Awake group) were included in the final analysis after 6 patients were lost to follow-up. The PCS in the Awake group was significantly higher than in the AG group (mean absolute difference = 11.26; p = 0.05). There was no significant difference for other psychological or QoL outcomes. Mortality was similar between the two groups (OR = 1.35; 95% CI [0.41; 4.46]; p = 0.63). There was more VAP in the GA group (p = 0.01).

Conclusions. Awake VA-ECMO implementation did not impact psychological status after ICU stay compared to the GA procedure. Regarding the complications that could be caused by GA, Awake ECMO technique represents a good alternative for RCS therapy.

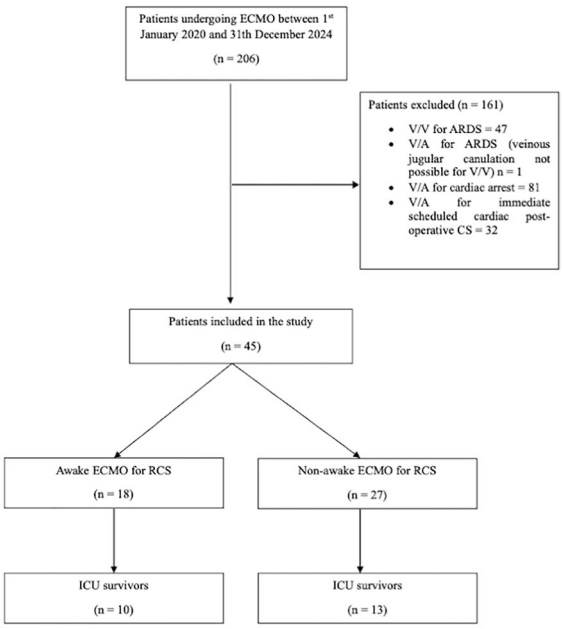


Fig 1 (abstract 000535) Flow-chart of the study. ARDS: acute respiratory distress syndrome; ECLS: extra-corporeal membrane oxygenation; ICU: intensive care unit; RCS: refractory cardiogenic shock; V/A: venoarterial; V/V: venovenous

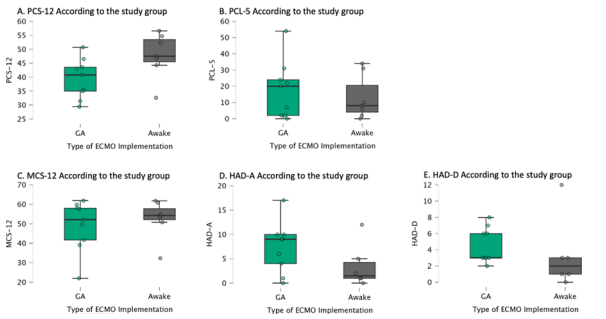


Fig 2 (abstract 000535) Boxplot of psychological and Quality of Life outcomes according to the type of ECMO implementation. ECMO: extra corporeal membrane oxygenation; HAD-A: Hospital Anxiety and Depression, Anxiety component; HAD-D: Hospital Anxiety and Depression, Depression component; MCS-12: Mental Component Score of the Short-Form-12 Items; PCL-5: Post Traumatic Stress Disorder Checklist for Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; PCS-12: Physical Component Score of the Short-Form-12 Items

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Topic: Cardiovascular issues in ICU

000537

Assessing FilmArray Pneumonia + panel dynamics during antibiotic treatment to predict clinical success in ICU patients with ventilated hospital-acquired pneumonia and ventilator-associated pneumonia: a multicenter prospective study

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Intensive Care Medicine Experimental, *2025*;**13(1)**: *000537*.

Introduction. Accurate microbiological documentation seems central for managing severe pneumonia. While the FilmArray® Pneumonia + panel (FA-PP) offers rapid pathogen identification, its effectiveness during antibiotic treatment and in predicting clinical outcomes remains unclear.
Methods. We conducted a prospective observational study across four ICUs from April 2022 to June 2024, including patients with ventilator-associated pneumonia (VAP) or ventilated hospital-acquired pneumonia (vHAP). Bacterial loads were monitored on days 0, 1, 3, 7 and 10 and 3 days after stopping antibiotics, using endotracheal aspirates (ETAs) analyzed by FA-PP and standard cultures. The main objective was to assess the correlation between quantitative changes in FA-PP results and clinical success. Quantitative changes over time were analyzed using mixed ordinal logistic regression.
Results. Of the 93 patients enrolled, 60.2% (n = 56) achieved clinical success, while the ICU mortality rate was 25.8% (n = 24). Although FA-PP and culture quantification results declined over time ($p < 0.0001$), neither method consistently correlated with clinical success (non-significant for both). At diagnosis, FA-PP showed excellent diagnostic performance compared to culture, with a sensitivity of 94% [95% CI: 87–97] and a specificity of 98% [95% CI: 97–98]. Quantitative concordance improved with higher DNA copies, from 22.9% at the culture threshold at 10^4 DNA copies/ml in FA-PP to 100% at $\geq 10^7$ DNA copies/ml. Diagnostic performance remained stable during antibiotic treatment with 94% sensitivity and 95% specificity in follow-up ETAs.
Conclusions. FA-PP provides rapid and accurate diagnostics but does not predict clinical outcomes during treatment, indicating limited utility for repeated testing in patient management.

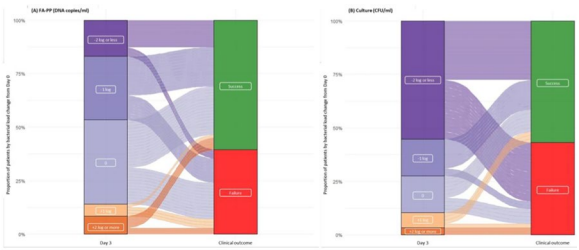


Fig 1 (abstract 000537) Waterfall plot of the greatest change in bacterial load from diagnosis (Day 0) to Day 3 in ICU patients with vHAP/VAP, and their corresponding clinical outcome. (A) Changes in DNA copies/ml quantified by FA-PP in 71 patients. (B) Changes in CFU/ml quantified by conventional culture in 58 patients. Data are derived from Table 2**A.**
FA-PP FilmArray® Pneumonia + panel, *CFU* colony-forming unit.

Topic: Infections and prevention

000539

Validation of physiological subphenotypes of acute respiratory distress syndrome

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000539***.

Introduction. Acute respiratory distress syndrome (ARDS) represents a significant burden on critical care, accounting for 10.4% of global ICU admissions and substantial mortality (1). Its clinical, radiological, pathological, and biological heterogeneity poses substantial challenges in patient management, including difficulties in treatment selection and patient stratification for clinical trials (2). Identifying reproducible, clinically relevant, and physiologically distinct subphenotypes in ARDS may support personalized strategies in critical care. Previously, we trained a clustering model using a Chilean cohort of patients with ARDS and identified two physiological subphenotypes: Efficient and Restrictive, which differ in clinical characteristics and outcomes.
Objectives. To externally validate the previously described ARDS physiological subphenotypes in an independent patient cohort.
Methods. The original model was trained using Gaussian Mixture Modeling (GMM) in a Chilean cohort of 224 ARDS patients diagnosed according to the Berlin criteria. We externally validated this model by applying the trained GMM to predict subphenotypes in an Amsterdam University Medical Center cohort of 494 COVID-19 ARDS patients. Data preprocessing included data cleaning, harmonization, normalization, encoding, and imputation, following the original modeling pipeline. Physiological variables from the first day of mechanical ventilation were analyzed, and clinical characteristics along with 28-day mortality were compared between the predicted subphenotypes.
Results. The external validation identified two distinct subphenotypes: Efficient (n = 153) and Restrictive (n = 341). Compared to the Efficient subphenotype, the Restrictive subphenotype exhibited a more mechanically restrictive pattern (driving pressure 15.9 vs. 10.7 cmH2O, p < 0.001), less efficient ventilation (Vd/Vt ratio 0.70 vs. 0.60, p < 0.001), and worse oxygenation (PaO2/FiO2 ratio 135.7 vs. 157.8, p < 0.001) (Table 1). The Restrictive subphenotype also had significantly higher 28-day mortality compared to the Efficient group (30.5% vs. 20.9%; p = 0.036), consistent with previous findings from the Chilean cohort (Fig. 1). Notably, this mortality difference was independent of the PaO2/FiO2 ratio, and therefore cannot be fully explained by traditional severity alone.

Table 1 Comparison of key physiological variables and mortality between predicted ARDS subphenotypes.

Variable	Efficient (n = 153)	Restrictive (n = 341)	p-value
Driving pressure (cmH_2O)	10.7 (9.3–12.7)	15.9 (13.8–18.0)	< 0.001
VD/VT ratio	0.595 (0.553–0.656)	0.696 (0.644–0.742)	< 0.001
Mechanical power (J/min)	14.1 (11.5–17.8)	18.8 (15.3–23.3)	< 0.001
PaO_2/FiO_2 ratio (mmHg)	157.8 (122.5–195.0)	135.7 (98.6–165.7)	< 0.001
28-day mortality (n, %)	32 (20.9%)	104 (30.5%)	0.036

Conclusions. The ARDS physiological subphenotypes identified using a clustering model trained in a Latin American population were successfully validated in an independent European cohort. The consistent physiological and outcome profiles across populations confirm the robustness and potential clinical utility of these subphenotypes for ARDS stratification and, possibly, personalized critical care management.

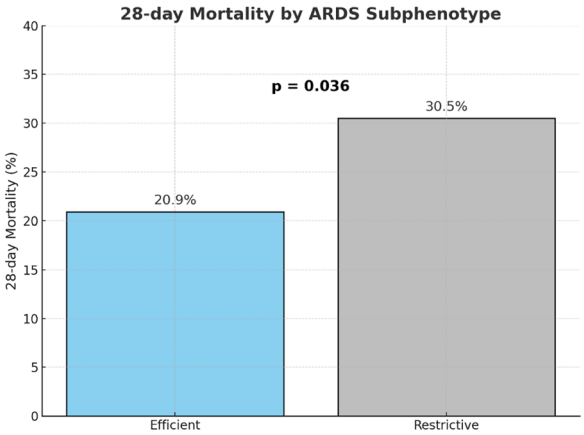


Fig 1 (abstract 000539) Comparison of 28-day mortality between predicted subphenotypes. The Restrictive group showed significantly higher mortality than the Efficient group (30.5% vs. 20.9%, p = 0.036)

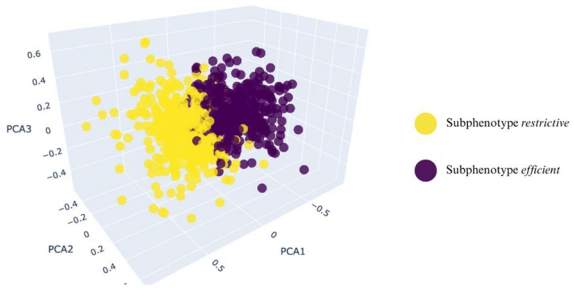


Fig 2(abstract 000539) Projection of patients onto the first three principal components, showing distinct clusters predicted by the trained GMM model

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Topic: Acute respiratory failure and mechanical ventilation

000540

CPAP improves inspiratory and expiratory efforts, but HFNC is equally effective in protecting the lung, diaphragm and accessory muscles in experimental self-inflicted lung injury

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000540***.

Introduction. Strenuous respiratory effort has been proposed as a second hit in severe acute lung injury, introducing the concepts

of "patient self-inflicted lung injury" (P-SILI) and underassistance myotrauma. The cardiorespiratory physiological effects of non-invasive respiratory support therapies such as continuous positive airway pressure (CPAP) and high-flow nasal cannula (HFNC) remains elusive.
Objectives. Here we investigated the effects of CPAP and HFNC on respiratory effort, expiratory muscle load, lung edema, right ventricular ejection, systemic inflammation, and lung & respiratory muscles injury in experimental P-SILI.
Methods. Lung injury was induced in Sprague Dawley rats through surfactant depletion (saline lavage), followed by three hours of unsupported (2L/min, positive control) or supported ventilation (CPAP 6 cmH2O, HFNC 4L/min, and protective mechanical ventilation [MV, negative control] groups), all of them with FIO2 1. Subjects were sequentially assessed through conventional ICU monitoring, arterial blood gases, esophageal manometry, surface electromyography (sEMG) on rectum abdominis muscle, lung and diaphragm ultrasound, and transthoracic echocardiography. Multiplex analysis and H&E histopathological assessment were carried out to study systemic inflammatory response, and damage on lungs, diaphragm, and intercostal muscles, respectively.
Results. Compared against the positive control group, all respiratory support therapies improved oxygenation at the end of the study, but only the CPAP and MV groups resulted in lower: 1) PaCO2, 2) respiratory effort (ΔPes) and work of breathing; 3) sEMG expiratory muscle activation; 4) ultrasound diaphragm excursion; and 5) pulmonary artery respiratory variability. Furthermore, intragroup analysis showed that CPAP also reduced respiratory rate and lung edema in the long run. In contrast, HFNC group increased the diaphragm excursion and lactate over time. Mortality occurred in unassisted (3/10) and HFNC groups (2/11). Only MV resulted in lower plasma chemokine growth-regulated protein alpha (GRO-alpha) than the unsupported group, without differences in any other cytokine. In morphological assessment, all respiratory support therapies prevented lungs (inflammation, vascular, airway and alveolar epithelial injury), diaphragm, and intercostal muscles injury (muscles inflammation, nuclei misposition, fragmentation, and necrosis) compared to the unassisted group, with MV showing the highest injury protection and HFNC, the lowest.
Conclusions. CPAP is more effective than HFNC in reducing respiratory effort, work of breathing, expiratory muscle activation, and cyclical vascular on–off flow, in experimental P-SILI. However, both therapies are helpful in preventing tissue injury and improving oxygenation. Interestingly, underassistance myotrauma also occurs in accessory respiratory muscles, not just the diaphragm.

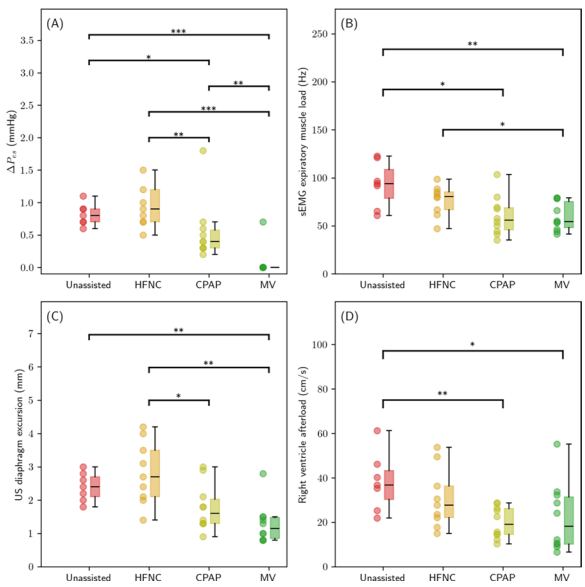


Fig. 1 (abstract 000540) Intergroup comparisons at the end of the study of the following parameters: respiratory effort (A), expiratory muscle activation (B), diaphragm excursion (C), and pulmonary artery respiratory variability (D). ΔPes = swing of esophageal pressure; sEMG = surface electromyography; US = ultrasound. * p value < 0.05; ** p value < 0.01; *** p value < 0.001

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Topic: Acute respiratory failure and mechanical ventilation

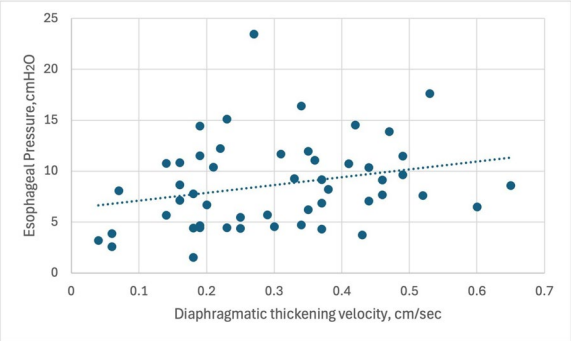
000542

Diaphragmatic thickening velocity and weaning outcome: a pilot study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000542***.

Introduction. Diaphragmatic dysfunction has been implicated with weaning failure. The velocity of diaphragmatic contraction (Dcv) has been evaluated using multiple modalities to predict the weaning outcome. However, the velocity of diaphragmatic thickening (Dtv) has not. Dtv is calculated as the ratio of diaphragmatic thickening to inspiratory time.
Objectives. Our hypothesis is that Dtv could differentiate weaning success from weaning failure and have better correlations with esophageal pressure and esophageal pressure–time product than Tfdi.
Methods. Fifty-six patients were enrolled in the study. Inclusion criteria were readiness for weaning from mechanical ventilation, as assessed by the treating physician according to published criteria, and first weaning attempt. Weaning failure was defined as a spontaneous breathing trial failure and/or need for reintubation and mechanical ventilation at 48 h. During an unassisted SBT we performed diaphragmatic sonography, peak-inspiratory thickness (Dtpi) and end-expiratory thickness (DTee), and simultaneous measurements of esophageal pressure swings (ΔPes). Diaphragmatic thickening velocity (DTv) was calculated as [peak inspiratory thickness(Dtpi) – end expiratory thickness (DTee)]/inspiratory time. Diaphragmatic thickening fraction was also calculated [(Dtpi – Dtee)/ Dtee]. The ultrasound operators were blinded to the outcome of weaning and the pressure measurements. The treating physicians were blinded to the ultrasound and pressure measurements.
Results. Twenty-eight patients succeeded weaning. Patients succeeding weaning displayed higher values of DTv [0.36 cm/sec (± 0.15) vs 0.25 cm/sec (± 0.13), p = 0.004)] and ΔPes [9.19 cmH2O (7.14–11.98) vs 5.66 cmH2O (4.45–10.38), p = 0.026]. Tfdi had no difference between weaning success and failure (p = 0.224). DTv correlated with ΔPes (rho = 0.30, p = 0.035) (Fig. 1.) while Tfdi did not (p = 0.317). There

were no differences in sex, age, APACHE II or reason of intubation. Successfully weaned patients were ventilated for fewer days than failure patients (8.5 (4–14.5) vs 14 (11–18), p = 0.019).
Conclusions. The main finding of this study is that DTv differed between weaning success and failure. Moreover, it was correlated, albeit weakly, with ΔPes. Our reasoning behind the fact that DTv has a better performance than Tfdi in assessing breathing effort, is that DTv does not assess the thickness per se of the muscle but rather, the velocity of its thickening. As the muscle contracts, it thickens and consequently it shortens. The velocity of shortening has been correlated with the produced work and inversely correlated with the opposed load. Thus, DTv has an improved correlation with weaning and breathing effort when compared with Tfdi.



Relationship between diaphragmatic thickening velocity and esophageal pressure

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Topic: Acute respiratory failure and mechanical ventilation

000543

Prediction of the Severity Level of Extravascular Lung Water Index in Septic Shock Patients

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Intensive Care Medicine Experimental, 2025;**13(1)**: 000543.

Introduction. In septic shock, increased pulmonary vascular permeability can lead to acute lung injury and ARDS, affecting fluid resuscitation, optimal hemodynamics, and tissue perfusion, which ultimately increases mortality and complications. The extravascular lung water index (EVLWI) in the PICCO hemodynamic monitoring system can be used to evaluate pulmonary permeability.
Objectives. We conducted a study to assess the EVLWI for predicting the severity level in septic shock treatment.
Methods. Patients with septic shock, defined according to Sepsis-3 criteria (hypotension requiring vasopressor support, lactate > 4 mmol/L), aged over 18 years, were included and monitored using the PICCO system to measure EVLWI. Exclusion criteria included patients with heart shunts, valvular heart disease, or those who had undergone lung resection. EVLWI measurements were taken at the time of PICCO placement, and at 24 h, 48 h, and 72 h. Results were compared between the survivor and non-survivor groups.
Results. A total of 31 patients were included in the study, of which 16/30 (51.6%) were survivors, and 15/30 (48.4%) were non-survivors. Causes of septic shock included pneumosepsis (45.2%), abdominal sepsis (22.5%), urosepsis (12.9%), biliary sepsis (12.9%), and unknown origin sepsis (6.5%). At the time of admission, EVLWI did not show significant differences between the two groups, with the survivor group having an average of 13.94 ± 6.55 and the non-survivor group 11.67 ± 4.48. However, after 72 h of treatment, EVLWI significantly decreased in the survivor group (10.81 ± 3.35, p < 0.05) compared to the non-survivor group (14.07 ± 7.03). At 72 h, patients with an EVLWI value between 0–10 had a lower mortality rate of 35.2%, compared to those with an EVLWI > 10, who had a mortality rate of 64.2%. The cut-off value for EVLWI > 10.5 ml/kg at 72 h showed a mortality prediction for septic shock with a sensitivity of 60% and specificity of 69%.
Conclusions. In septic shock patients, the EVLWI index showed statistically significant differences between survivors and non-survivors at 72 h. An EVLWI value greater than 10.5 ml/kg at 72 h is a reliable predictor of mortality with a sensitivity of 60% and specificity of 69%.

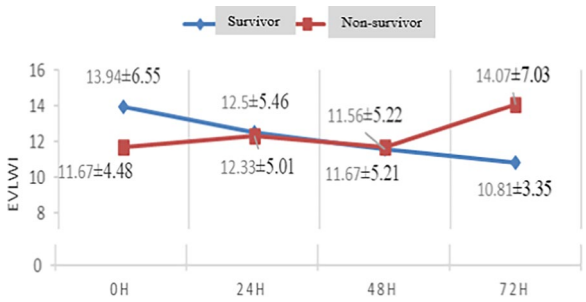


Fig. 1 (abstract 000543) EVLWI value at T0h, T12h, T48H and T72H

Table 1 EVLWI value between survivor and non-survivor group

EVLWI (ml/kg)	Survivor group		Non-survivor group	
	n= 16	%	n= 15	%
0 – 7	2	66,7	1	33,3
8 – 10	9	64,3	5	35,7
>10	5	35,7	9	64,3

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g*, *SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

Table 2 EVLWI Cut-off value, sensitivity, specificity in predicting mortality in sepsis

EVLWI (ml/kg)	Sensitivity (%)	Specifidity (%)
9,5	73%	32%
10,5*	60%	69%
11,5	53%	73%

** Highest Youden's index*

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g*, *SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

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Topic: Sepsis

000545

Impact of levosimendan on outcome as adjunct to standard therapy in ARDS patients supported with VV-ECMO—a retrospective observational study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000545***.

Introduction. Acute respiratory distress syndrome (ARDS) is associated with high mortality. In severe cases, venovenous extracorporeal membrane oxygenation (VV-ECMO) is employed when conventional therapies fail. [1,2] Right ventricular injury (RVI) can further worsen prognosis, even under ECMO support. [3,4] Levosimendan, a calcium sensitizer with inotropic and vasodilatory properties, may enhance right ventricular function and reduce pulmonary artery pressure without increasing myocardial oxygen consumption.[5,6] However, its impact on clinical outcomes in ARDS patients supported with VV-ECMO remains unclear.[6].
Objectives. The primary objective was to assess whether the administration of levosimendan is independently associated with improved ICU and 90-day survival in ARDS patients treated with VV-ECMO. Secondary objectives included evaluation of catecholamine-free days (CFD) and ventilator-free days (VFD) within 28 days of ECMO initiation.
Methods. We conducted a retrospective observational study including adult patients with ARDS treated with VV-ECMO (> 24 h) between January 2014 and October 2024. Patients who received levosimendan as an adjunct to standard care to prevent right ventricular dysfunction were allocated to the treatment group; all others served as controls. Patients bridged to lung transplantation were excluded. CFD and VFD were compared using the Mann–Whitney U test. We performed a multiple logistic regression for ICU and 90-day mortality adjusted for SAPS II, SOFA score at ECMO initiation, BMI, sex, and duration of mechanical ventilation prior to ECMO.
Results. A total of 169 patients (mean age 52 ± 13 years; 69% male) were included, of whom 62 received levosimendan. COVID-19 was the underlying cause of ARDS in 51%. Baseline SAPS II (38 [33–43] vs. 38 [32–47]) and SOFA scores (8 [7–9] vs. 8 [7–10]) were comparable between groups. ICU mortality was 50% in the levosimendan group and 46% in controls; 90-day mortality was 52% vs. 48%, respectively. Levosimendan was not significantly associated with ICU mortality (OR 1.33; 95% CI 0.65–2.73; p = 0.44) or 90-day mortality (OR 1.33; 95% CI 0.66–2.56; p = 0.46). Kaplan–Meier analysis of 90-day survival showed no significant difference. Median CFD (6 [0–17] vs. 7 [0–18]; p = 0.49) and VFD (0 [0–0] vs. 0 [0–1]; p = 0.49) did not differ significantly. Utilization of adjunctive therapies prior to ECMO—prone positioning (82% vs. 80%), inhaled nitric oxide (58% vs. 58%), and neuromuscular blockade (52% vs. 42%)—was similar in both groups.
Conclusions. In this retrospective cohort of patients with severe ARDS requiring VV-ECMO, levosimendan administered as an adjunct to standard care was not associated with improved ICU or 90-day survival. Furthermore, no differences were observed in catecholamine-free or ventilator-free days.

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7 No grant or external funding was received for this study.

Topic: Acute respiratory failure and mechanical ventilation

000546

Combined diaphragmatic and rectus femoris ultrasound for predicting weaning outcomes in mechanically ventilated ICU patients: a prospective observational study abstract

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000546***.

Introduction. ICU patients frequently experience rapid loss of muscle mass and function during hospitalization, leading to weaning difficulties[1]. Ultrasound has become a promising bedside tool for real-time muscle function assessment due to its practicality[2, 3]. This study aimed to systematically characterize temporal changes in diaphragm and peripheral muscles (rectus femoris) in mechanically ventilated patients using ultrasound monitoring, analyze their correlations, and explore their association with mechanical ventilation weaning success.
Methods. This prospective observational study enrolled mechanically ventilated patients from a tertiary hospital ICU. Ultrasound measurements of rectus femoris thickness (RFT), rectus femoris cross-sectional area (RFCSA), and diaphragmatic thickening fraction (DTF) were recorded on days 1, 3, 5, 7, and at extubation day. Day 1 RFT and RFCSA served as baseline to calculate variation rates at subsequent timepoints. Correlations between muscle parameters and weaning outcomes were analyzed. The predictive performance of single and combined indicators was evaluated.
Results. 73 patients were included (median age 73 years, range 28–91; 30.43% female). Rectus femoris ultrasound parameters showed significant positive correlations with DTF at all timepoints ($r > 0.50$, $P < 0.05$). The failed weaning group exhibited: significantly higher RFT variation rates (day 3: 13.55% ± 11.78% vs. 9.02% ± 7.67%; day 5: 18.28% ± 14.43% vs. 11.32% ± 7.05%; day 7: 26.40% ± 14.88% vs. 12.38% ± 6.70%; extubation day: 28.30% ± 15.88% vs. 13.56% ± 7.10%; $P < 0.05$). Significantly higher RFCSA variation rates (day 3: 13.38% ± 10.46% vs. 6.91% ± 9.31%; day 5: 19.16% ± 14.80% vs. 10.48% ± 6.46%; day 7: 24.29% ± 12.52% vs. 12.33% ± 5.06%; extubation day: 26.31% ± 14.72% vs. 14.36% ± 6.01%; $P < 0.05$). Significantly lower DTF at all timepoints (day 1: 18.68% ± 4.63% vs. 27.88% ± 6.24%; day 3: 17.72% ± 3.69 vs. 27.82% ± 5.99%; day 5: 16.19% ± 5.25% vs. 27.14% ± 6.55%; day 7: 15.84% ± 5.99% vs. 25.26% ± 5.91%; extubation day: 14.34% ± 6.01% vs. 29.31% ± 6.13%; $P < 0.05$). ROC analysis revealed optimal predictive performance for RFCSA variation rate ($AUC = 0.869$, $P < 0.05$) and DTF ($AUC = 0.892$, $P < 0.05$) at extubation day. Combined use improved AUC to 0.926 ($P < 0.05$).

Conclusions. Ultrasound assessment of the rectus femoris reflects diaphragmatic function and expands respiratory muscle monitoring strategies. Rectus femoris thickness and cross-sectional area changes, when combined with diaphragmatic ultrasound, enhance the reliability of predicting weaning outcomes, providing stronger clinical evidence for extubation decisions.

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Topic: Acute respiratory failure and mechanical ventilation

000547

Angiotensin-II effect on transcranial color Doppler ultrasonography in critically ill patients experiencing refractory shock: preliminary data

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000547***.

Introduction. Cerebral hemodynamics assessed by transcranial color Doppler (TCCD) ultrasonography is frequently altered in critically ill patients experiencing circulatory shock, showing impaired cerebral autoregulation [1], decreased estimated cerebral perfusion pressure (eCPP) [2] and increased pulsatility index (PI) [3]. While a recent study investigated individualized hemodynamic management guided by TCCD-PI in patients with sepsis-induced encephalopathy [4], the effect of a second-line vasopressors on TCCD ultrasonography has poorly been explored in patients with refractory shock.
Objectives. To assess the changes in TCCD before and after the introduction of a second-line vasopressor in critically ill patients with refractory shock.
Methods. This was a single-center prospective ongoing registry, conducted at the ICU of the HUB (Brussels, Belgium). We included adults with refractory shock undergoing second-line vasopressors, admitted between May 2024 and February 2025, with a complete TCCD at all the timepoints; TCCD was used to assess mean flow velocity (MFV), PI, resistivity index (RI), and eCPP [calculated as = mean arterial pressure (MAP) x (end diastolic velocity (EDV)/MFV) + 14] [4] in the proximal portion of the right middle cerebral artery right before (T0) and at 6 and 24 h after the initiation of the vasopressor.
Results. We enrolled 13 patients, 5 treated with vasopressin and 8 with angiotensin-II; 84.6% were males and mean age was 62 ± 16 years. A significantly higher number of patients with eCPP > 60 mmHg was observed in the angiotensin-II group (p = 0.014) at 6 h (Table 1). Repeated measures Linear Mixed Model analysis showed a significant main effect of time on both norepinephrine dose (p < 0.001) and angiotensin-II dose (p < 0.001) (Fig. 1). No other significant differences in other TCCD-derived parameters were observed (Fig. 2). Possible confounders (sodium, PaCO2 and temperature) were also assessed, and showed no significant main effect for time or group.

Table 1 (abstract 000547) Clinical presentation and outcomes in the two groups.

	Vasopressin (5 patients)	Angiotensin-II (8 patients)	*p-value**
Type of shock: [1]			0.39
Septic	2 (40)	5 (62.5)	
Cardiogenic	1 (20)	0 (0)	
Septic + cardiogenic	0 (0)	1 (12.5)	
Other vasoplegic	2 (40)	2 (25)	
T0-APACHE II [2]	23.6 ± 11.4	27.7 ± 6.1	0.82
T0-SOFA Score [2]	13.2 ± 4.4	12.6 ± 4.2	0.94
T0-eCPP > 60 mmHg [1]	2 (40)	3 (37.5)	0.93
6h-eCPP > 60 mmHg [1]	0 (0)	6 (75)	*0.014*
24h-eCPP > 60 mmHg [1]	1 (20)	2 (33.3)	0.62
T0-PI < 1.1 [1]	1 (20)	3 (37.5)	0.5
6h-PI < 1.1 [1]	1 (25)	6 (75)	0.098
24h-PI < 1.1 [1]	1 (20)	2 (33.3)	0.62
T0-RI < 0.75 [1]	3 (60)	5 (62.5)	0.93
6h-RI < 0.75 [1]	3 (75)	8 (100)	0.14
24h-RI < 0.75 [1]	3 (60)	5 (83.3)	0.39

1- n. (%).
2- Mean ± S.D.
*- Significant if p < 0.05.

Conclusions. With the limits of our small sample, the administration of angiotensin-II was associated with a higher eCPP in critically ill patients with refractory shock and requiring a second-line vasopressor.

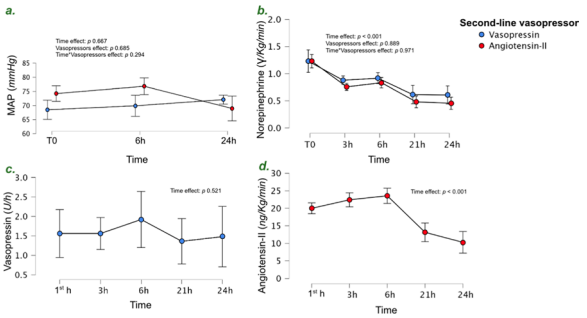


Fig 1 (abstract 000547) Vasopressors dose and MAP over time in the two groups

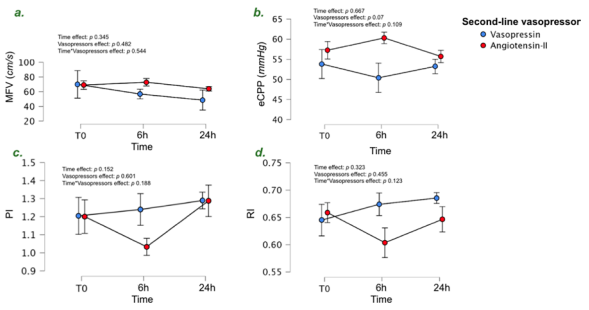


Fig 2 (abstract 000547) Evolution of TCCD ultrasonographic parameters over time in the two groups

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Topic: Cardiovascular issues in ICU

000548

Continuous CO2-measurement during respiratory physiotherapy sessions in ICU

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Introduction. Patients hospitalized in ICU, require pulmonary physiotherapy (PPh), aiming to enhance the patient's functional capacity and to improve respiratory independence. In our center this normally consists of intrapulmonary percussive ventilation (IPV). Sudden fluctuations in pulmonary ventilation and pulmonary perfusion may cause changes in PCO2 values. Sudden decreases in PCO2 can cause impaired coronary flow and decreased cerebral perfusion.

Objectives. A pilot study to compare transcutaneous CO2 (tCO2) values to values in arterial blood gas (aCO2) and end tidal CO2 (ETCO2) before and after PPh. To study the effect on CO2 during PPh in mechanically ventilated patients using continuous TCO2 measurement, fluctuations which normally go unmeasured.

Methods. Using the SENTEC continuous CO2 measurement, it is possible to measure CO2 transcutaneously during IPV sessions. Comparison with PCO2 from the arterial blood gas (aCO2) and measured end tidal CO2 (ETCO2) took place both pre- and post-PPh. All patients studied were sedated and on IPPV (intermittent positive pressure ventilation) without spontaneous breathing. Measurements took place 15 min pre-PPh, immediately post-PPh and 15 min after PPh. CO2 was measured transcutaneously during the whole PPh procedure (tCO2). All measured values are given in mmHg.

Results. 15 patients with differing reasons for admission were included, all on IPPV. One patient was excluded because he demonstrated spontaneous breathing during PPh. In the remaining 14 (8 male, mean age 67,6 years) mean FiO2 was 0.41, mean PEEP was 8. Looking at all values before and after the PPh sessions together, mean aCO2 was 40.1 (SD = 6.81), mean tCO2 was 42.4 (8.24) and mean ETCO2 was 30.4 (7.10). TCO2 was more strongly correlated to aCO2 ($r = 0.928$, $p < 0.001$) than ETCO2 ($r = 0.724$, $p < 0.001$). Mean difference between aCO2 and tCO2 was 2.3 (3.17); for aCO2 and ETCO2 this was 9.73 (5.18), ($p < 0.001$). During PPh, mean difference from baseline (at initiation of PPh) to maximum value measured tCO2 during PPh was 5.28 (5.61) ($p = 0.002$), with a range from 0.00 to maximum 22.2. Mean baseline to minimum measured tCO2 during PPh was 4.46 (3.05) ($p < 0.001$) with a range from 0.00 to 8.7. Mean difference from baseline to end value, at cessation of PPh, was 2.33 (3.94), from 4.7 higher to 8.7 lower. The mean range (highest to lowest during PPh) was 9.74 (5.85), minimum 5.00, to a maximum of 28.6.

Conclusions. The correlation between aCO2 and tCO2 is very robust, stronger than with ETCO2. TCO2 measurement proved feasible during PPh and significant changes in TCO2 were measured during PPh, reflecting significant changes in PCO2, which can have particular importance in patients vulnerable to changes in CO2, such as those with neurotrauma or acute brain injury. TCO2 measurement, because of its immediacy, may have added value in steering PPh and other manoeuvres, such as ventilation after intubation, in these patient populations.

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Topic: Information systems and Data Science

000549

Effect of cyclic daytime versus continuous enteral nutrition on circadian rhythms in critical illness (CIRCLES)

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Introduction. Circadian rhythms are severely disrupted in patients in the intensive care unit (ICU), which has been associated with poor clinical outcomes[1,2]. Feeding is one of the most important regulators of the circadian clock. A potential contributor to the circadian disruption in the critically ill is therefore the fact that enteral nutrition during ICU stay is worldwide administered 24 h a day. Rhythmic feeding-fasting cycles may provide a potent synchronizing cue for the circadian clock, suggesting that optimalization of feeding-fasting cycles in the ICU might strengthen or restore circadian rhythms[3].

Objectives. The CIRCLES study aims to investigate the impact of cyclic daytime enteral nutrition versus continuous enteral nutrition on circadian rhythms in critically ill patients.

Methods. This investigator-initiated non-blinded randomized controlled trial was conducted in a tertiary care ICU. Patients with an expected ICU stay > 48 h who are receiving or intended to receive enteral nutrition were eligible for inclusion. Patients were randomized to receive either continuous enteral feeding (standard of care) or cyclic enteral feeding during daytime hours (between 8 AM to 8 PM). Similar nutritional targets were prescribed in both groups, and standard of care protocols regarding glucose regulation and treatment of glucose intolerance were followed. Primary outcomes were amplitude of 24-h rhythms in core body temperature, mean blood pressure and heart rate (variability) as determined with cosinor analysis on day 3–4 after the initiation of enteral nutrition. Secondary study outcomes include average glucose levels, insulin requirements, caloric intake and gastric residual volumes. The primary and secondary outcomes were compared between the two study groups using a Student's t-test, or a Mann–Whitney U-test for non-normally distributed data. Data are presented as means with standard deviations, or as medians with interquartile ranges when the data are not normally distributed.

Results. A total of 85 patients were included in the study, of whom 62 completed follow-up until study day 3—4. Baseline characteristics of the included patients are presented in Table 1. The amplitude of 24-h rhythms in core body temperature, heart rate, mean arterial pressure, and heart rate variability—measured by SDNN and RMSSD—was consistently higher in the cyclic feeding group compared to the continuous feeding group, although these differences did not reach statistical significance (Fig. 1). Daily caloric intake per kilogram body weight was comparable between groups, with patients in the continuous feeding group receiving 20.38 ± 5.20 kcal/kg/day and those in the cyclic group 18.25 ± 6.39 kcal/kg/day (p = 0.12). Mean gastric residual volume per measurement was significantly elevated in the cyclic group (88.47 [68.64—107.75] mL) compared to the continuous group (58.21 [26.02—96.75], p < 0.05) Time-weighted average blood glucose levels were marginally but significantly higher in patients receiving cyclic feeding (9.28 ± 1.59 mmol/L) than in those receiving continuous feeding (8.57 ± 0.96 mmol/L, p < 0.05). No significant difference was observed in daily insulin administration, with average doses of 19.26 [0.00–63.38] units/day in the continuous group versus 15.60 [0.00–50.70] units/day in the cyclic group (p = 0.89).
Conclusions. Amplitudes of 24-h rhythms in vital signs were numerically higher on study day 3 to 4 in patients randomized to the cyclic daytime feeding group compared to the continuous feeding group, although these differences were not statistically significant. Cyclic feeding during daytime hours was safe and feasible. Further research is required to support its use as a possible intervention to strengthen circadian rhythms in the ICU, and to determine whether circadian rhythm enhancement translates into improved clinical outcomes.

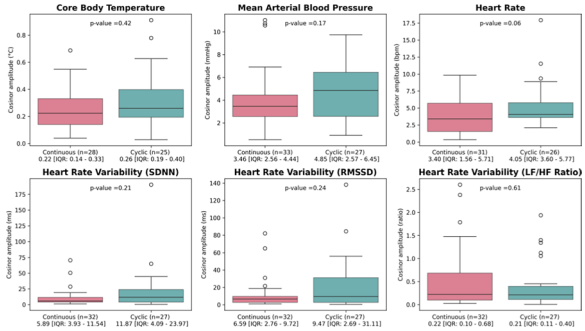


Fig 1 (abstract 000549) Cosinor amplitudes of vital signs on study day 3 to 4. Data are presented as median and interquartile range, and groups are compared with a Mann–Whitney U test.

Table 1 Baseline characteristics of included patients

	All included patients (n=86)	Continuous feeding group (n=47)	Cyclic feeding group (n=39)	p- value
Age (years), median [IQR]	61.0 [53.0-69.0]	61.0 [53.5-68.5]	61.0 [52.5-69.0]	0.88
Sex (Female), n (%)	21 (24.0%)	12 (26.0%)	9 (23.0%)	
BMI, median [IQR]	27.2 [24.3-31.3]	27.0 [24.3-30.6]	27.8 [24.9-31.6]	0.53
APACHE IV-score, median [IQR]	77.5 [61.0-96.5]	74.5 [57.5-90.2]	82.5 [63.8-98.2]	0.65
Diabetes diagnosis, n (%)	15.0 (17.4%)	8.0 (17.0%)	7.0 (17.9%)	
Type of admission, n (%)				
• **Medical**	52 (60.5%)	28 (59.6%)	24 (61.5%)	
• **Elective surgery**	18 (20.9%)	11 (23.4%)	7 (18.0%)	
• **Emergency surgery**	16 (18.6%)	8 (17.0%)	8 (20.5%)	
Reason for ICU admission				
• **Cardiovascular**	40 (46.5%)	21 (44.7%)	19 (48.7%)	
• **Respiratory**	23 (26.7%)	16 (34.0%)	7 (17.9%)	
• **Transplant**	8 (9.3%)	4 (8.5%)	4 (10.3%)	
• **Gastrointestinal**	4 (4.7%)	3 (6.4%)	1 (2.6%)	
• **Neurological**	4 (4.7%)	2 (4.3%)	2 (5.1%)	
• **Trauma**	3 (3.5%)	1 (2.1%)	2 (5.1%)	
• **Metabolism**	1 (1.2%)	0 (0%)	1 (2.6%)	
• **Musculoskeletal/skin**	1 (1.2%)	0 (0%)	1 (2.6%)	
• **Genitourinary**	1 (1.2%)	0 (0%)	1 (2.6%)	

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g*, *SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

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Topic: Metabolism, endocrinology, liver failure and nutrition

000550

Complementing capillary refill: splenic Doppler for dynamic perfusion monitoring in septic shock

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Introduction. Septic shock is still associated with high mortality. As part of the treatment, early resuscitation is often guided by clinical parameters such as capillary refill time (CRT), but its reliability is limited by interobserver variability and clinical factors such as vasopressor use or edema. While splenic Doppler ultrasound has shown utility in detecting occult hemorrhagic shock, its role in septic shock remains unexplored. This study evaluates splenic perfusion using Doppler ultrasound, specifically the splenic velocity–time integral (s-VTI), as a complementary tool for visceral perfusion assessment.
Methods. This is a preliminary report of a prospective observational study including adult patients with septic shock. Splenic Doppler measurements (Fig. 1), including s-VTI and splenic resistance index (s-RI), were performed using a sector probe at ICU admission (0 h), 3 h, 6 h, and every 24 h thereafter until shock resolution (defined as 24 h without vasopressors), death, or day 7. CRT was assessed on the distal phalanx of the index or great toe after 10 s of compression. We also include 30 healthy controls for splenic Doppler measurements and then we defined a cut off s-VTI < 22 cm to detect splenic hypoperfusion, based on the 10th percentile.
Results. We include 13 patients, with a median age of 69 years. The median value of SOFA was 12. 23,08% had reduced ejection fraction, 46,15% were on mechanical ventilation, and 53,85% needed renal replacement therapy. At admission, septic patients exhibited significantly lower s-VTI than controls (17.2 vs. 31 cm; p < 0.001). Among survivors, s-VTI increased by 107.9%, reaching normalization at shock resolution (31.75 cm; p < 0.001). Non-survivors maintained persistently low values (15.5 and 16.7 cm) (Fig. 2). s-RI showed limited clinical value, with minor changes after resuscitation (0.68 baseline vs. 0.60 final) but remained elevated compared to controls (0.49; p < 0.001) (Fig. 3).
CRT was prolonged in 85% at admission and normalized in 91% of survivors. In those with both abnormal CRT and s-VTI, s-VTI recovered first in 4 patients, CRT in 1, and both simultaneously in 4. Recovery occurred at 38 h for s-VTI vs. 43 h for CRT. At the final observation point, the correlation between s-VTI and CRT was moderate (ρ = -0.63; p = 0.02), while that between s-RI and CRT was weak (ρ = -0.12; p = 0.69).
Conclusions. Improvement in splenic perfusion, as assessed by s-VTI was associated with clinical outcome and recovery from septic shock,

detecting visceral perfusion changes as early as, or even earlier than, CRT. s-RI lacked clinical utility in this setting. The moderate correlation between s-VTI and CRT may reflect the heterogeneity of perfusion and vasoplegia in septic shock. This finding could provide new insights into the evaluation of different hemodynamic phases. The combination of s-VTI and CRT in a protocol for guided resuscitation may be useful in the management of septic shock, by helping to restore perfusion and minimize potential harm.

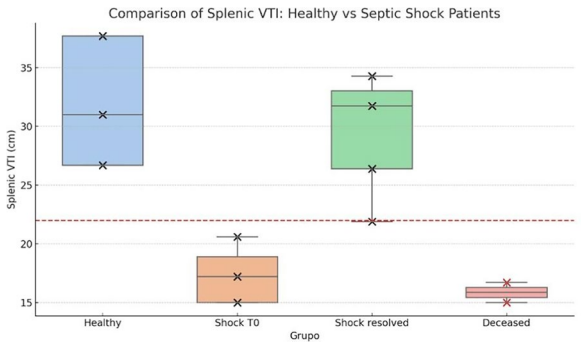


Fig. 2 (abstract 000550)

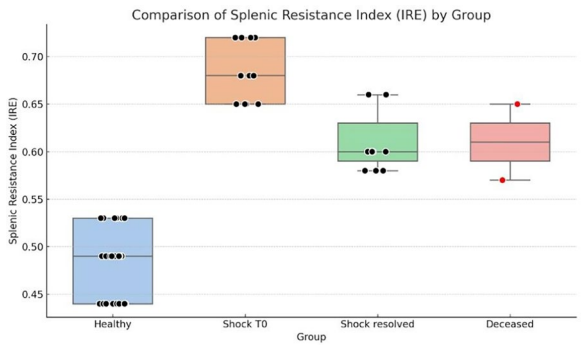


Fig. 3 (abstract 000550)

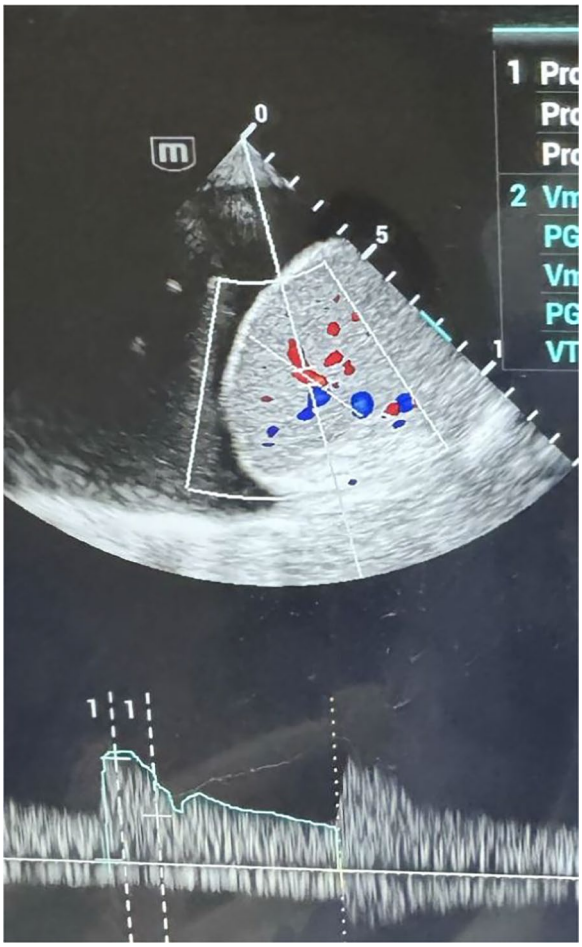


Fig 1 (abstract 000550) Splenic VTI measurement.

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Topic: Sepsis

000551

Trauma code protocol in a tertiary center in Cantabria (Spain)

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Introduction. Trauma is a major cause of morbidity and mortality. Actually, Trauma Code Protocol (TCP) has become standard of care at most tertiary care centers, but it can lead high rates of overtriage. Cantabria, in the north of Spain, has a population of 593.386 inhabitants. From April 1, 2022 we have implemented TCP in our hospital.
Objectives. To describe epidemiology, severity scores, and mortality in trauma patients with activated TCP or not.
Methods. This retrospective and descriptive single-center study was performed between January 1, 2024 to December 31, 2024. The study participants were trauma patients admitted to a Trauma Intensive Care Unit (ICU) in a tertiary center in Cantabria (Spain). The Trauma Code was classified as Yellow (12 criteria) and Red (6 criteria) based on ATS criteria. It was activated by the on-call intensivist, with a call from the Out-of-Hospital Emergencies or Emergency Service.
Epidemiological data, Injury Severity Score (ISS), and RTS (Revised Trauma Score) were collected in TCP patients and non-TCP.
Results. A total of 221 trauma patients were admitted to the ICU (34,9% of total admissions). Number of TCP activations were 520. A total of 121 TCP (63 Red and 58 Yellow) were admitted to the ICU (54,7% of trauma patients and 42,5% of all activations). Main source of Yellow TCP was Emergency Service (75,8%). These patients had an average age of 57,2 years (19–81), 20,6% were women, with an average ISS of 22,6 (9–75), RTS 6,2 (5,58–7,84), use of mechanical ventilation in 15,5%, and a mortality rate of 1,7% (1 patient). Main source of Red TCP was Out-of-Hospital Emergencies "061" (84,1%). These patients had an average age of 48,8 years (17–87), 14,2% were women, with an average ISS of 24,3 (1–75), RTS 6,4 (1,02–7,84), use of mechanical ventilation in 52,3%, and a mortality rate of 7,9%(5 patients). Overall mortality in TCP was 4,9%.
TCP was not activated (non-TCP) in 100 patients with an average age of 57 years (17–89), an average ISS of 23,2 (1–75), RTS 7 (6,084–7,84), use of mechanical ventilation in 36%, and a mortality rate of 12% (12 patients).
Conclusions. Mortality was lower in TCP than in non-TCP. Although mortality in Yellow TCP was lower than in Red TCP, both were low. In TCP and non-TCP similar ISS and RTS scores were collected.

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Topic: Trauma

000552

Financial costs and workforce burden associated with potentially inappropriate therapies in critical care: preliminary findings from a multicenter prospective observational study.

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Introduction. The patient autonomy, as a prevailing tenet of medical ethics [1], and the notable escalation in the utilization of life-sustaining therapies [2] have raised the issue of withholding or withdrawing treatments in end-of-life care. However, the financial costs and workforce burden of potentially inappropriate therapies (PITs) persist as a significant burden, particularly in countries where ambiguities surrounding the withdrawal or withholding of such therapies remain, including Turkey.
Objectives. To ascertain the incidence as well as the financial and workforce costs of PITs.
Methods. The study was conducted between 12/01/2024 and 03/28/2025, following ethics committee approval (date:11/19/2024, IRB no.2785). The hypothetical decision for PITs was based on at least one of four criteria, in addition to a baseline criterion outlined in Table 1. Financial and workforce costs were calculated by comparing expenses from the date of the PITs decision to discharge, against the total hospitalization cost.

Table 1 (abstract 000552) Identification of PITs.

A	**The patient's attending physician has determined that the treatment is no longer in the patient's best interest [3,4]**
B.1	The treatments only prolong the dying process instead of achieving the intended therapeutic goals [5–8]
B.2	No reasonable expectation that the patient will recover sufficiently to survive outside the acute care setting [9,10]
B.3	Presence of severe irreversible neurological damage or persistent vegetative state [5–8,10]
B.4	Death is considered unavoidable for the patient [8]

Results. A total of 756 patients were analyzed and 119 were identified as receiving PITs (Fig. 1) with an incidence of 15.7%. The financial burden of these patients amounted to €442,291.87, constituting 25.0% of the total cost (Fig. 2). The total number of hospitalization days was 8,858, while it was 3,319 days after the PITs decision, with a proportion of 37.5%. The PITs depicted in Table 2.

Table 2 (abstract 000552) Workforce cost of PITs.

Potentially inappropriate therapies			
	Day(s)/ count(s)/ session(s)		***Count(s)/unit(s)***
Mechanical ventilation	1991	Blood sampling	310
Cardiopulmonary resuscitation	132	Urine sampling	140
Continuous renal replacement therapy	64	Tracheal aspirate sampling	177
Paracentesis	6	Tissue sampling	45
Vasopressor therapy	889	X-ray	237
Central venous catheterization	105	Magnetic resonance imaging	12
Conventional hemodialysis	12	Computed tomography	64
Thoracentesis	1	Ultrasonography	5
Percutaneous endoscopic gastrostomy	10	Decubitus debridement	6
Gastroscopy/ Colonoscopy	3	Tracheostomy	2
Percutaneous biliary drainage	1	Ventricular shunt surgery	1
Amputation	1	Blood product transfusion	200

Conclusions. An approach is recommended for the decision of withholding or withdrawing the PITs, with the involvement of patients and families to safeguard patients' best interests while ensuring the efficient allocation of health resources.

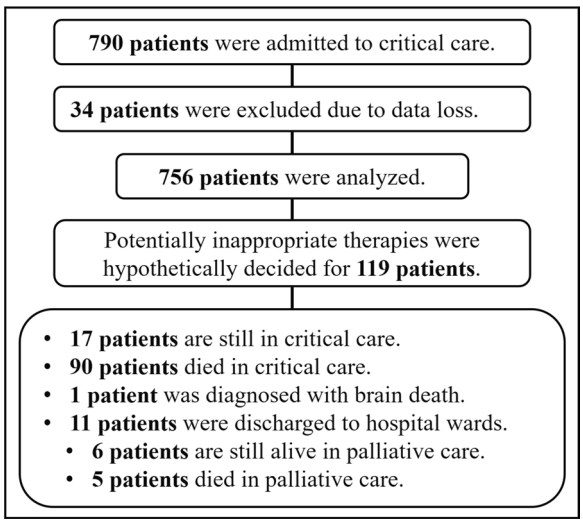
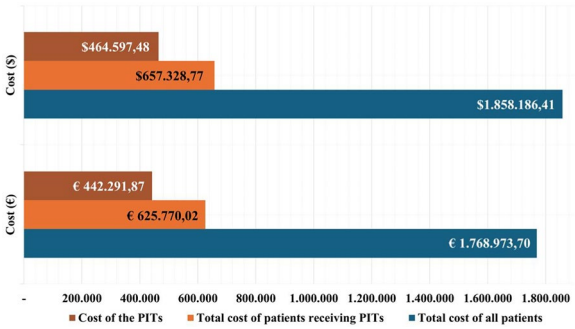


Fig 1 (abstract 000552) Flowchart of the study



The conversion of the euro and the dollar was based on the average exchange rates from the Central Bank of the Republic of Turkey during the period under study (1 € = 37,70 ₺, 1 $ = 35,89 ₺).Abbreviations: PITs, potentially inappropriate therapies.
Fig. 2. Cost analysis of the patients.

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Topic: Ethics and end of life care

000553

Impact of the culture of preservative fluid in heart transplantation at University Hospital of Gran Canaria Doctor Negrín

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000553***.

Introduction. The heart transplant patient is susceptible to infection due to immunosuppression. There is a need to clarify microbiological

patterns in the preservation fluid and explore their relationship with early infection events in the recipient patient.
Objectives. The objective of this study is to analyze the early infection of the graft and its relationship with the infection of the preservation fluid.
Methods. This is a retrospective study that analyzes the data of 86 donors with their respective recipients from December 2019 to May 2024. Clinical data, all available cultures of preservation fluids, pre-transplant donor cultures and recipient cultures during the postoperative period in the intensive care unit were analyzed.
The heart was stored in a bag immersed in Custodiol® preservation liquid and surrounded by ice to maintain a temperature of 4ºC during cold ischemia time for transport. Two samples of preservation fluid were sent for culture.
Results. The prevalence of positive cultures of preservation fluid was 55.8% (48/86). The frequencies of microorganisms isolated in the preservation fluid are shown in table and Fig. 1. 8.3% (4/48) of the preservation fluid samples were polymicrobial, and 13 (27%) were positive for at least one high-risk pathogen. The most common single-agent isolated pathogens were Staphylococcus epidermidis (44%), Staphylococcus aureus methicillin-sensitive (19%) and propionibacterium acnes (19%). No multidrug-resistant pathogens were found in our series. We did not find in our series infections of the receptor related to the preservation fluid infection.
Conclusions. Despite the high incidence of positive cultures of the preservation fluid, the rate of related infection is 0. In other studies with a higher volume of patients, the average of related infections is around 1%. This makes us, as many authors recommend, consider the profitability of stopping the cultures of preservation fluid in our center.

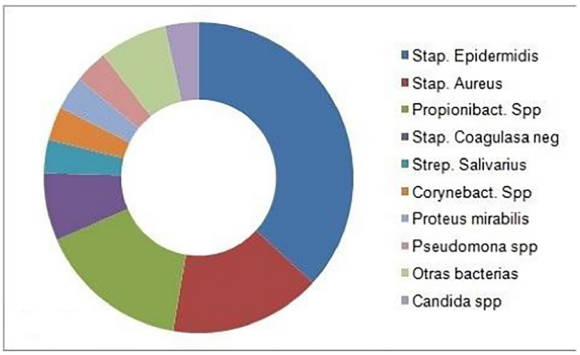


Fig 1 (abstract 000553)

Topic: Brain death, organ donation and transplantation

000554

Application of the STABLE scale in patients admitted to the ICU for ECMO support as bridge to lung transplantation

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000554***.

Introduction. To compare in-hospital mortality estimated by the STABLE scale (Stratification Risk Analysis in Bridging Patients to Lung Transplant on ECMO) (1) in patients admitted to the Intensive Care Unit (ICU) receiving extracorporeal membrane oxygenation (ECMO) support as a bridge to lung transplantation (BLT).
Methods. Retrospective study (2021–2024) including patients admitted to ICU who received ECMO support as BLT in a tertiary hospital with a lung transplant volume > 50/year. ICU stay was defined as the sum of pre and post-lung transplant days, and real in-hospital mortality as death between the first hospitalization day to hospital discharge. Predicted in-hospital mortality was estimated by the STABLE scale, with data obtained from the electronic medical record. Categorical variables: % (absolute value) and quantitative variables: mean ± ds (normal distribution) or medians (IQR25-IQR75; non-normal distribution). Normality: Shapiro–Wilk test. Area under the curve (AUC) of real and predicted mortalities.
Results. We included 15 patients with ECMO support as BLT. Mean age 59 ± 9 years, 60% (n = 9) male. Main lung disease: diffuse interstitial lung disease (non-pulmonary fibrosis type) 53.3% (n = 8). At the time of hospital admission, 42.9% (n = 6) were undergoing pre-transplant evaluation and 35.7% (n = 5) were on the transplant waiting list, with LAS (Lung Allocation Score) values of 88 (81–90) points. Prior to transplantation or death, 13.3% (n = 2) received renal replacement therapy for acute renal failure; 7.1% (n = 1) had Br values > 1.2 mg/dl and 40% (n = 6) required mechanical ventilation (MV). After ECMO commencement, half of the patients with MV were extubated (n = 3). Median ECMO runs 4 (2–4) days. MV days until transplantation or death: 4.5 (2–22). Days on the waiting list until transplantation or death: 25 (12.5–53.5). ICU stay 27 (8–42) days.
Real in-hospital mortality: 33.3% (n = 5). STABLE scale 6.20 ± 4.2 points, predicted STABLE scale mortality 11.8% (5.7;13.9). AUC ROC of STABLE scale 0.78 (IC95 0.51;1.00); AUC ROC of estimated mortality 0.79 (IC95 0.53;1.00).
Conclusions. In our study, the probability of death estimated by the STABLE scale correlates adequately with real mortality. However, due to the low statistical power of the study, it is not possible to define a cut-off for the STABLE score above which there is a better correlation with actual mortality.

Reference

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Topic: Brain death, organ donation and transplantation

000555

Factors associated with failure of MRSA decolonization in critically ill patients: a retrospective analysis

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Introduction. Nasal colonization by methicillin-resistant Staphylococcus aureus (MRSA) in critically ill patients triggers contact precautions and decolonization protocols, aiming to prevent transmission and infection. Failure of decolonization may occur, however little is known regarding the associated factors.
Objectives. To identify clinical factors associated with failure of MRSA decolonization in a cohort of ICU patients undergoing a standardized decolonization protocol.
Methods. We conducted a retrospective study of 71 ICU patients admitted from May 2022 to October 2024 with a positive screening swab for MRSA upon admission. Eight patients who were unable to complete the decolonization protocol or follow-up testing were excluded, resulting in a final sample of 63 patients. All included patients underwent decolonization with intranasal mupirocin and chlorhexidine gluconate baths for 5 days. Follow-up swabs were collected at 48 h, day 7, and day 14. Decolonization was deemed

successful if all three follow-up swabs were negative. In cases of persistent positivity, a second 5-day course of mupirocin and chlorhexidine was administered. Persistent positivity after two cycles was considered a decolonization failure. To explore potential predictors of failure, we assessed the association between decolonization outcome and clinical variables, including age, sex, diabetes mellitus (DM), immunosuppression, malignancy, chronic kidney disease (CKD), dialysis, presence of medical devices, recent hospitalizations, and recent antibiotic use (within the previous 3 months). Chi-square tests and binary logistic regression were used for statistical analysis.

Results. The overall decolonization success rate was 71.4%, with 45 out of 63 patients achieving documented MRSA eradication. Among all variables, only DM showed a statistically significant association with decolonization failure (chi^2 = 4.71; p = 0.030) and logistic regression confirmed a strong trend toward significance for DM (OR = 3.59; p = 0.06). No significant association was found for age, gender, CKD, dialysis, immunosuppression, malignancy, medical devices, hospitalizations or recent antibiotic use.

Conclusions. DM appears to be associated with a higher risk of MRSA decolonization failure in critically ill patients. These findings suggest that in diabetic patients, strict adherence to the decolonization protocol is particularly important. Timely and complete follow-up with control swabs may be especially valuable in this subgroup, helping to confirm eradication and avoid false assumptions of success.

Topic: Infections and prevention

000557

Perceptions and experiences of ICU professionals regarding end-of-life care: a survey-based study

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Introduction. End-of-life care (EOLC) is a fundamental aspect of intensive care medicine, requiring clinical expertise, ethical decision-making, and emotional resilience from healthcare professionals. Understanding how ICU professionals perceive and experience EOLC is essential to improving support systems and training programs.

Objectives. To evaluate the perceptions, experiences, and emotional impact of EOLC among ICU physicians and nurses, identifying potential disparities and areas for improvement in institutional support.

Methods. A cross-sectional survey was conducted among ICU staff (physicians and nurses) at Hospital Universitario 12 de Octubre between January and February 2025. The survey, adapted from Riegel et al1, included Likert-scale questions (1 = strongly disagree, 6 = strongly agree) assessing knowledge, attitudes, and personal experiences related to EOLC. Descriptive statistics (mean ± standard deviation) were used to summarize responses, and Mann–Whitney U tests were performed to compare differences between physicians and nurses.

Results. A total of 58 ICU professionals participated (43,33% physicians, 56,66% nurses). Physicians reported significantly higher training in communication with families (3.25 ± 1.42 vs. 1.31 ± 0.73, p < 0.001) and symptom management (3.38 ± 1.55 vs. 1.84 ± 1.24, p < 0.001). They were also more likely to rely on scientific literature in EOLC decisions (4.08 ± 1.31 vs. 3.03 ± 1.65, p = 0.016) and had received more postgraduate education in EOLC (3.38 ± 1.74 vs. 2.41 ± 2.04, p = 0.019) (Table 1). Nurses scored higher related to the perception that EOLC becomes a nurse-led practice once the decision to withdraw care has been made (5,09 ± 1,146 vs. 3,54 ± 1,285, p < 0.001). Both groups showed similar perceptions in the domains of organizational culture and palliative care resources and values, indicating a shared understanding of institutional support and the availability of resources for end-of-life care (Tables 2 and 3).

Conclusions. The findings suggest that while ICU physicians receive more formal training in end-of-life care (EOLC) and base their decisions more on scientific evidence, nurses perceive themselves as playing a central role once care withdrawal decisions have been made. This divergence in training and perceived responsibilities may influence how EOLC is approached within multidisciplinary teams. Despite these differences, both groups share a common perception of institutional support and available resources, which could serve as a foundation for further improvements. Addressing these gaps through targeted educational programs and fostering a more structured, collaborative approach to EOLC could enhance the quality of care and support provided to both patients and healthcare professionals.

Table 1 Knowledge of end-of-life care among ICU professionals

Knowledge of End-of-Life Care among ICU Professionals	Mean (± SD)	Physicians (Mean ± SD)	Nurses (Mean ± SD)	Mann-Whitney U Test p-value
I have received in-service education that assists me to support and communicate with families of dying patients	2,14 ± 1,432	3,25 ± 1,422	1,31 ± 0,738	p <0,001
I have received in-service education that assists me to provide care and manage patient symptoms at the end-of-life	2,52 ± 1,592	3,38 ± 1,555	1,84 ± 1,247	p <0,001
I draw on evidence from the literature to provide end-of-life care to patients and their families	3,50 ± 1,57	4,08 ± 1,316	3,03 ± 1,656	p = 0,016
My postgraduate education included end-of-life care content relevant to the critical care context.	2,83 ± 1,93	3,38 ± 1,74	2,41 ± 2,046	p = 0,019

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g, SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

Table 2 organizational culture and patient and family preferences in EOLC.

Organizational Culture and Patient and Family preferences in EOLC	Mean (± SD)	Physicians (Mean ± SD)	Nurses (Mean ± SD)	Mann-Whitney U Test p-value
After a decision is made to withdraw treatment, nurses are left to manage the care of the patient	4,45 ± 1,416	3,54 ± 1,285	5,09 ± 1,146	p <0,001
In ICU, families are given adequate time to consider decisions to withhold/withdraw treatment for the patient	4,28 ± 1,322	4,54 ± 1,250	4,03 ± 1,379	p = 0,164
In ICU, family meetings with the healthcare team are held to resolve differing views about a patient's treatment	3,97 ± 1,578	4,33 ± 1,606	3,63 ± 1,519	p = 0,081
In ICU, the patient's preferences (or their likely preference according to family) for end-of-life care are considered	4,47 ± 1,404	4,96 ± 1,042	34,06 ± 1,544	p = 0,028
In ICU, families are involved in decisions about the dying patient	4,41 ± 1,200	4,63 ± 1,135	4,22 ± 1,263	p = 0,221
When a patient dies in ICU, families have sufficient time to spend with the patient	2,28 ± 1,182	2,79 ± 1,285	1,81 ± 0,896	p = 0,002

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g, SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

Table 3 Palliative care values, emotional support and care planning

Palliative Care Values, Emotional Support and Care Planning	Mean (± SD)	Physicians (Mean ± SD)	Nurses (Mean ± SD)	Mann-Whitney U Test p-value
End-of-life care is as important as curative care in the critical care environment	5,26 ± 1,208	5,21 ± 1,179	5,31 ± 1,281	p = 0,394
End-of-life care should include care of the patient's family	5,79 ± 0,554	5,88 ± 0,338	5,75 ± 0,622	p = 0,483
It is a privilege to care for a patient at the end-of-life and their family	4,74 ± 1,305	4,63 ± 1,279	4,88 ± 1,338	p = 0,395
The medical staff support end-of-life care for dying patients in ICU	4,50 ± 1,064	4,92 ± 0,076	4,16 ± 1,139	p = 0,007
In ICU, when a diagnosis with a likely poor outcome is made, families are informed of end-of-life care options.	4,57 ± 1,171	4,88 ± 0,850	4,28 ± 1,326	p = 0,098
All members of the healthcare team in ICU agree with and support end-of-life care when it is implemented	4,59 ± 1,312	4,92 ± 1,176	4,31 ± 1,378	p = 0,086

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g, SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition),

PHQ Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

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Topic: Ethics and end of life care

000559

Assessment of extended inflammatory parameters in intensive care unit patients undergoing antimicrobial treatment—retrospective analysis

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Introduction. Extended inflammatory parameters (EIP) are markers assessed during total blood count analysis. There is limited evidence regarding use of EIP in chronic conditions [1], malnutrition [2], and sepsis in the intensive care unit (ICU) [3]. Inflammatory parameters often add to clinical assessment. The introduction of new, easily accessible inflammatory markers in ICU settings could improve decision-making.
Objectives. This study assesses EIP in ICU patients during antimicrobial treatment, and their correlations with routine inflammatory parameters.
Methods. This retrospective study was approved by the bioethical committee and included patients with confirmed bacterial infection receiving antimicrobials in the ICU. Patient demographics, mortality during antimicrobial treatment, and overall ICU mortality were recorded. Patients' laboratory results were obtained from the day before starting microbial treatment (D0), for up to 5 days of therapy (D1-D5). EIP included neutrophil reactivity intensity (NEUT-RI), and neutrophil granularity intensity (NEUT-GI).
Results. The study included 88 antibiotic therapies in the ICU. The average age was 54.9 years and 35,2% of patients were female. Factors associated with mortality during microbial treatment were higher NEUT-RI at D1 (71.1 vs 60.8, $p = 0.01$), and higher procalcitonin (PCT) at D5 (15.94 vs 3.8 ng/mL, $p = 0.017$). Factors associated with overall ICU mortality were lower NEUT-GI at D0 (153.1 vs 156.6, $p = 0.006$), higher PCT at D2 ($p = 0.012$), D3 ($p = 0.042$), D4 ($p = 0.023$), D5 ($p = 0.005$), and the higher neutrophil–lymphocyte ratio at D0 ($p = 0.016$), D2 ($p = 0.008$), D3 ($p = 0.007$), D4 ($p < 0.001$), D5 ($p = 0.003$). NEUT-RI had significant ($p < 0.05$) moderate correlation with CRP at D0 ($r = 0.59$), D2 ($r = 0.44$), D3 ($r = 0.52$), D4 ($r = 0.49$), and D5 ($r = 0.42$). NEUT-GI had significant negative weak correlation with PCT at D2 (r =—0.29), and D3 (r =—0.24). NEUT-RI and NEUT-GI had significant weak correlation at D0 ($r = 0.37$) and D1 ($r = 0.29$).
Conclusions. In this study, early EIP assessment predicted ICU outcomes. Higher NEUT-RI at the beginning of antimicrobial treatment was associated with worse outcomes. Higher NEUT-GI values before antimicrobial treatment were related to better overall ICU survival. The moderate correlation between NEUT-RI and CRP calls for further research in fields where CRP showed benefits in monitoring inflammation. The weak correlation between NEUT-RI and NEUT-GI only during the first two days suggests different cellular mechanisms affecting the parameters and needs further investigation. The use of EIP in ICU settings requires additional studies.

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Topic: Sepsis

000560

Dose-dependent mortality benefits of norepinephrine monotherapy versus multiple vasopressors in critically ill patients

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Introduction. Despite inconclusive findings from major trials [1], current guidelines [2] on septic shock recommend vasopressin as a potential adjunct to first-line therapy with norepinephrine. However, the optimal timing for introducing a second vasopressor agent remains uncertain [3].
Objectives. To assess the association between vasopressor strategy (norepinephrine monotherapy vs multiple vasopressor combination) and ICU mortality in patients requiring hemodynamic support.
Methods. Data from the seven ICU databases from the US and Europe (n = 349,993 patients)—AmsterdamUMCdb[4], eICU-CRD[5], HiRID[6], MIMIC-III, MIMIC-IV[7], NWICU[8], SICdb[9]—were harmonized and cleaned. Routinely collected information on demographics, comorbidities, physiological variables, lab results, and treatment parameters were extracted for the first 24 h of vasopressor administration.
Multivariable logistic regression was used to assess the association between vasopressor strategy and ICU mortality, adjusting for age, sex, weight, admission type, use of corticosteroid, renal replacement therapy and mechanical ventilation, APACHE II and SOFA scores, comorbidities, septic shock, fluid intake and urine output in the first 24h. Adjusted absolute risks of ICU mortality were predicted at every maximum rate of concurrent vasopressor in norepinephrine-equivalent dose [10], in 0.1 µg/kg/min increments for each strategy. Sensitivity analysis in patients with sepsis was conducted.
Results. Among 31,728 included patients, the median age was 66 years [IQR 55–75], with a predominance of male patients (61.1%). The median SOFA score was 4 [IQR 1–7], median vasopressor maximal rate during the first 24 h was 0.14 µg/kg/min norepinephrine equivalents [IQR 0.07–0.29]. The cohort comprised 27,922 patients receiving norepinephrine monotherapy and 3,806 patients receiving multiple vasopressors (vasopressin, epinephrine, or phenylephrine in addition to norepinephrine), with ICU mortality rates of 14.8% (4,120/27,922) and 35.4% (1,349/3,806), respectively.
Norepinephrine monotherapy was associated with significantly lower ICU mortality compared to multiple vasopressors at doses below 0.3 µg/kg/min (predicted ICU mortality risk at 0.3 µg/kg/min: 18.9% [95% confidence interval (CI): 16.9–21.0%] vs. 24.1% [95% CI: 21.1–27.3%]) (Fig. 1). Conversely, at maximal doses of 2.2 µg/kg/min and above, multiple vasopressor combinations were associated with improved outcomes (predicted ICU mortality risk at 2.2 µg/kg/min: 46.7% [95% CI: 40–53.5%] vs 59.3% [95% CI: 53.6–64.7%]). Subpopulation analysis

of sepsis patients confirmed the results (**Fig. 2**). Subgroup analysis revealed that at 0.3 µg/kg/min, norepinephrine plus vasopressin was associated with higher mortality (25.2% [95% CI: 21.6–29.3%]) compared to norepinephrine monotherapy (18.7% [95% CI: 16.7–20.8%]), while norepinephrine plus phenylephrine showed no significant difference (22.7% [95% CI: 19–26.7%]) (**Fig. 3**).

Conclusions. Our findings suggest a dose-dependent relationship between vasopressor strategy and ICU mortality. Compared to therapy with multiple vasopressors, norepinephrine monotherapy was associated with lower mortality at doses below 0.3 µg/kg/min but higher mortality at doses above 2.2 µg/kg/min. These results may inform clinical decision-making on vasopressor escalation.

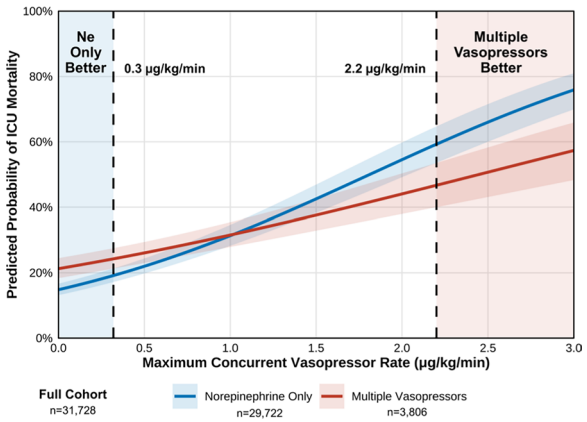


Fig 1 (abstract 000560) Adjusted risk of in-ICU mortality at different maximum rates of vasopressors for single or multiple vasopressors strategy. Ne: norepinephrine.
Maximum rate of vasopressors is shown in µg/kg/min of norepinephrine-equivalent dose, computed from the first 24 h from start of vasopressors. Multiple vasopressors include every combination of two or more vasopressors at the same time.
Thresholds 1 and 2 correspond, respectively, to the first dose where confidence intervals overlap and the first dose where confidence intervals separate.
Prediction is adjusted for age, sex, weight, admission type, use of RRT, mechanical ventilation, APACHE II and SOFA scores, diagnosis of hypertension, congestive heart failure, cardiac arrhythmia, renal failure, liver disease, chronic pulmonary disease, or metastatic cancer, sepsis, corticosteroid use, fluid intake, and urine output in the first 24h.

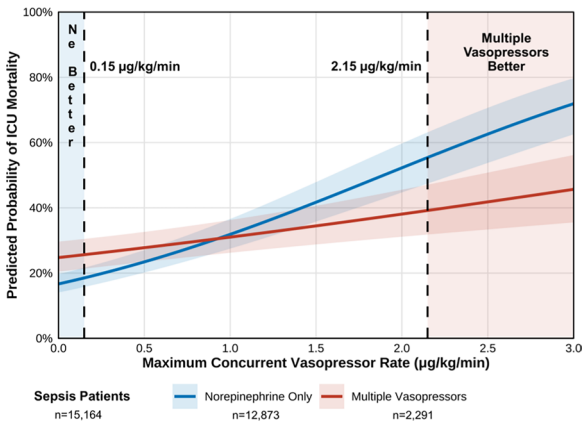


Fig 2 (abstract 000560) Adjusted risk of in-ICU mortality at different maximum rates of vasopressors for single or multiple vasopressors strategy in the subpopulation with sepsis.
Ne: norepinephrine only.
Maximum rate of vasopressors is shown in µg/kg/min of norepinephrine-equivalent dose, computed from the first 24 h from start of vasopressors. Multiple vasopressors include every combination of two or more vasopressors at the same time.
Thresholds 1 and 2 correspond, respectively, to the first dose where confidence intervals overlap and the first dose where confidence intervals separate.
Prediction is adjusted for age, sex, weight, admission type, use of RRT, mechanical ventilation, APACHE II and SOFA scores, diagnosis of hypertension, congestive heart failure, cardiac arrhythmia, renal failure, liver disease, chronic pulmonary disease, or metastatic cancer, corticosteroid use, fluid intake, and urine output in the first 24 h.

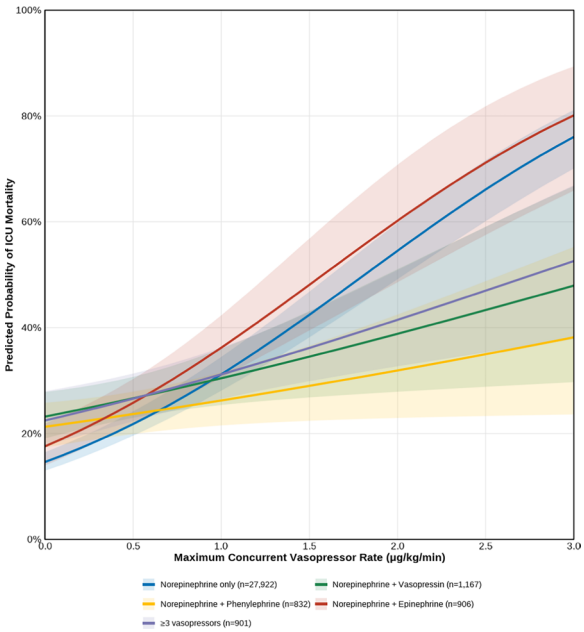


Fig 3 (abstract 000560) Adjusted risk of in-ICU mortality at different maximum rates of vasopressors for single or multiple vasopressors strategy, including every different combination.
Maximum rate of vasopressors is shown in µg/kg/min of norepinephrine-equivalent dose, computed from the first 24 h from start of vasopressors.
Prediction is adjusted for age, sex, weight, admission type, use of RRT, mechanical ventilation, APACHE II and SOFA scores, diagnosis of hypertension, congestive heart failure, cardiac arrhythmia, renal failure, liver disease, chronic pulmonary disease, or metastatic cancer, sepsis, corticosteroid use, fluid intake, and urine output in the first 24h.

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11 Maxime Fosset thanks SRLF (Société de Réanimation de Langue Française) and Fulbright France Foundation for their help and support.

Topic: Cardiovascular issues in ICU

000563

Listening between the lines: thematic analysis of caregiver feedback following implementation of family care journals in the PICU

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000563***.

Introduction. Family engagement is a cornerstone of pediatric intensive care unit (PICU) care, yet limited qualitative data in pediatrics captures caregivers' real-time experiences. Family Care Journals (FCJs) were introduced as a communication and reflection tool, enabling families to document their journey and voice concerns. Thematic analysis of open-ended caregiver comments provides deeper insight into the family experience beyond structured survey responses.
Objectives. After completing the quantitative phase of the study, we proceeded with the qualitative phase, aiming to identify recurring themes in caregivers' feedback following the implementation of FCJs in the PICU. Our goal was to understand the key drivers of satisfaction and pinpoint areas for improvement in care delivery.
Methods. From 2016 to 2020, 366 caregivers of critically ill children completed a 12-item questionnaire at PICU discharge. Open-ended comments (n = 172; 147 English, 25 Spanish) were analyzed using an inductive thematic approach. Responses were categorized into positive and negative sentiments and grouped into thematic domains based on content patterns. During the study period, the unit transitioned from the original PICU space to a new, state-of-the-art 57-bed PICU spanning three floors.
Results. Positive themes (68.1%) were dominated by expressions of gratitude (54.1%), especially toward compassionate nursing care, staff professionalism, and inclusion in decision-making. Communication satisfaction was the second most frequent positive theme (13.4%). Negative comments (31.9%) highlighted areas for improvement in communication (15.1%), mainly due to interdisciplinary inconsistencies and language barriers (2.9%). Environmental concerns (11.6%) were predominantly associated with the previous PICU space, which lacked adequate accommodations for families. After moving to the new 57-bed facility, comments reflected improved satisfaction with space, comfort, and amenities. Delays in care (5.2%) were attributed to systemic hospital bed availability issues. These thematic insights aligned with quantitative findings.
Conclusions. Thematic analysis revealed that emotional support, clear communication, and physical comfort are central to positive family experiences in the PICU. FCJs served as a valuable avenue for caregivers to express concerns and appreciation and for care teams to identify actionable improvements. The move to a modern, larger PICU enhanced environmental satisfaction and further supported family centered care. These insights support the continued use of FCJs and inform strategies for ongoing quality improvement in critical care settings.

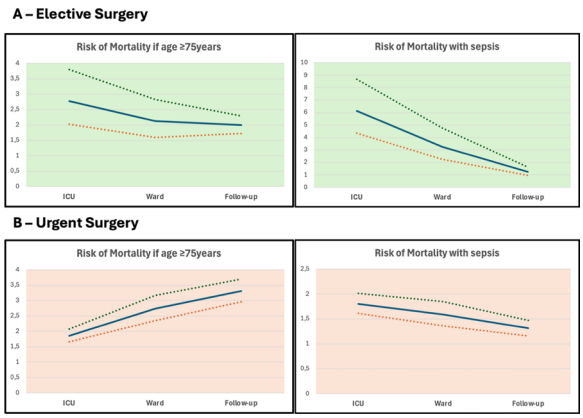
Topic: Health Services Research and Outcome

000566

Surgical patients admitted to intensive care. Do elective and urgent surgery patients have similar outcomes?

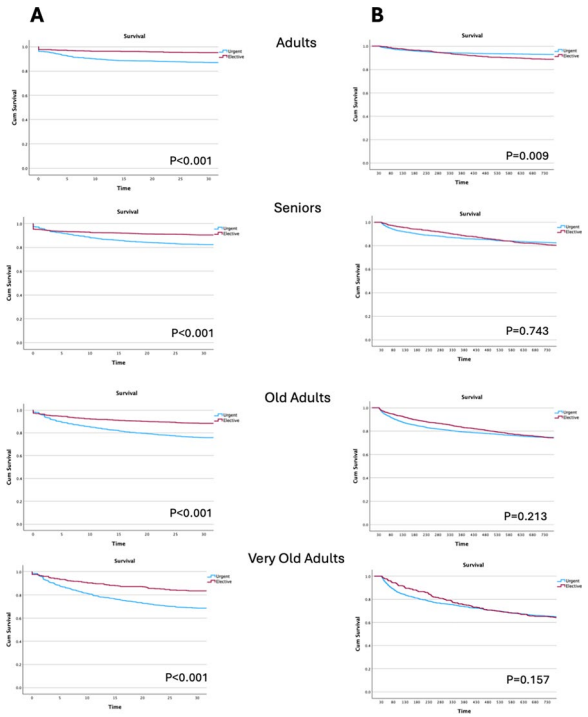
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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000566***.

Introduction. The landscape of critical care is evolving. Advances in treatment and supportive care, along with the evolving technology supporting surgical interventions, like robotics, have made possible the achievement of outstanding results. The contemporary evaluation of the prognosis of critically ill surgical patients is paramount to promoting individualized care. This study aims to assess and compare the outcomes of elective and urgent surgical patients admitted to the Intensive Care Unit, both short-term (first 30 days) and long-term (until two years).
Methods. Post hoc analysis of the CIMbA LT study, a retrospective, multicentre, observational study conducted on Portuguese multipurpose Intensive Care Units over four years. Surgical patients were segregated for further analysis. We compared differences between patients admitted after elective or urgent surgery.
Results. We included 13,748 surgical adult patients admitted to an Intensive Care Unit during the study period. Roughly one-third of our population was submitted to elective and two-thirds to urgent surgery. Patients submitted to an urgent procedure had higher severity and in-hospital mortality (24.6% versus 8.2%, $p < 0.001$), whilst among those who survived until hospital discharge, scheduled surgery patients had higher long-term mortality (28.9% versus 25.0%, odds ratio 1.21, 95% CI 1.11–1.32). This difference in the long-term risk was statistically significant in the younger population. All surgical critically ill patients had a markedly increased risk of 1-year mortality, compared to the general population, even after being discharged alive from the Hospital: urgent surgical procedure, odds ratio 10.8 (95% CI 9.0–12.9); elective surgery odds ratio 14.6 (95% CI 11.3–18.8).
Conclusions. Surgical patients submitted to urgent and elective procedures have different trajectory patterns after Intensive Care Unit admission and should have a personalized approach. Urgent surgery patients have high short-term mortality, whilst elective surgical patients showed higher long-term mortality risk, particularly noticeable in younger cohorts. All surgical patients admitted to the Intensive Care Unit had a very high first year risk of mortality.



Risk of mortality associated with older age and sepsis for surgical patients, elective (panel A) and urgent (panel B), at the ICU, Hospital

and after 2 years (continuous line—odds ratio; dashed lines—95% CI). ICU—Intensive Care Unit.



Survival curves according to the age group: survival in the first 30 days after admission (panel A) and from the 31st day until two years, addressing only patients who survived the first 30 days after surgery (panel B). Age group: adult: 18–50 years; senior: ≥ 50–65; old: ≥ 65–80; very old: ≥ 80.

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Topic: Perioperative care

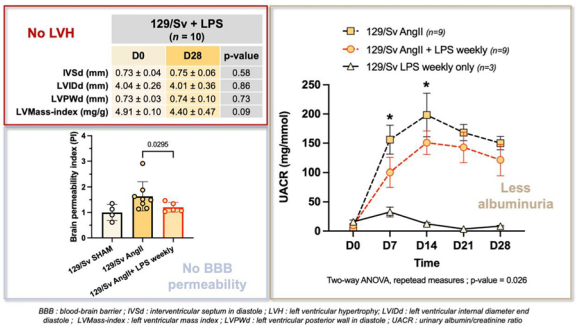
000568

Mechanisms of malignant hypertension: a murine model to explore the role of inflammation in target organ damage

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Introduction. Malignant hypertension (MH), a life-threatening condition characterized by rapidly progressive blood pressure elevation with acute target organ damage, remains a critical challenge in the intensive care unit (ICU). MH primarily affects the microvasculature and causes ischemia, leading to brain hemorrhages, renal failure, retinal damage, and cardiac dysfunction. The mechanisms driving organ-specific vulnerability remain poorly understood. Experimental models are essential to decipher the complex interplay between genetic background (innate susceptibility) and vascular injury and to develop targeted interventions. We hypothesized that inflammation may modulate susceptibility to MH-induced injury.
Objectives. To investigate the mechanisms underlying MH-induced microvascular damage, explicitly focusing on the role of inflammation.
Methods. Three-month-old 129S1/SvImJ (129/Sv) and C57BL/6 J male mice received angiotensin II (AngII) (600 ng/kg/min) or saline (NaCl 0,9%) for 28 days (D28) via osmotic minipumps. Target-organ damage was assessed using standardized methods: cognitive testing (Morris Water Maze), blood–brain barrier (BBB) permeability (3 kDa TMR-dextran tracer), immunostaining (GFAP, IBA1, CD206), cerebral microbleeds, renal ultrastructure (electron microscopy), urinary albumin/creatinine ratio (UACR), echocardiography (LVMass), electrocardiography (QRS duration), and retinal vascular analysis. Brain microvessels were isolated for bulk RNA sequencing. A subgroup of 129/Sv mice received low-dose LPS (0.25 mg/kg/week) to explore the role of inflammation.
Results. Despite comparable AngII-induced hypertension between strains, only 129/Sv mice developed characteristic features of MH on D28. These mice suffered from systemic disease. Retinal analyses revealed blood–retinal barrier disruption and dextran extravasation in hypertensive 129/Sv mice. Renal evaluation showed severe podocyte foot process effacement and a more than 25-fold increase in urinary albumin/creatinine ratio (UACR), while electron microscopy confirmed glomerular injury. Cardiac echography and electrocardiogram demonstrated left ventricular hypertrophy (LVH) and prolonged QRS duration, reflecting structural and electrical remodeling. In the brain, 129/Sv mice exhibited marked cognitive impairment in the Morris Water Maze, increased BBB permeability, and cerebral microbleeds, indicating significant neurovascular damage. Immunostaining revealed astrocyte activation. In contrast, C57BL/6J mice did not develop organ-specific damage, highlighting the strain-specific vulnerability to hypertensive injury.
Given that neurological deterioration is a significant concern for intensivists, we focused on brain susceptibility to better understand the mechanisms driving cerebral involvement in MH. We performed

bulk-RNA sequencing of brain microvessels to identify pathways involved in MH microvascular damages. In 129/Sv mice treated with AngII, we observed down-regulation of specific inflammatory pathways (interferon type I pathway) compared to the C57BL/6J strain, potentially contributing to their vulnerability to MH-induced damage. These results were supported by increased brain tissue-resident and perivascular macrophage activation (IBA1 and CD206 immunostaining), heart, and kidney (complement pathway) in C57BL/6J mice after AngII treatment compared to the hypertensive 129/Sv strain.
To confirm this hypothesis, in which low-grade inflammation could exert protective effects, we induced low-grade inflammation via intraperitoneal lipopolysaccharide (LPS) injections weekly (0.25 mg/kg) in 129/Sv mice with AngII administration. The hypertensive 129/Sv mice with LPS had significantly lower BBB permeability and lower UACR than the same hypertensive strain without LPS and did not develop LVH (Figure).
Conclusions. We developed a robust and original murine model of malignant hypertension that recapitulates severe human end-organ damage (1). This model reveals the critical interplay between genetic background and inflammation in shaping susceptibility to hypertensive injury. Our findings suggest that low-grade inflammation may exert protective effects in MH and support immunomodulatory strategies to prevent organ damage in hypertensive emergencies. These results offer a translational platform to explore precision medicine approaches in the ICU.



BBB : blood-brain barrier ; IVSd : interventricular septum in diastole ; LVH : left ventricular hypertrophy; LVIDd : left ventricular internal diameter end diastole ; LVMass-index : left ventricular mass index ; LVPWd : left ventricular posterior wall in diastole ; UACR : urinary albumin/creatinine ratio

The hypertensive 129/Sv mice with LPS had significantly lower BBB permeability and lower UACR than the same hypertensive strain without LPS and did not develop LVH

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2 Bourse Société Francophone de Néphrologie Dialyse et Transplantation (SFNDT) 2023
3 MD—PhD student grant—CHU de Bordeaux / Université de Bordeaux

Topic: Translational biology

000569

Time to fluids and antibiotics in inpatient sepsis

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Introduction. Sepsis is one of the leading causes of critical care admissions worldwide. Sepsis guidelines recommend timely fluid resuscitation and antibiotic administration. However, most research focuses on patients with community acquired sepsis, and it is unclear how well these guidelines apply to inpatients who develop sepsis (or nosocomial sepsis).
Objectives. We conducted a systematic review to assess quality of care in hospitalized adults who develop sepsis. The outcomes of interest included mortality, ICU stay length, hospital length of stay, and survival to hospital discharge.
Methods. We searched MEDLINE, EMBASE, and Scopus (from January 2001–December 2024) for randomized controlled trials and cohort studies that included hospitalized adults (age > 18) who developed nosocomial sepsis. Two reviewers independently screened citations in two stages: titles/abstracts and full text. Disagreements were resolved through discussion or third-party adjudication. Studies were assessed using the Modified Cochrane 2.0 or Newcastle–Ottawa Risk of Bias tools. We initially planned to perform meta-analysis, however due to clinical and methodological heterogeneity, we summarize findings narratively.
Results. Of 6,258 citations, we included 12 studies. The studies included six retrospective cohort studies, five prospective cohort studies, and one quality improvement study. From the included studies, four main themes emerged: (1) early antibiotics and fluid resuscitation improved outcomes, (2) inpatients experience delayed initial resuscitation compared to those with community acquired sepsis who present to the emergency department, (3) routine assessment of physiologic markers such as serum lactate levels lead to more timely resuscitation, and (4) integration of allied healthcare personnel quality improvement projects reduces resuscitation times.
Conclusions. This study highlights the need for more research specifically focused on the care of sepsis in hospitalized patients. Further randomized controlled trials and quality improvement initiatives are essential to ensure quick recognition and implementation of sepsis management strategies in hospitalized patients, as recommended by the Surviving Sepsis Campaign. Our analysis shows that nursing-led quality improvement initiatives can improve sepsis management and reduce delays in treatment, underscoring the need for coordinated efforts across care teams.

Topic: Sepsis

000570

Clinical and nutritional factors in swallowing function recovery and hospital stay after extubation

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000570***.

Introduction. Post-extubation dysphagia (PED) recovery time varies among survivors of critical illness. While factors associated with PED occurrence have been identified, those related to recovery duration remain unclear. Identifying which factors are most strongly associated with delayed swallowing recovery could help stratify patients and refine early intervention strategies. Moreover, prolonged dysphagia may extend hospital stay, increasing healthcare burden.
Objectives. To evaluate the association between recovery time from post-extubation dysphagia and clinical and nutritional factors, and its impact on hospital stay.
Methods. This study presents preliminary data from an ongoing prospective study (June 2024–February 2025) conducted at a public tertiary hospital in Argentina. It includes patients aged ≥ 18 years who required mechanical ventilation (MV) for ≥ 48 h. Swallowing function recovery (GUSS-ICU = 10) and recovery time (> 5 vs. ≤ 5 days) were analyzed in relation to clinical and nutritional factors, including age, sex, APACHE II score, malnutrition at ICU admission, ICU-acquired weakness (ICUAW), MV duration, and ICU stay. Chi-square and Mann–Whitney U tests were used for comparisons. Relative risk (RR) with 95% confidence intervals (95% CI) assessed associations. Kaplan–Meier

analysis evaluated the effect of swallowing recovery time on hospital stay (Log-Rank test).
Results. A total of 52 patients were included (mean age: 37 ± 16 years, 65.4% male). Mean APACHE II score: 19 ± 6. Malnutrition at ICU admission: 65.4%. Median MV duration: 7 days (P25-P75: 4–8). Median ICU stay: 11 days (P25-P75: 8–13). Swallowing recovery time ranged from 1 to 24 days (median: 5, P25-P75: 3–7). Patients were categorized as delayed recovery (> 5 days, n = 20) or faster recovery (≤ 5 days, n = 32). Delayed recovery was significantly associated with MV > 7 days (RR = 2.83; 95% CI: 1.42–5.64; p = 0.002; OR = 6.50; 95% CI: 1.84–22.92) and ICU stay > 11 days (RR = 3.00; 95% CI: 1.28–7.05; p = 0.004; OR = 5.73; 95% CI: 1.65–19.94). No significant associations were found with APACHE II, age, sex, malnutrition, or ICUAW. Patients with delayed recovery had longer hospital stays (p = 0.014). Kaplan–Meier analysis confirmed a significant effect of recovery time on hospital stay (Log-Rank: $\chi^2 = 44.143$, p < 0.001), with a mean stay of 9.3 ± 1.0 vs. 3.0 ± 0.2 days.
Conclusions. Prolonged mechanical ventilation (> 7 days) is associated with delayed recovery from post-extubation dysphagia (> 5 days), leading to longer hospital stays. These findings emphasize the need for early interventions to mitigate the impact of prolonged MV on swallowing recovery and hospital stay.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000571

Implementation of a dysphagia program for patients weaned from mechanical ventilation

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000571***.

Introduction. Lack of awareness, guidelines and specialized staff/resources hinders post-mechanical ventilation dysphagia (PMVD) management, leading to suboptimal care. An interdisciplinary program enables timely identification, monitoring and intervention.
OBJECTIVES. To describe the ongoing development of a dysphagia management program providing continuous, standardized care through an interdisciplinary approach for patients weaned from MV.
Methods. The program, implemented in a tertiary public hospital in Argentina, covered care from ICU to post-hospital discharge. Phase 1 included establishing an interdisciplinary team (speech-language pathology [SLP], nutrition, physiotherapy and head and neck surgery), conducting a survey to assess ICU healthcare professionals' knowledge/perceptions and ongoing research on PMVD frequency, evolution and associated factors, using the Gugging Swallowing Screen-ICU and bedside and/or instrumental tests when needed. Phase 2 included training sessions and the formal presentation of institutional guidelines with standardized tools, alarm sign checklists, and management algorithms. Research remains ongoing, with new studies being developed. Future phases (3 and 4) will focus on rehabilitation, evaluating training improvements and ensuring sustainability through expanded research and surveillance.
Results. The dysphagia management program was successfully implemented in Phases 1 and 2. The interdisciplinary team and the application of guidelines facilitated early identification and interventions, enhancing communication and improving collaborative action. Preliminary findings indicate that most patients presented PMVD upon weaning and nearly half had dysphagia at ICU discharge. By hospital discharge, only a few patients still had dysphagia and the outpatient follow-up system ensured continuity of care for at-risk patients. A survey assessing healthcare professionals' knowledge/perceptions showed variability in responses among professional groups and differences in perception based on experience, which were addressed through targeted training. The feasibility of the program's initial phases was demonstrated: preliminary data from ongoing research showed that the proposed tools could be used successfully with the institution's available resources.
Conclusions. The PMVD management program demonstrated the feasibility and improving outcomes of addressing PMVD through an interdisciplinary team. This enabled early identification, assessment and tailored interventions across the patient care continuum, from weaning to post-discharge. Preliminary findings confirmed that the strategies were feasible and aligned with the institution's resources. Standardized guidelines streamlined care, while future rehabilitation programs and a planned surveillance system will ensure the program's sustainability and improvement. This model could be applied to other institutions for effective dysphagia management from ICU to post-discharge care.

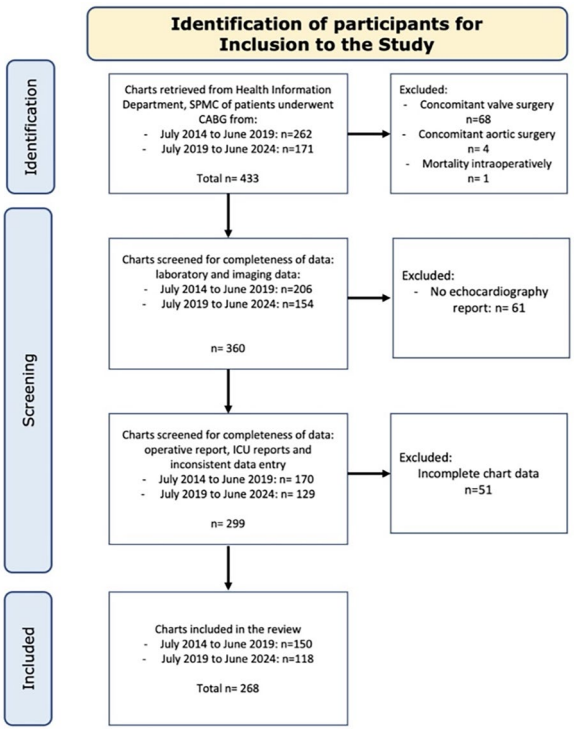
Topic: Metabolism, endocrinology, liver failure and nutrition

000573 Comparative impact analysis of cardiac intensivist involvement on CABG surgery outcomes in Southern Philippines Medical Center—Heart Institute: a retrospective cohort study (2014–2024).

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Introduction. Coronary artery disease remains a leading cause of mortality worldwide, with coronary artery bypass graft (CABG) as a key intervention. Numerous international studies, predominantly from high-income countries, suggest improved postoperative outcomes with intensivist involvement. However, these findings may not be generalizable to low- and middle-income countries (LMICs) due to differences in healthcare infrastructure and resources. In the Philippines, local data on the impact of cardiac intensivists remain limited. Evaluating its effect in a local, resource-constrained context is essential to inform clinical and policy decisions.
Objectives. To determine the impact of integrating a cardiac intensivist on postoperative outcomes of CABG patients at Southern Philippines Medical Center (SPMC)—Heart Institute from 2014 to 2024. Specifically, it examines patient profiles and compares outcomes: mortality, ICU and hospital length of stay, mechanical ventilation time, blood transfusion volume, ICU readmission and complications—before and after the integration of a cardiac intensivist.
Methods. This retrospective cohort study analyzed CABG patients at SPMC-Heart Institute over two periods: pre-integration (July 2014 – June 2019, n = 150) and post-integration (July 2019 – June 2024, n = 118) with a cardiac intensivist. Primary outcomes were mortality, ICU length of stay, blood transfusion volume and mechanical ventilation duration. Secondary outcomes included postoperative hospital stay, ICU readmission, and complications. Statistical analysis was conducted using Mann–Whitney U and Chi-square tests.
Results. The post-integration group showed significant reductions in SICU stay (3.8 vs. 5.6 days, 95% CI: 3.33 – 4.27 vs. 4.73 – 6.47; p = 0.013), mechanical ventilation duration (9.2 vs. 29.0 h, 95% CI: 7.46 – 11.0 vs. 20.7 – 37.3; p = 0.008), and blood transfusion volume (2.3 vs 4.7 units, 95% CI: 1.68 – 2.92 vs. 3.76 – 5.64; p = 0.04). In-hospital mortality (3.4% vs. 8.7%; p = 0.125), postoperative hospital stay (11 vs. 14 days; p = 0.187), SICU readmissions (3.4% vs. 8.2%; p = 0.378), and complications, including AKI requiring dialysis (5.9% vs. 13.3%; p = 0.153) showed non-significant reductions.
Conclusions. The integration of a cardiac intensivist into CABG management significantly reduced ICU stay, ventilation duration, and transfusion needs. Although reductions in mortality and complications were not statistically significant, the trend suggests potential benefits. These outcomes are consistent with those reported in high-income

countries and underscore the value of cardiac intensivist involvement, particularly in resource-limited settings. Further multicenter studies in the Philippines are recommended to validate these results and evaluate long-term outcomes.



Data collection procedure based on inclusion and exclusion criteria

Table 3 Post-operative outcomes

Post-operative Outcomes[a]	Overall		Control		Intervention		P-value	Odds ratio	
Mortality (Yes)									
Recovery room	2	(0.7)	1	(0.7)	1	(0.8)			
SICU	5	(1.9)	2	(1.3)	3	(2.5)	0.797	1.346	(1.556)
in hospital	17	(6.3)	13	(8.7)	4	(3.4)	0.125	0.363	(0.240)
ICU stay (days)	4.8	(4.5)	5.6	(5.4)	3.8	(2.6)	0.013		
Recovery room	1.1	(0.8)	1.3	(1)	0.8	(0.4)	0.000		
SICU	3.7	(4.2)	4.2	(5.1)	3	(2.4)	0.101		
Post-operative hospital day (days)	13	(8.9)	14	(10.7)	11	(5.8)	0.187		
Mechanical ventilation (hours)	20	(39.7)	29	(50.8)	9.2	(9.7)	0.000		
Blood transfusion (number)	3.6	(5)	4.7	(5.8)	2.3	(3.4)	0.001		
SICU readmission (Yes)	31	(11.6)	22	(8.2)	9	(3.4)	0.378	0.672	(0.303)
Post-operative complications (exist)									
Atrial Fibrillation	61	(22.8)	38	(25.3)	23	(19.5)	0.0929	0.573	(0.190)
Pneumonia	111	(41.4)	64	(42.7)	47	(39.8)	0.367	0.779	(0.216)
Stroke	3	(1.1)	3	(2)	0	(0)			
Acute Kidney Injury	72	(26.9)	45	(30)	27	(22.9)	0.400	0.757	(0.251)
Acute Kidney Injury needing dialysis	27	(10.1)	20	(13.3)	7	(5.9)	0.153	0.476	(0.248)
Postoperative bleeding	29	(10.8)	19	(12.7)	10	(8.5)	0.148	0.499	(0.240)
Pleural effusion	35	(13.1)	21	(14)	14	(11.9)	0.509	0.766	(0.309)
N	268		150		118				

[a]Continuous variables are presented as mean (sd) while categorical variables are presented as frequency (percentage)
[b]Standard errors in parenthesis

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g, SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

Primary and secondary outcomes.

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10 none

Topic: Perioperative care

000574

Real-time gastric reactance monitoring versus intermittent lactate in high-risk cardiac surgery

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000574***.

Introduction. Patients undergoing high-risk cardiac surgery with cardiopulmonary bypass (CPB) are particularly susceptible to significant perioperative complications. Serum lactate (LCT), the conventional biomarker for tissue hypoperfusion, is limited by its delayed response. In contrast, gastric reactance (XL), derived from continuous gastric impedance monitoring, is a minimally invasive, real-time metric that captures early and patient-specific indicators of splanchnic ischemia.

Objectives. To compare the performance of XL and LCT as indicators of tissue hypoperfusion in high-risk cardiac surgery patients, focusing on perioperative events (pre-CPB, during CPB, post-CPB, first 4 h postoperatively).
Methods. This prospective observational study enrolled adult patients classified as high-risk based on any of the following criteria: Society of Thoracic Surgeons (STS) score ≥ 6%, EuroSCORE II ≥ 6%, left ventricular ejection fraction (LVEF) < 45%, tricuspid annular plane systolic excursion (TAPSE) < 17 mm, or lateral tricuspid annular systolic velocity < 0.1 m/s measured via tissue Doppler imaging. All patients underwent elective cardiac surgery—either valve replacement, coronary artery bypass grafting (CABG), or combined procedures—using CPB.
XL was continuously recorded using a feeding tube embedded with impedance sensors. Serum lactate (LCT) was measured at perioperative events. Postoperative complications—defined as excessive bleeding, cardiogenic shock, or vasoplegic syndrome—were used as clinical endpoints. The minimum value of XL (XL_Min) and the maximum LCT level (LCT_Max) per event were analyzed using receiver operating characteristic (ROC) curves.
Results. Among the 37 patients enrolled in the study, the 72-h mortality rate was 11% (4/37), while the 30-day mortality rate reached 30% (11/37). Major perioperative complications occurred in 62% of the cohort (23/37). During the Post-CPB event (see Table 1 and Fig. 1), XL_Min demonstrated the strongest predictive performance (AUC = 0.73, 95% CI [0.56, 0.89]; positive predictive value [PPV] = 0.88, 95% CI [0.80, 1.00]; negative predictive value [NPV] = 0.60, 95% CI [0.48, 0.79]), followed by the maximum lactate concentration (LCT_Max), which also showed notable performance (AUC = 0.65, 95% CI [0.46, 0.83]; PPV = 0.78, 95% CI [0.69, 1.00]; NPV = 0.53, 95% CI [0.43, 0.83]).
Conclusions. XL_Min outperformed LCT_Max in predicting major perioperative complications in this cohort of high-risk cardiac surgery patients. XL provided earlier and more patient-specific indications of tissue hypoperfusion, with higher predictive accuracy than LCT_Max. These findings support the potential role of XL as a real-time, noninvasive biomarker for guiding hemodynamic management and improving perioperative monitoring in this vulnerable population.

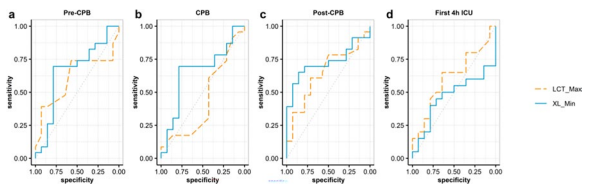


Fig 2 (abstract 000574) ROC curves comparison between Minimum XL (XL_Min) and maximum Lactate (LCT_Max) during **(a)** pre-CPB, **(b)** CPB, **(c)** post-CPB, and **(d)** first 4h in Intensive Care Unit (ICU). Cardiac pulmonary bypass (CPB).

Table 1 ROC curves analysis per event and variable

Event	Measurement	ROC curve area (CI 95%)	Cut-off point	Sensitivity (CI 95%)	Specificity (CI 95%)	PPV (CI 95%)	NPV (CI 95%)
Intraoperative							
Pre-CPB	XL_Min (-jΩ)	0.66 (0.46, 0.85)	15.78	0.70 (0.52,0.91)	0.79 (0.43,1)	0.84 (0.7,1)	0.61 (0.48,0.86)
Pre-CPB	LCT_Max (mmol/L)	0.61 (0.42, 0.80)	1.65	0.39 (0.26,0.91)	0.93 (0.5,1)	0.9 (0.69,1)	0.48 (0.42,0.79)
CPB	XL_Min (-jΩ)	0.66 (0.46, 0.85)	14.86	0.70 (0.48,0.91)	0.79 (0.50,1)	0.84 (0.7,1)	0.61 (0.47,0.83)
CPB	LCT_Max (mmol/L)	0.45 (0.24, 0.65)	6.65	0.09 (0.04,1)	1.0 (0.07,1)	1.0 (0.64,1)	0.40 (0.39,1)
Post-CPB	XL_Min (-jΩ)	0.73 (0.56, 0.89)	16.9	0.65 (0.39,0.87)	0.86 (0.71,1)	0.88 (0.8,1)	0.6 (0.48,0.79)
Post-CPB	LCT_Max (mmol/L)	0.65 (0.46, 0.83)	3.25	0.61 (0.26,0.91)	0.71 (0.43,1)	0.78 (0.69,1)	0.53 (0.43,0.83)
Postoperative							
First 4h in the ICU	XL_Min (-jΩ)	0.47 (0.27, 0.67)	22.32	0.4 (0.05,0.75)	0.79 (0.5,1)	0.73 (0.61,1)	0.48 (0.42,0.65)
First 4h in the ICU	LCT_Max (mmol/L)	0.61 (0.41, 0.80)	3.65	0.65 (0.15,0.95)	0.64 (0.36,1)	0.72 (0.65,1)	0.56 (0.45,0.88)

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g*, *SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

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Topic: Cardiovascular issues in ICU

000576

Application of loading dose warfarin in pregnant women with pulmonary embolism—a prospective, randomized, double-blind trial

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000576***.

Introduction. Warfarin is the preferred oral anticoagulant for pulmonary embolism in pregnant women. A number of factors could influence the therapeutic dose of warfarin and there is individual variability, making it challenging to determine the appropriate initial and maintenance dose. Warfarin is usually used in a fixed loading dose regimen, which may increase the risk of bleeding or prolong the time to reach standard dose. Pharmacogenomic studies have shown that genotype-based pharmacogenetic models can accurately and effectively guide individual loading dosages, which could significantly reducing the risk of excessive anticoagulation.
Objectives. The aim of the study is to compare the efficacy and safety of loading dose versus maintenance dose of warfarin therapy in pregnant women with pulmonary embolism (PE) under the guidance of clinical pharmacogenetic information.
Methods. A total of 64 pregnant women with PE were recruited from September 2023 to August 2024. The patients were randomly divided into the experimental group and the control group using a random-number table according to the ratio of 1:1. Patients in the experimental group (pharmacogenetic-guided loading dose group) received a regimen combining the initial 1 to 3 days loading dose with the International Warfarin Pharmacogenetics Consortium (IWPC) dose prediction model. Patients in the control group (pharmacogenetic-guided maintenance dose group) only received a regimen guided by the IWPC dose prediction model for the initial 1 to 3 days. Starting from day 4,

the warfarin dose was adjusted according to the international normalized ratio (INR). The primary outcome was first time to therapeutic INR (2.0–3.0) in pregnant women with PE.
Results. The study found that the median time to first reach the therapeutic INR was 5.5 days in the experimental group compared to 7 days in the control group (p = 0.002). The median time within therapeutic range (TTR) was 97.24% in the experimental group compared to 95.50% in the control group (p = 0.001). The difference in adverse events showed no statistical significance between the two groups (P > 0.05).
Conclusions. Pharmacogenetics-guided loading dose to initiate warfarin therapy was superior to pharmacogenetic-guided maintenance dose. And there appears to be no increased risk of drug-related bleeding. The study could provide ideas for the precise treatment of warfarin in pregnant women with PE.

Reference

1 The authors thank the study volunteers and the study staff for their participation. We also thank the assistance of Obstetrics and Gynaecology teams.

Topic: Pharmacology and Toxicology/Poisoning

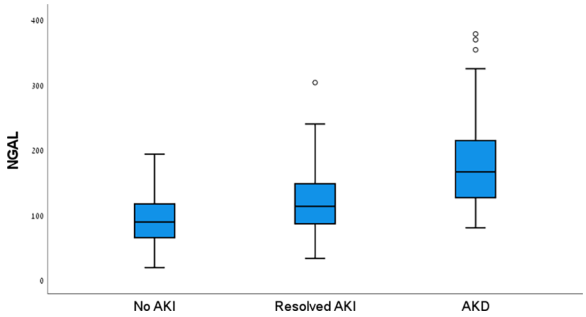
000577

Neutrophil gelatinase-associated lipocalin (NGAL) for the assessment of persistent renal dysfunction after acute kidney injury

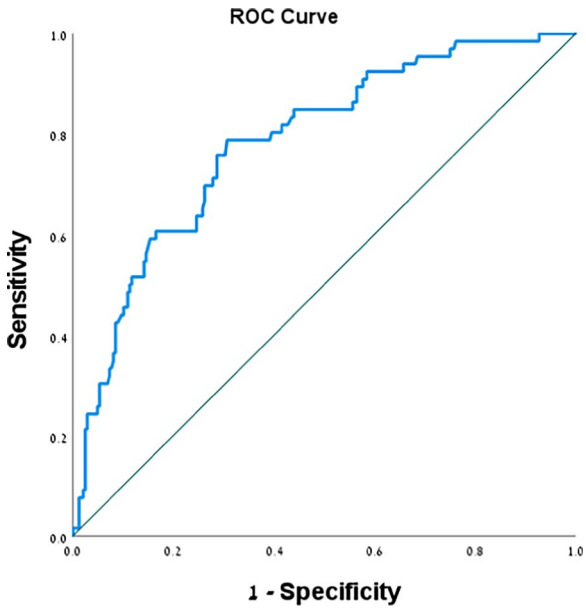
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Introduction. Renal injury is a significant complication in ST-segment elevation myocardial infarction (STEMI) and is associated with poor outcomes. The recently introduced term acute kidney disease (AKD) describes persistent renal dysfunction lasting 7–90 days post-acute kidney injury (AKI). Neutrophil gelatinase-associated lipocalin (NGAL), a biomarker for tubular injury, has shown promise in predicting AKI.

Objectives. The study aimed to evaluate NGAL's diagnostic utility for predicting AKD in STEMI patients.
Intensive Care Medicine Experimental, 2025;13(1): 000577.
Methods. This prospective observational study included 312 patients admitted with STEMI. NGAL levels were measured within 2 h of admission. AKI and AKD were defined using KDIGO criteria, and patients with chronic inflammation or end-stage renal disease were excluded. Receiver operating characteristic (ROC) analysis was performed to evaluate NGAL's predictive value for AKD and its optimal value for prediction.
Results. Overall, 64 patients developed AKI (21%), with 30 (47%) progressing to AKD. Patients with AKD had higher admission NGAL levels (median 165 ng/ml) compared to those with resolved AKI (112 ng/ml) or no AKI (88 ng/ml, p < 0.001,Fig. 1). NGAL had a good predictive ability for AKD (area under the ROC of 0.784), with a threshold of > 150 ng/ml having 65% sensitivity and 77% specificity for correct prediction (Fig. 2). Multivariate analysis confirmed NGAL > 150 ng/ml as an independent predictor of AKD (OR 6.42, 95% CI 3.15–13.09, p < 0.001).
Conclusions. Elevated NGAL levels are independently associated with AKD development in STEMI patients. These findings suggest NGAL could be a valuable biomarker for early risk stratification, supporting timely interventions to mitigate persistent renal injury. Further research is warranted to confirm its clinical utility.



NGAL levels in patients with no AKI, resolved AKI and AKD



ROC curve for NGAL AKD assessment

Topic: Acute Kidney Injury and haemofiltration

000578

Association between permissive azotemia and prognostic outcomes in sepsis-associated acute kidney injury: development of a blood urea nitrogen trajectory model

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000578***.

Introduction. Sepsis-associated acute kidney injury (SA-AKI) constitutes a critical complication in ICU populations, independently linked to progressive chronic kidney disease and mortality. While preclinical models suggest renal protective effects of permissive azotemia[1], clinical translation remains unvalidated. This study aims to explore the clinical potential protective effects and feasibility of permissive azotemia.
Objectives. To characterize blood urea nitrogen (BUN) trajectory patterns and evaluate their clinical correlations with renal recovery and mortality in SA-AKI patients, thereby investigating the clinical feasibility of permissive azotemia strategies.
Methods. This retrospective cohort study utilized the Medical Information Mart for Intensive Care IV (MIMIC-IV) database to identify SA-AKI patients meeting KDIGO and Sepsis-3 criteria. Group-based

trajectory modeling was applied to delineate BUN evolution patterns in patients receiving renal replacement therapy (RRT patients) and not receiving RRT (non-RRT patients) [2]. Our primary outcome was 7-day renal function recovery. Secondary outcomes were ICU mortality, 28-day mortality and 90-day mortality. We used multivariable logistic regression and Cox proportional hazards models to assess associations between trajectory classes and clinical outcomes.

Results. Four distinct trajectory classes emerged in both RRT (n = 683) and non-RRT (n = 4,370) cohorts (Fig. 1). In RRT patients: Class 1 (rapidly declining high BUN, 28.4%) demonstrated reference outcomes; Class 2 (persistent mild azotemia, 17.9%) and Class 3 (persistent moderate azotemia, 35.7%) showed superior early renal recovery (OR 1.88 [1.02–3.49] and 1.74 [1.04–2.92], respectively) with comparable mortality; Class 4 (persistent severe azotemia, 18.0%) exhibited elevated 28-day (HR 1.66 [1.02–2.69]) and 90-day mortality (HR 1.65 [1.06–2.56]). Non-RRT patients maintaining normal/mild azotemia (Classes 1–3) demonstrated optimal outcomes, while Class 4 (moderate azotemia, 18.5%) showed increased ICU mortality (OR 2.25 [1.43–1.81]) and 28-day mortality risk (OR 1.59 [1.09–2.34]).

Conclusions. This trajectory analysis reveals four BUN evolution patterns with differential prognostic implications in SA-AKI. Moderate azotemia maintenance in RRT patients correlated with enhanced renal recovery (adjusted OR 1.74) without mortality penalty, whereas severe azotemia conferred mortality risks despite potential recovery benefits. Non-RRT patients exhibited optimal outcomes with physiological-to-mild BUN levels. These findings suggest tailored RRT management based on azotemia strategies may optimize SA-AKI outcomes.

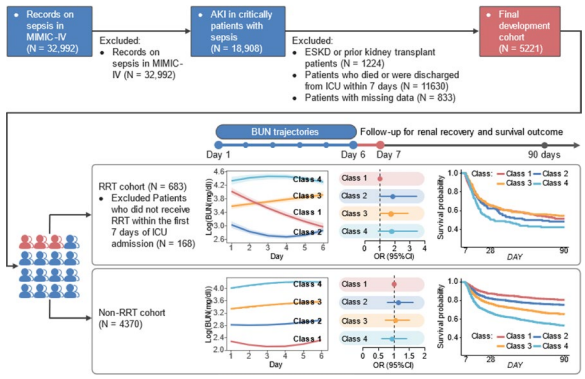


Fig 1 (abstract 000578) BUN trajectories associated with renal recovery and survival outcomes in SA-AKI patients

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3 National Natural Science Foundation of China (82,302,411)

Topic: Acute Kidney Injury and haemofiltration

000579

Use of machine learning techniques to explore if linezolide is associated with more frequent thrombocytopenia in septic patients admitted in adult intensive care units.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000579***.

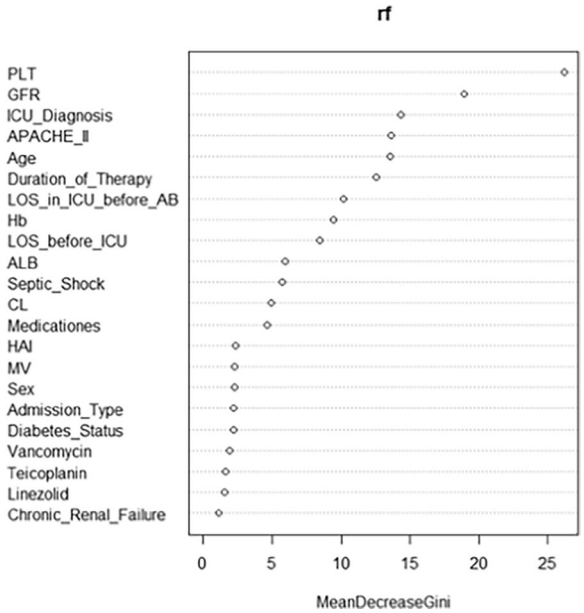
Introduction. Artificial intelligence techniques such as machine learning and deep learning are widely used in healthcare for predicting diseases and identifying risk factors. Thrombocytopenia is the most prevalent coagulation disorder in ICU patients.

Objectives. This study aims to employ machine learning techniques to identify if linezolide, compared to vancomycin or teicoplanin, is associated with higher frequency of thrombocytopenia in septic patients when initiating empirical antibiotic therapy.

Methods. We conducted a retrospective study on all patients admitted to the five medical and surgical ICUs in a large tertiary teaching hospital between 2018 and 2024. Every patient with equal or more than 18-year old, and thrombocytopenia at least five days after start of intravenous linezoide, vancomycin or teicoplanin was included. Twenty one clinical and laboratory risk factors were evaluated for predicting thrombocytopenia according to the previous studies and an expert panel. Different prediction algorithms, including Logistic Regression, Gradient Boosting, and Random Forest algorithms, were developed based on the supposed risk factors. The algorithm's performance was evaluated using accuracy, precision, recall, F1-score, and support metrics.

Results. The total number of patients admitted during the study period was 18,752, from which 872 patients received one of the target medications. Eligible patients during the study period were 512, whereas 186 patients experienced thrombocytopenia. Random Forest model performed best in identifying the effective factors, with an accuracy of 81.6%, a sensitivity of 72.7%, and a specificity of 79.8%. Key predictors included ICU admission platelet count, glomerular filtration rate at the time of start of the antibiotics, ICU diagnosis, APACHE II, duration of antibiotic therapy, age, length of stay in ICU before start of antibiotics, hemoglobin level at the ICU admission, septic shock and length of stay before ICU in hospital (Fig. 1).

Conclusions. In comparison to vancomycin and teicoplanin, linezolide is not associated with more frequent thrombocytopenia in septic ICU patients. Platelet count at the time of ICU admission and kidney function at the time of sepsis are more important determinant of risk of thrombocytopenia in these patients.



Risk factors for thrombocytopenia in septic ICU patients after receiving linezolide, vancomycin or teicoplanin.

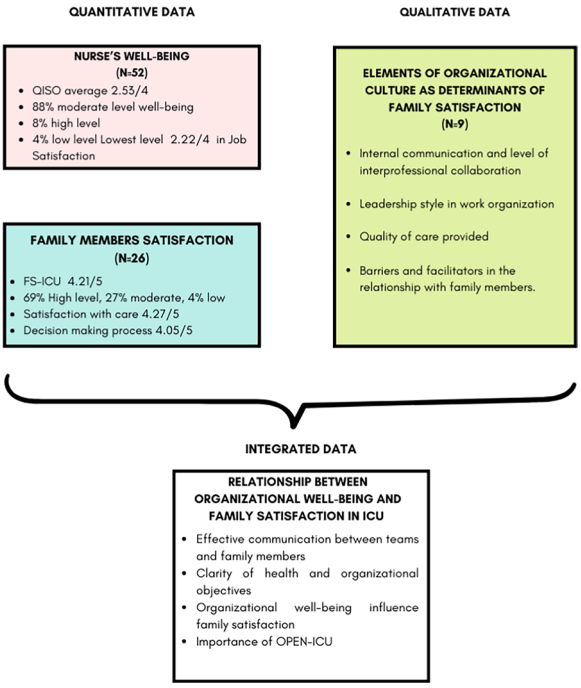
Topic: Transfusion and haemostasis disorders

000582

The impact of ICU nurses' well-being on family satisfaction: preliminary results from a mixed-methods study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000582***.

Introduction. The well-being of ICU nurses is crucial, particularly given high burnout and turnover rates. While their exposure to ethical and existential challenges remains understudied, family satisfaction is a key quality measure in healthcare. The relationship between these two phenomena has yet to be explored.
Objectives. To investigate the relationship between ICU nurses' well-being and family satisfaction.
Methods. We employed a mixed-methods convergent parallel design, following the Good Reporting of A Mixed Methods Study (GRAMMS) guideline. Nurses' well-being was assessed using the brief form of the Nursing Questionnaire of Organizational Health (QISO), covering workplace comfort, stress, safety, work tolerability, openness to innovation, and psychophysical distress. Family satisfaction was measured using the Family Satisfaction-ICU (FS-ICU) tool, which evaluates satisfaction with care (16 items) and decision making (10 items) on a 5-point Likert scale. Participants included ICU nurses with $\geq$ 1 year of experience and family members of patients hospitalized for $\geq$ 72 h in four hospitals in northeast Italy. A focus group comprising ICU nurses, physicians, and nurse assistants explored perceptions, which were thematically analyzed using Atlas®. The study was approved by the Territorial Ethics Committee of the Central-Eastern Veneto Area (CET) with the approval code CET-ACEV: 6024/U6/24.
Results. The study included 52 nurses and 26 family members. The average QISO score was 2.53 out of 4, while the total FS-ICU average was 4.21 out of 5. Among nurses, 88% (n = 46) reported moderate well-being, 8% (n = 4) high well-being, and 4% (n = 2) low well-being. The lowest mean value of perceived well-being (2.22 out of 4) was related to job satisfaction. For family members, 69% (n = 18) reported high satisfaction, 27% (n = 7) moderate satisfaction, and 4% (n = 1) low satisfaction. Average scores were 4.27/5 for care received and 4.05/5 for the decision-making process. Qualitative analysis revealed the theme "Elements of organizational culture as determinants of family satisfaction", with four categories identified: internal communication and level of interprofessional collaboration, leadership style in work organization, quality of care provided, and barriers and facilitators in the relationship with family members. The integrated results reveal how effective communication between teams and family members, along with clear health and organizational objectives, enhances nurses' organizational well-being, which in turn impacts family satisfaction in the ICU (Fig. 1).
Conclusions. This study highlights the significant link between ICU nurses' well-being and family satisfaction, emphasizing the importance of prioritizing staff well-being to improve overall ICU outcomes.



Joint display

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Topic: Nursing care and physiotherapy

000583

Active and passive respiratory mechanics during weaning of mechanical ventilation

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000583***.

Introduction. Active respiratory mechanics (Ea, elastance, Ra, resistance) has not been measured during weaning of mechanically ventilated patients. They relationship with passive values (Ep,Rp) its related with the reserve available of load compensation.
Objectives. Our objective is to analyze these variables during a spontaneous breathing test (SBT).
Methods. In a multidisciplinary ICU, ventilated patients at least for 48 h, ready to weaning were studied. Airways pressure and flow were recorded, Ep and Rp were obtained on volume assist–control with constant flow. Active measurement (Ea, Ra) with the ventilator on pressure support ventilation without assistance (PS0PEEP0), were calculated

with occlusion pressure (Pocc) after an expiratory pause and the preceding inspiratory volume and flow.
Results. Forty-five patients were studied, after 8 ± 12 days on mechanical ventilation for different reason. Thirty-five patients were successful extubated, during SBT changed inspiratory flow and respiratory rate 0,58 ± 0,15 vs 0,80 ± 0,17 l/s (p < 0,001) and 21 ± 5 vs 19 ± 3 bpm (p = 0,02).
Active elastance was 50 ± 33% higher than passive elastance [40 ± 13 (15–85) vs 23 ± 9 cmH2O/l (p < 0,001)] and were related with respiratory effort (Pocc) r:0,5 (p < 0,001). The active resistance mean was 9 ± 4 vs 16 ± 6 cmH2O/l·s-1 (p < 0,001), 52 ± 41% lower than Rp. Did not relate with different inspiratory flow -0,1 (p = 0,3), and the correlation with Pocc was 0,3 (p = 0,02).
In 39 patients with 2–3 valid registers, Ea showed a variability of 36 ± 36% (1–161%). This was not related with the mean active elastance or respiratory effort. The Ra variability was 66 ± 40%, related with the resistance mean value r:-0,4 (p = 0,005) and did not relate with active elastance variability.
The weaning outcome (f, failure vs s, success) were not related with the respiratory mechanics measured in passive or active condition (Ep,f 23 ± 9 vs 23 ± 9; Rp,f 13 ± 5 vs 17 ± 6; Ea,f 42 ± 18 vs 39 ± 12.; Ra,f 9 ± 6 vs Ra,s 9 ± 4). The degree of change from passive to active, was not related with the weaning evolution.
Conclusions. Active respiratory mechanics can be measured during weaning of ventilated patients. These values are significantly influenced by respiratory muscle activity. In the group of patients studied, results showed too high variability and we couldnot evaluate the meaning in the weaning outcome.

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Topic: Acute respiratory failure and mechanical ventilation

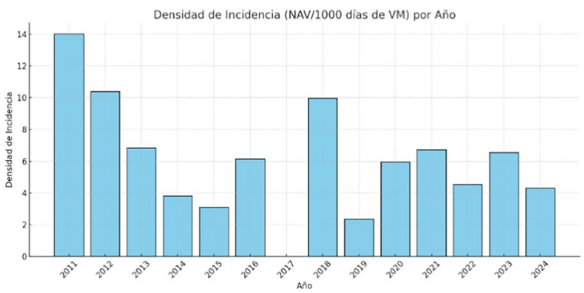
000584

Descriptive analysis of ventilation-associated pneumonia (VAP) in our intensive care unit (ICU). Role of oropharyngeal decontamination (OPD) and selective digestive decontamination (SDD) program in improving our tasas.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000584***.

Introduction. Ventilator-Associated Pneumonia (VAP) is defined as an infection of the lung parenchyma that occurs in patients undergoing invasive mechanical ventilation (IMV) and therefore requires tracheal intubation (a risk factor) for a period of more than 48 h. It is one of the main infections associated with healthcare, with high associated morbidity and mortality, as well as an increase in ICU length of stay and costs. The Pneumonia Zero project was launched in 2011 and will be updated in 2022, adding new measures to the package of recommendations. These measures include selective digestive and oropharyngeal decontamination, which we include in our ICU (Annex 1). The goal was to reduce the national average incidence of VAP to fewer than 7 episodes per 1,000 days of mechanical ventilation.
Objectives. To describe the evolution of VAP rates since the implementation of the package of preventive measures, considering the adaptation we did in 2022 with the incorporation of OPD and SDD, search and elimination of reservoirs and "waterless ICUs".
Methods. Patients admitted to our ICU since 2011 to 2024 during the annual ENVIN cut. Only included patients admitted for more than 24 h. Between 18 and 22 UCI beds. Followed until ICU's discharge. Statistical parameter: incidence density (ID) VAP episodes/1000 days of mechanical ventilation days. Data from National Nosocomial Infections Surveillance (ENVIN).
Results. The incidence rate has clearly decreased since the implementation of the package of measures in 2011, when the DI was 14,02. We observed a clear and immediate improvement in subsequent years. In 2017, data were not collected due to a hospital merger between the two hospitals in Granada, and in 2018, we suffered the consequences of the lack of adherence to the Pneumonia Zero protocol we had previously implemented in our unit. In 2019, normality began to return, and in 2022, the measures described above were added. Since then, our VAP rates have remained controlled and below the proposed national target (Annex 2).
Conclusions. It is clear that preventive measures to prevent VAP applied to our patients have a positive effect on controlling the number of patients suffering from this healthcare-associated infection. In this sense, they are also capable of reducing mortality, as well as hospital stays and costs. For all these reasons, we must continue along these lines.



Annex 2 (abstract 000584) Incidende density

Annex 1: Mandatory preventive measures

1	Proper training and education in airway management
2	Strict hand hygiene before handling the airway
3	Oral hygiene using chlorhexidine (0.12%–0.2%)
4	Control and maintenance of cuff pressure (> 20 cm H_2O)
5	Avoid, whenever possible, the supine position at 0°
6	Promote procedures that safely reduce the need for or duration of intubation
7	Avoid scheduled changes of tubing, humidifiers, and tracheal tubes
8	Continuous aspiration of subglottic secretions
9	Selective digestive decontamination (complete or oropharyngeal)
10	Systemic antibiotics (two days) during intubation in patients with decreased level of consciousness

Annex 1 (abstract 000584) Mandatory preventive measures

Topic: Infections and prevention

000585

Towards silent ICUs and smart alarms—requirement engineering for the interaction with SDC networks

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000585***.

Introduction. The new IEEE 11073 Service-oriented Device Connectivity (SDC) standard family [1,2] enables the wireless connection and interoperability of medical devices in the ICU and the harmonization of multimodal data, including high-frequency data, alarms and medication. The implementation of the standard by the medical-device industry puts the long-awaited silent ICU patient room within reach [3]. With data transfer and remote device control available by SDC in real time and across devices from different manufacturers, the seamless inclusion of data-driven algorithms into the ICU environment is feasible [1,4], e.g., clinical decision support systems, high level smart alarms or alarm profile recommendations. To achieve this integration and leverage SDC to improve patient care, the interaction of non-SDC devices, IT systems and stakeholders with the SDC network needs to satisfy a multitude of requirements. What are they and are they included in the SDC standard?
Objectives. To elicit, analyze, plan, and check the requirements of external communication and interaction with an SDC network of medical devices.
Methods. Requirement engineering was performed according to best practice guidelines [5] by one data scientist and two physicians with research experience in medical informatics employing Natural language, Unified Modelling Language and Informal modelling. As requirement dimensions Function, Quality, Scenarios, Stakeholders and Structure of external communication and interaction with the SDC network were considered [5]. Requirements were developed in three steps: 1) requirements elicitation by introspection and archeology; 2) requirement analysis and planning by domain-driven development, informal modelling and vision; and 3) requirements checking by peer review [5].
Results. Functional, qualitative, and structural requirements for the interaction with the SDC network are shown in Table 1. Figure 1 illustrates stakeholders and use cases, revealing real-time data processing as a central use case. As visualized in the Data Flow Model, the currently published SDC standard [1] does not address the interaction requirements, while IHE [4] defines Gateways, considers interoperability, but defines only the FHIR and HL7 v2 Gateways as bidirectional (Fig. 2). Both ignore the importance of enabling high-frequency and real-time interactions.

Table 1: (abstract 000585) Functional, qualitative and structural requirements of the connected SDC- and non-SDC-network of medical devices

Function	Quality	Structure
Patient allocation: Matching data to patients Alignment: Time synchronization of data across devices Human-readability: Data understandable by humans Machine-readability: Data usable by algorithms	Data security: Protection against unauthorized data and device access Compact data format: Data format that allows real-time high-frequency data transfer Interoperability: Seamless SDC and non-SDC device and system interaction	Bandwidth: Rate of transfer suitable for real-time high-frequency data Bidirectional communication: Allow data transfer from and to SDC network Low latency: Allow real-time data transfer

Conclusions. Most of the necessary requirements are currently not included in the SDC standard [1], and only partially included in the IHE SDC supplement [4]. Real-time, bidirectional and high-frequency data transfer is essential for meaningful interactions with the SDC network. Our results are limited by the subjectivity of requirement engineering techniques. Further research is needed to verify, expand, and prioritize the requirements by including all stakeholders; and investigate suitable data standards for the interaction with the SDC network. An improved and extended SDC standard that considers the requirements of the interaction with non-SDC devices and systems is needed to create a unified, interoperable device architecture with harmonized data and not promote more proprietary systems. Only then can SDC deliver on its promises—such as the Silent ICU or the integration of algorithms—and thereby improve patient care and patient safety.

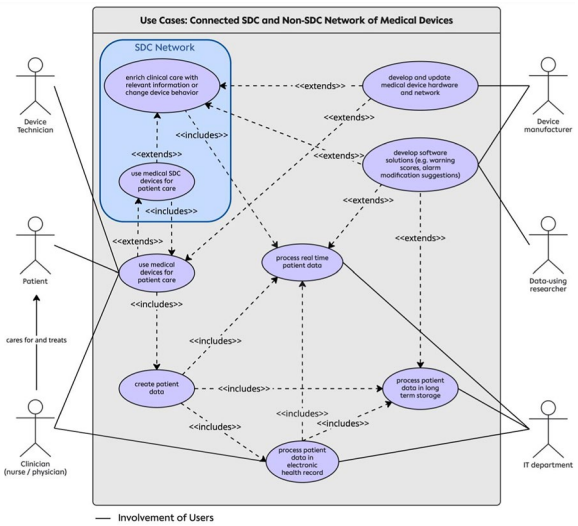


Fig 1 (abstract 000585) Scenario use cases of the connected SDC- and non-SDC-network of medical devices with stakeholders as users

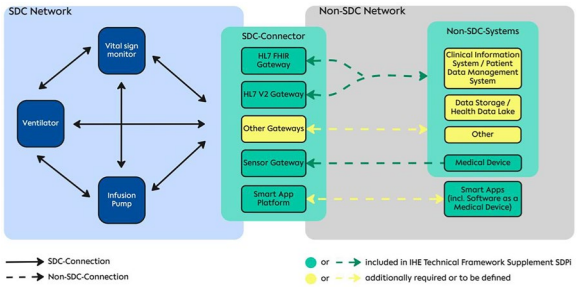


Fig 2 (abstract 000585) Data flow model of the connected SDC- [1] and non-SDC-network of medical devices including descriptions by IHE [4].

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[7] First authorship is shared between the first two authors. Last authorship is shared between the last two authors.

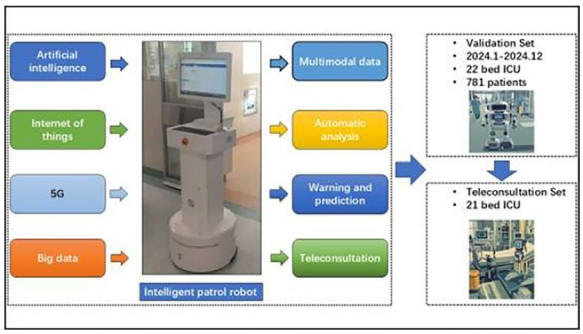
Topic: Information systems and Data Science

000586

ICU intelligent patrol robot: a pilot clinical application report

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000586.

Introduction. The development of artificial intelligence, big data and other technologies has promoted the construction opportunities of intelligent ICU. Intelligent ICU needs to be upgraded intelligently in the aspects of disease detection, prediction, auxiliary decision-making, resource allocation and telemedicine to improve the efficiency of ICU treatment.
Methods. We developed a set of ICU intelligent patrol robot, which combines with ICU intelligent system, integrates artificial intelligence, Internet of things, 5G, big data, and has the functions of real-time collection of patient multimodal data, automatic analysis, early warning and prediction, department resource management, teleconsultation. We connected the ICU intelligent patrol robot with the ICU information system, and carried out clinical operation and multi-center verification.
Results. From January 2024 to December 2024, the ICU intelligent patrol robot was initially applied in a tertiary teaching hospital with 22 beds. During this period, a total of 781 critical ill patients' real-time multimodal data (including his system information, monitor information, ventilator waveform, blood filter parameters, and patient abnormal action data) were collected, and automatic analysis, early warning prediction, and ICU management support were carried out. Moreover, the ICU Intelligent Patrol Robot was applied and validated for remote consultation in another 21-bed tertiary teaching hospital, allowing real-time transmission of multi-dimensional patient information and audio/video consultation.
Conclusions. The intelligent patrol robot in ICU has the functions of real-time collection of patient multimodal data, automatic analysis, early warning and prediction, department resource management, teleconsultation, which can effectively improve the level of ICU intelligence and treatment efficiency. ICU intelligent patrol robot is a necessary node device in the future development of intelligent ICU.



Graphical abstract

Topic: Information systems and Data Science

000587

Improving post-operative blood management in patients undergoing breast reconstructive surgery

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Intensive Care Medicine Experimental, ***2025*;13(1)**: ***000587***.

Introduction. Blood transfusions are more frequent in breast reconstruction patients compared to simple mastectomy with rates of 20–30% vs 4%, respectively. Risk factors include preoperative anaemia, intraoperative blood loss and bilateral surgery. Many surgeons aim for haemoglobin of 90 g/L and haematocrit of 0.25 due to concern for flap failure.
Stringent blood management is associated with reduced morbidity and mortality as well as cost saving. Following studies into postoperative blood management, contemporary practice favours a restrictive approach to haemoglobin targets.
Objectives. This project aimed to review current practice of postoperative blood management in patients with breast cancer undergoing mastectomy with breast reconstruction. These patients were admitted to the High Dependency Unit in a large metropolitan hospital in New South Wales, Australia.
Following a review of current practice, the unit worked with the surgical team to optimise blood transfusion rates.
Methods. This was a retrospective audit patients admitted from January 2023 to January 2025. Data were extracted from operative anaesthetic forms; clinical ward round entries; observation charts and pathology reports. A total of 40 patients were included. Measures were subsequently implemented by the critical care and surgical team to reduce blood transfusion rates.
Results. 40 patients were included in the audit with an average age of 53 years and 100% female. 60% (24/40) patients received at least 1 unit of packed red blood cells. The average number of units per transfusion was 1.72 at initial audit. The majority of patients received their first unit within 24 h of surgery. The most common transfusion threshold was 85 g/L of haemoglobin. It was noted that patients who received

transfusion received more post-operative intravenous fluid but minimal difference in perioperative fluids.
A reduction in transfusion thresholds and careful fluid prescribing resulted in a 42% reduction in blood transfusion and the average unit rate was reduced 1.0 unit per a transfused patient with no reported adverse events.
Conclusions. Breast reconstruction patients are frequently transfused following their operation with relatively high haemoglobin threshold due to concern for flap failure. Although it cannot be completely extrapolated to plastic surgery, evidence from cardiothoracic surgery have shown no inferiority in lower targets therefore this approach should be considered in this population. This audit shows that the majority of patients were transfused at thresholds between 75 and 90: restrictive transfusion practices would eliminate a large proportion of these transfusions.
Recent studies show goal-directed fluid therapy reduces length of stay and result in no increase in complications and that the use of vasopressors does not increase the risk of flap failure. This audit shows patients who are transfused, on average, receive significantly more intravenous fluids. Careful fluid prescribing, particularly in the first 24 h after surgery, is imperative to prevent unnecessary transfusion due to haemodilution.
Simple postoperative interventions can significantly reduce transfusion rates with no documented incidents of flap failure or other complications as shown in this quality improvement project.

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Topic: Perioperative care

000588

USP52 regulates STAT2 stability and potentiates IFN-I signaling: a novel target for antiviral therapy

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000588***.

Introduction. Viral infections account for over 75% of all infectious diseases worldwide, posing a critical threat in intensive care settings. In severe viral illness, dysregulation of host immune responses often leads to poor outcomes. Type I interferons (IFN-I) are central to the innate antiviral defense, initiating transcription of interferon-stimulated genes (ISGs) that restrict viral replication. However, therapeutic use of IFNs has shown limited success, partly due to incomplete understanding of the regulatory mechanisms controlling IFN-I signaling. Deubiquitinases (DUBs), enzymes that remove ubiquitin from target proteins, have emerged as important post-translational regulators of immune pathways, but many remain poorly characterized.
Objectives. To investigate the role of USP52, a deubiquitinase, in modulating IFN-I signaling and antiviral immunity through regulation of STAT2 protein stability.
Methods. PBMCs were isolated from clinically confirmed viremic patients and healthy donors. mRNA levels of USP52 were measured using RT-qPCR. USP52 was knocked down in vitro using CRISPR-Cas9. Changes in cellular viral susceptibility following the absence of USP52 were assessed using VSV-infected cells, followed by quantification of viral replication by RT-qPCR, Western blotting, and fluorescence microscopy. ifnar1 knockdown MEF cells were used to confirm IFN-I-dependence. Effects of USP52 on STAT2 protein levels, stability and interactions were assessed by co-immunoprecipitation, CHX chase assay and treatment with proteasome (MG132) or lysosomal (MA) inhibitors. The ubiquitination pattern of STAT2 was assessed to identify specific linkage types affected by USP52.
Results. USP52 expression was significantly reduced in PBMCs from infected individuals compared to healthy controls. Knockdown of USP52 resulted in increased viral replication and decreased antiviral gene expression. Notably, the antiviral effect of USP52 was lost in IFNAR1-deficient cells, confirming its dependence on the IFN-I pathway. USP52 did not enhance IFN-β production, but significantly upregulated the expression of downstream ISGs, such as ISG15 and MX1. Immunoprecipitation assays revealed a direct interaction between USP52 and STAT2. Knockdown of USP52 led to rapid STAT2 degradation, which was reversed by proteasome inhibition but not by lysosome inhibition. Ubiquitination assays showed that USP52 specifically inhibited K48-linked polyubiquitination of STAT2, thereby preventing its proteasomal degradation and prolonging its half-life.
Together, these findings demonstrate that the deubiquitinase USP52 stabilizes STAT2 protein levels by inhibiting its K48-linked polyubiquitination and proteasomal degradation, thereby maintaining the integrity of the type I interferon signaling pathway and promoting the expression of downstream ISGs, ultimately enhancing the antiviral activity of IFN-I.
Conclusions. USP52 is a critical positive regulator of IFN-I-mediated antiviral immunity. By stabilizing STAT2 through inhibition of K48-linked ubiquitination, USP52 enhances ISG expression and restricts viral replication. These findings identify USP52 as a promising therapeutic target to augment interferon responses in patients with severe viral infections. This mechanism may offer a novel strategy to overcome current limitations in IFN-based antiviral therapies, with potential relevance in the treatment of viral sepsis, emerging viral pandemics, and immunocompromised states. Future research may focus on small-molecule modulators of USP52 activity as adjuncts to existing antiviral regimens.

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Topic: Infections and prevention

000589

Use of a non-invasive EEG/ECG index to assess the inflammatory response in surgical patients

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000589***.

Introduction. Monitoring of the inflammatory state in critically ill patients is pivotal for early detection and progression of sepsis and systemic inflammatory response syndrome (SIRS) [1,2]. Sepsis, a leading cause of mortality in ICUs, necessitates timely intervention guided by accurate inflammatory assessment [3]. Perioperative inflammation, a known trigger of postoperative complications [4], highlights the demand for real-time, non-invasive monitoring tools. Current biomarkers often lack real-time capability or require invasive sampling. Heart rate variability (HRV), reflecting autonomic regulation, has emerged as a potential inflammatory indicator [5], though its specificity is confounded by anesthetic modulation [6]. At ESICM 2024, we introduced the Trending of Sepsis and Inflammation (TSI) index, a non-invasive tool integrating HRV and EEG-derived consciousness monitoring [7]. The TSI is now enhanced with sample entropy of the RR signal, a non-linear parameter capturing autonomic complexity. Non-linear HRV metrics, such as sample entropy, are increasingly recognized for characterizing dysregulated inflammatory states [8], offering improved sensitivity. This updated TSI-E aims to refine real-time perioperative inflammatory monitoring.
Objectives. To evaluate the ability of the Trending of Sepsis, Inflammation, and Entropy (TSI-E) index—a novel update integrating sample entropy of the RR signal—to assess inflammatory responses following surgical stimuli. Surgical stimuli elicit inflammation, resulting in significantly higher TSI-E values postoperatively compared to preoperative baselines. Anesthetic confounders are controlled via stable Brain Activity (BA) index measurements.
Methods. A prospective observational study, approved by the local ethics committee, enrolled 41 ASA I-II patients undergoing major abdominal or thoracic surgery at Hospital Quirón Salud Barcelona. Written informed consent was obtained from all participants. The Trending of Sepsis, Inflammation, and Entropy (TSI-E) index—an updated metric incorporating sample entropy of the RR signal, HRV parameters (RMSSD, LF/HF ratio), and the Brain Activity (BA) index (a validated consciousness index analogous to the Bispectral Index, BIS)—was recorded using the CoreSys One monitor (CoreSys Health S.L., Barcelona, Spain). Continuous 5-min data segments were analyzed pre- and post-surgical stimulus under standardized anesthesia. The statistical significant values was considered to be $p < 0.05$.
The TSI-E, developed by CoreSys Health, quantifies inflammatory status on a 0–100 scale: 0–25 (normal), 25–50 (mild inflammation), 50–75 (strong inflammation/risk of sepsis/SIRS), and 75–100 (severe inflammation/septic shock risk). Statistical analysis included Wilcoxon signed-rank tests for pre/post-comparisons and PK statistics to evaluate the behavior of the TSI-E between the pre- and post-surgical stimulus groups. Anesthetic confounders were controlled via stable BA index measurements (p = NS).
Results. Wilcoxon signed-rank tests demonstrated a significant postoperative increase in TSI-E values ($p \leq 0.0005$), supporting the hypothesis that surgical stimuli elicit inflammation. Median TSI-E rose from 12.01 (IQR: 1.04–23.35; normal range) preoperatively to 29.58 (IQR: 25.73–32.58; normal-to-mild transition) postoperatively (Fig. 1). The TSI-E's predictive accuracy, quantified by the PKjstatistic (0.8593), surpassed prior TSI iterations, reflecting enhanced sensitivity to inflammatory dynamics through the integration of sample entropy. Brain Activity (BA) index stability (ΔBA < 5%, p = NS) confirmed consistent anesthesia depth, ruling out autonomic confounders.
Conclusions. The TSI-E index demonstrated significant postoperative increases, supporting its ability to detect surgically induced inflammatory responses through the integration of sample entropy—a non-linear metric capturing autonomic complexity. With strong predictive accuracy (PKj = 0.8593) and stable Brain Activity (BA) index values (p = NS), TSI-E shows promise as a real-time, non-invasive tool for inflammatory monitoring. Future studies should validate TSI-E against gold-standard inflammatory biomarkers (e.g., IL-6, procalcitonin).

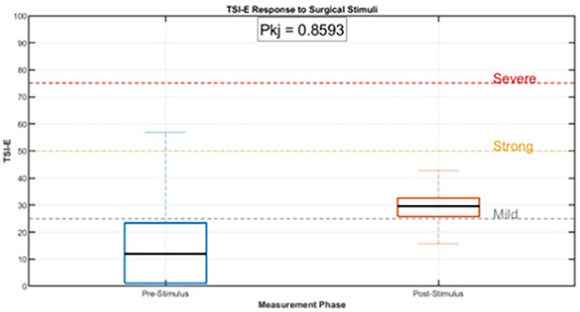


Fig 1 (abstract 000589) Boxplot comparing TSI-E scores before (pre-surgical stimulus) and after (post-surgical stimulus) surgical intervention in 41 ASA 1–2 patients. Post-stimulus TSI-E values increased significantly (median pre: 12.01 vs. post: 29.58), transitioning from normal (0–25) to mild (25–50) inflammatory ranges

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Topic: Sepsis

000591

Optimization of cefotaxime dosing in the intensive care unit: validation of pharmacokinetic models for ICU continuous infusion

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000591***.

Introduction. Cefotaxime, a widely used beta-lactam in the intensive care units (ICU), exhibits high inter-individual pharmacokinetic (PK) variability in critically ill patients due to altered physiology. Although population PK models exist for different groups, most are based on intermittent administration and have no external validation in the critical care context. Current ICU guidelines favor continuous infusion for beta-lactams, but there are no models that have been validated for the cefotaxime.
Objectives. Given this gap and the clinical importance of achieving therapeutic goals, this study evaluates the predictive performance of existing PK models for cefotaxime using external data from continuous infusion ICU patients.
Methods. In this study, adult ICU patients receiving continuous cefotaxime infusion with therapeutic drug monitoring were retrospectively analyzed. Exclusion criteria included age < 18 years, pregnancy, renal replacement therapy, or ECLS. Population PK models were selected from the literature based on their reproducibility and evaluated using external clinical data in R software, accuracy was assessed using prediction error metrics. Based on the best model, personalized dosing was calculated to achieve target concentrations of 20 or 40 mg/L based on bacterial MICs or theoretical threshold to support optimized and individualized antibiotic therapy in critically ill patients.
Results. Two population PK models for cefotaxime were externally validated in 72 ICU patients receiving continuous infusion. The models of *Urien* et al.(1) and *Swartling* et al. (2) were selected based on their applicability and availability of covariates. Both showed under-prediction of observed concentrations, with Swartling's model showing better precision (MDAPE 20%) and lower bias (MDPE -20%) than Urien's (30%, -27%). The Swartling model, derived from ICU data, enabled individualized dosing simulations to achieve target concentrations (20–40 mg/L), highlighting its utility for model-based precision dosing in critically ill patients. (Fig. 1).
Conclusions. This study demonstrates that both PK models, originally developed for intermittent administration of cefotaxime, are also applicable to continuous infusion ICU patients. The Swartling model showed a higher predictive power and greater relevance for critically ill patients. It allows for individualized dosing based on renal function and body weight. Despite a tendency to underestimate concentrations, the model provides acceptable accuracy and clinical utility. These results support the use of the model as a dosing reference and highlight the importance of therapeutic drug monitoring to optimize cefotaxime therapy, especially in severe infections and variable renal function.

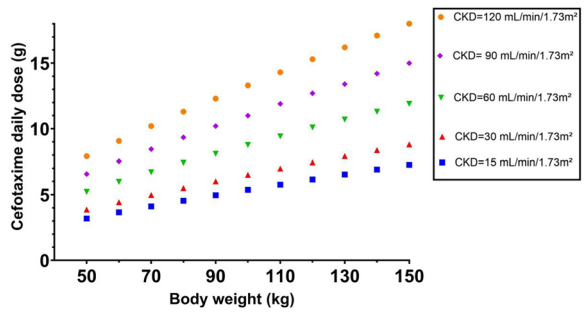


Fig 1 (abstract 000591) Cefotaxime daily dose according to CKD-epi and body weight for the theoretical threshold of 40mg/L.

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Topic: Pharmacology and Toxicology/Poisoning

000593

Prognostic and predictive value of stress hyperglycemia ratio in ARDS patients under the 2023 new global definition: a multicenter cohort study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000593***.

Introduction. The 2023 global new acute respiratory distress syndrome (ARDS) definition modifies the 2012 Berlin criteria to addresses its applicability in non-intubated patients or resource-limited settings, resulting in the greater population heterogeneity (1). There remains a critical unmet need for reliable biomarkers capable of facilitating accurate risk stratification and guiding personalized therapeutic interventions in ARDS patients under this revised definition (2).
Objectives. We aim to explore the value of stress hyperglycemia ratio (SHR) in predicting clinical outcomes and guiding personalized hypoglycemic therapy (HGT) in patients under the 2023 revised ARDS definition.
Methods. In this multicenter, retrospective cohort study, 852 ARDS patients who meet the 2023 global definition were stratified into low SHR (n = 525) and high SHR groups (n = 327). Overall survival (OS) were analyzed by Kaplan–Meier method, and prognostic factors were identified by multivariable Cox proportional hazards models. Predictive performance was evaluated via Harrell's concordance index (C-index) and area under the time-dependent receiver operating characteristic curve (AUC), comparing baseline and integrated survival models.
Results. Survival analysis demonstrated that elevated SHR levels were significantly associated with worse OS, along with higher in-hospital, 28-day, and 90-day mortality. Cytokine profiling revealed markedly increased plasma concentrations of IL-12p70, IL-6, IL-8, IL-17A, and TNF-α in high-SHR patients compared to the low-SHR group. Multivariable analysis identified SHR status as an independent predictor of OS (HR: 2.427, 95% CI: 1.578–3.733), with consistent results across both intubated (HR: 2.634, 95% CI: 1.568–4.424) and non-intubated (HR: 3.935, 95% CI: 1.836–8.437) subgroups. Incorporation of SHR status into the baseline model significantly improved its predictive accuracy for OS, increasing the C-index from 0.657 to 0.712 and AUC from 0.690 to 0.747. Among hyperglycemic ARDS patients, hypoglycemic therapy (HGT) conferred survival benefits exclusively in high-SHR cases, regardless of intubation status.
Conclusions. Elevated SHR status was independently associated with increased mortality risk in ARDS patients meeting the 2023 global definition. Notably, among hyperglycemic patients, HGT brought significant survival benefits exclusively to the high-SHR cases.

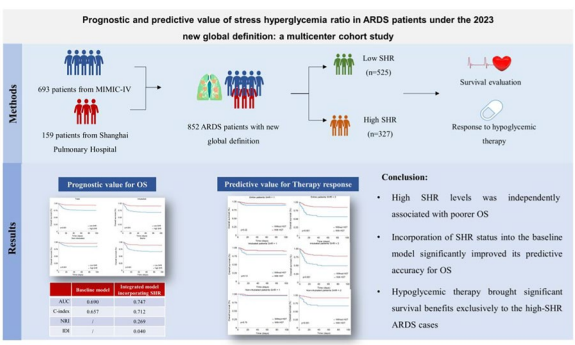


Fig 1 (abstract 000593) Graphic abstract. Abbreviation: ARDS, adult respiratory distress syndrome; OS, overall survival; SHR, stress hyperglycemia ratio; HGT, hypoglycemic therapy

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Topic: Acute respiratory failure and mechanical ventilation

000595

Impact of introducing respiratory metagenomic (RMg) sequencing with multiprofessional team interpretation and advice on antimicrobial stewardship (AMS) outcomes over adult and paediatric intensive care (ICU) areas.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000595***.

Introduction. RMg utilises rapid nanopore sequencing to identify a comprehensive respiratory pathogen profile earlier than conventional testing(1). RMg sequencing was introduced at University Hospital Southampton NHS Foundation Trust (UHS) in December 2024 as part of a UK pilot implementation project(2). To understand and deliver recommendations into clinical practice, multidisciplinary team (MDT) interpretation and advice was implemented.
Objectives. To assess the outcome of RMg sequencing combined with MDT interpretation on AMS outcomes in adult and paediatric critical care.
Methods. An MDT (healthcare scientist, microbiologist, pharmacist, virologist) reviewed RMg results twice a week to interpret, discuss and communicate findings in February and March 2025. Patients from all ICU areas (general, paediatric, cardiac, neurology) at UHS were eligible for inclusion. Patients were referred for RMg if: they were a new ICU admission for lower respiratory tract infection; or they exhibited a new deterioration in markers of respiratory function; or there were no organisms identified by conventional methods or concern that an organism had not been detected. The MDT determined implications for patient care and findings were disseminated to clinical teams by multiple routes with an immediate focus on those that were time critical. AMS decisions were stratified into pre-agreed outcomes (Table 1).
Results. Sixty-four respiratory samples from 62 patients were sequenced and discussed. The majority of samples 36/64 (56%) were from general adult ICU followed by paediatric ICU 10/64 (16%). Most samples were endotracheal aspirates 41/64 (64%), with the remainder being sputum 14/64 (22%), bronchoalveolar lavage 7/64 (11%) and pleural fluid 2/64 (3%). In 50/64 (78%) cases the MDT outcome impacted clinical care including: assurance of current treatment 35/64 (55%); change to antimicrobial prescription 8/64 (12%) and other predetermined outcomes (Table 1). Antimicrobial (AM) therapy was optimised in 15/64 (23%) of cases. Of these, in 7/64 (11%) cases the RMg sequencing identified unexpected pathogens resulting in a significant change to treatment or investigation focus.

Table 1: (abstract 000595) AMS outcomes.

AMS outcome	Number	%
Continuation of current regime (results support current plan/reassurance)	35	55
AM prescription changed based on RMg (length/backup)	8	12
AM stopped: reduction in number or all AM	4	6
AM regime changed resulting in broader spectrum AM therapy (escalation)	2	3
AM regime changed resulting in narrower spectrum AM therapy (de-escalation)	1	2
Positive outcome on clinical care—total	*50*	*78*
RMg result did not impact current treatment (inc. run failure)	14	22

Conclusions. RMg sequencing, interpretation and discussion in MDT allowed for full utilisation of RMg results in supporting AMS decisions for patient care. The scientist's role in interpreting the raw metagenomic results was vital to allow for treatment decisions to be made. In over two-thirds of cases there was reassurance of current therapy or changes to therapy made, giving confidence to the MDT review model.

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Topic: Infections and prevention

000597

Impact of the culture of preservation fluid in lung transplantation at University Hospital Gran Canaria Doctor Negrín

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000597***.

Introduction. Lung transplantation is the treatment of choice for patients in the final stage of their lung disease. Infections in this population significantly reduce their survival.
Objectives. The objective of this study is to analyze the early infection of the graft and its relationship with the infection of the preservation fluid.
Methods. This is a retrospective study that analyzes the data of 21 donors with their respective recipients from July 2023 to December 2024. Clinical data, all available cultures of preservation fluids, pretransplant donor respiratory cultures and post-operative recipient cultures in the intensive care unit were analyzed.
The lungs were kept in a bag immersed in Perfadex® preservation fluid and surrounded by ice to maintain a temperature of 4oC during cold ischemia for transport. Two samples of preservation fluid, one for each lung, were sent for culture.
All patients were treated with antibiotic treatment based on prior cultures from a known donor or recipient prior to transplantation.
Results. The prevalence of positive cultures of the preservation fluid was 98% (41/42). The frequencies of microorganisms isolated in the preservation fluid are shown in table and Fig. 1. 47.6% (20/42) of the preservation fluid samples were polymicrobial, and 15 (23%) were positive for at least one high-risk microorganism. The most common single-agent isolated microorganism were Staphylococcus epidermidis (32%) and methicillin-sensitive Staphylococcus aureus (10%), with 33% being a low-risk staphylococcus case.
Conclusions. Despite the near 100% incidence of preservation fluid infection, the rate of related pneumonia is 0. Since almost all the fluids

were contaminated, we cannot clarify the debate about whether the infection of the preservation fluid is related to increased mortality or morbidity in the lung transplant patient.

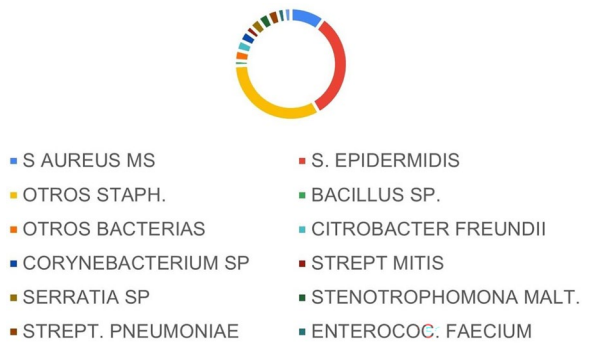


Fig 1 (abstract 000597)

Topic: Brain death, organ donation and transplantation

000599

Exhaled air temperature as a non-invasive marker of respiratory pattern in healthy volunteers

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000599***.

Introduction. In acute respiratory failure (ARF), both oxygenation and ventilation are typically impaired. Oxygenation is non-invasively monitored using pulse oximetry, while respiratory rate (RR) measurement outside the ICU is typically performed intermittently and manually by nursing staff. In non-intubated patients, tidal volume and inspiratory/expiratory times cannot be continuously monitored without interfering with natural breathing.
Temperature fluctuations within a Venturi mask may be used to detect respiratory phases, enabling continuous RR monitoring in patients receiving oxygen therapy. These signals could also serve as surrogates for tidal volume and the inspiratory-to-expiratory (I:E) ratio. We hypothesize that introducing external airflow to the mask will attenuate the tidal volume signal while preserving RR and timing information.
Objectives. To assess the correlation between temperature signals inside a Venturi mask and respiratory pattern parameters (RP) in healthy volunteers (HV) and to evaluate how these signals behave under various oxygen flow conditions.
Methods. This observational study was conducted with HV positioned supine, with an up tilt 30°. Simultaneous recordings included:
Temperature signals from four SC50 thermistors embedded in a Venturi mask.
Thoracic and abdominal plethysmography signals.
A previous study using a pneumotachograph and an airtight mask in HV demonstrated strong correlations ($r > 0.9$) for RR, timing, and volume parameters (Fig. 1).Each HV underwent a 3-min baseline recording followed by recordings during six different breathing patterns (mouth/nose breathing, shallow/deep respiration) under oxygen flow rates from 0 to 15 L/min, as well as under high-flow nasal cannula (HFNC) at 50 and 60 L/min.
Advanced signal processing techniques were applied to extract respiratory parameters (Fig. 2). Signals from upper and lower thermistors were combined and compared with the summed thoracic and abdominal plethysmography data. Linear cross-correlations (r) were computed for RR, I:E ratio, and volume surrogates, expressed as mean ± standard deviation (SD).
Results. Across all recordings, temperature signals showed strong correlations with plethysmography: RR ($r = 0.98 \pm 0.01$), inspiratory time/total time ($r = 0.88 \pm 0.07$), expiratory area ($r = 0.80 \pm 0.09$), and amplitude–volume surrogate ($r = 0.69 \pm 0.13$). When rapid shallow breathing was simulated, the patterns led to a reduced correlation, particularly with added external flows of 8 and 12 L/min. HFNC at 50 L/min maintained significant correlations ($p < 0.05$) for RR (0.65 ± 0.19), inspiratory to total time (0.65 ± 0.16), and volume/amplitude measures (0.69 ± 0.21).
Conclusions. Temperature signals from within a Venturi mask reliably reflect breathing pattern in healthy volunteers, showing high concordance with plethysmographic data supporting the feasibility of non-invasive respiratory monitoring during oxygen therapy. The system's behavior needs to be improved to ensure better performance with the addition of external flows.

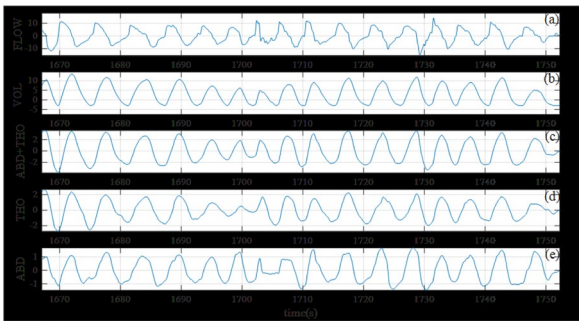


Fig 1 (abstract 000599) (a) flow signal, (b) flow-derived volume signal, (c) volume signal derived from the sum of volumes (d) and (e), (d) chest band volume signal, (e) abdominal band volume signal.

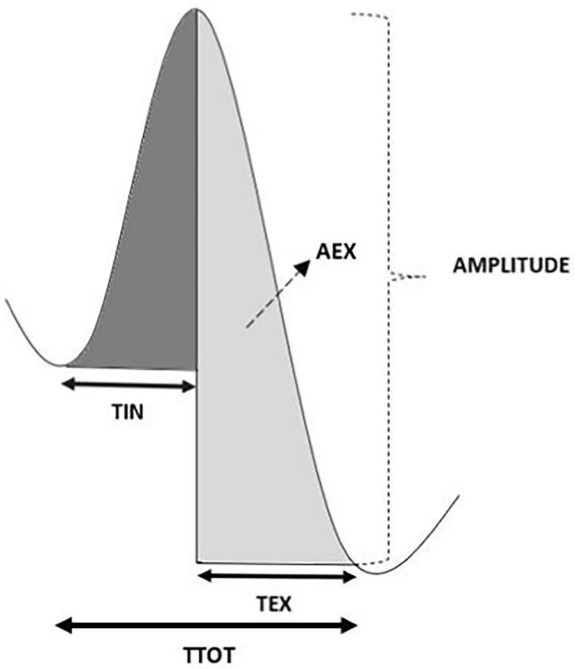


Fig. 2 (abstract 000599) Respiratory parameters derived using advanced signal processing techniques

Reference
1 Fundació La Marató de TV3 (202,122–30)

Topic: Acute respiratory failure and mechanical ventilation

000600

Breathing pattern variability as an early predictor of unfavorable outcomes in pneumonia-induced acute respiratory failure

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Introduction. In acute respiratory failure (ARF), patient self-inflicted lung injury has emphasized the importance of non-invasive early breathing pattern (BP) assessment.
Objectives. To describe clinical characteristics and BP in patients with ARF secondary to pneumonia and to study its early predictive capacity for unfavorable outcomes (UO).
Methods. This prospective, multicentre observational study included adult patients with ARF due to bacterial or COVID pneumonia requiring oxygen therapy. Exclusion criteria: prior or in-episode non-invasive ventilation, or PaO_2/FiO_2 < 100 on high-flow nasal cannula (HFNC). UO was defined as PaO_2/FiO_2 < 100 on HFNC, mechanical ventilation, or death.
Severity scores, clinical and analytical data were collected at inclusion. BP was recorded for 5 min using SC50 temperature sensors placed in a Venturi mask and analyzed with advanced algorithms to extract breath-by-breath parameters (Fig. 1). Statistical analysis included multivariate modeling.
Data are presented as median (IQR)*p < 0.05 for differences between-groups.
Results. 82 were included: 67 (82%) had favourable (FO) and 15 (18%) (UO).
The relevant clinical and signal characteristics of patients with both outcomes are shown in Table 1,2 and Fig. 2.
Multivariate analysis identified lymphocyte % (↓, p = 0.005), CRP (↑, p = 0.003), and amplitude variability (CV, ↑, p = 0.008) as independent predictors of unfavorable outcome.

Table 1: (abstract 000600) Clinical characteristics

	FO	UO
Female (%)	44.8	40
Age (y)	72 (62–81)	75 (59–80)
BMI (kg/m^2)	28 (25–31)	27 (24–31)
FiO_2*	0.26 (0.24–0.28)	0.31 (0.28–0.35)
O_2 flow (L/min)*	4 (3–6)	6 (4–15)
$PaCO_2$ (mmHg)*	37.5 (34.3–43.1)	33.2 (30.1–36.8)
Borg scale*	2 (0–4.5)	4 (2–6)
Lymphocytes (%)*	11 (7–15)	6 (5–10)
CRP (mg/dL)*	11 (5–19)	25 (6–39)
D-dimer (ng/dL)*	627 (608–1083)	4300 (4300–4321)

Table 2:(abstract 000600) BP Parameters

	FO	UO
TTOT (seg)	2,82 (2,11–3,34)	1,86 (1,73–3,16)
CV TTOT*	0,21 (0,16–0,27)	0,32 (0,27–0,51)
RR (bpm)	23.5 (21.2–25.9)	27.9 (24.1–32.1)
CV RR*	0.23 (0.16–0.31)	0.32 (0.23–0.43)
Amplitude (V)	0.24 (0.17–0.33)	0.19 (0.15–0.26)
CV amplitude*	0.53 (0.31–0.68)	0.93 (0.58–0.98)

Conclusions. Patients with UO exhibited greater variability in initial BP, particularly in signal amplitude, suggesting its potential role as an early non-invasive prognostic biomarker in pneumonia-induced ARF.

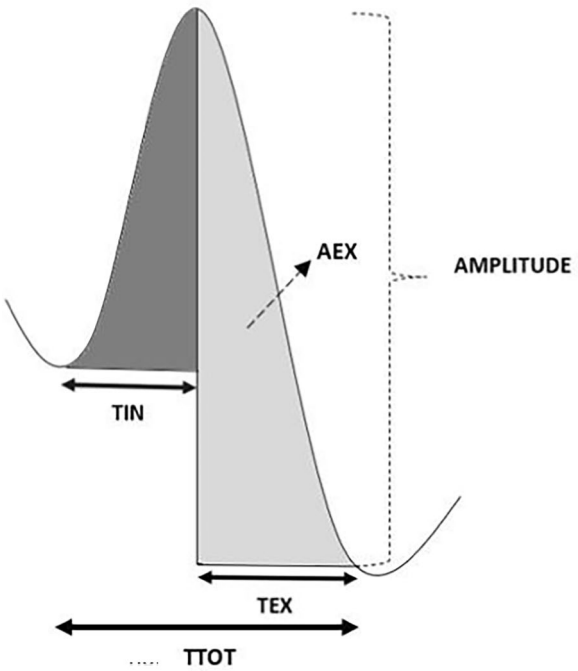


Fig 1 (abstract 000600) Respiratory parameters derived using advanced signal processing techniques

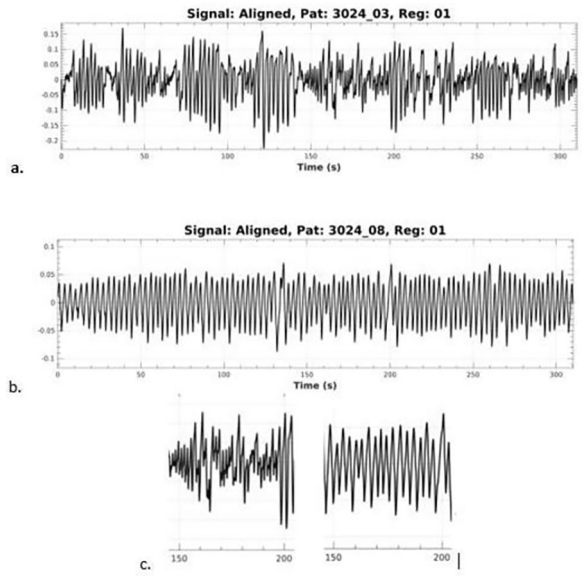


Fig 2 (abstract 000600) Signal obtained in a patient who had unfavorable outcome (a), favorable (b) and both amplified (c)

Reference

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Topic: Acute respiratory failure and mechanical ventilation

000604

Heterogeneous treatment effects in cardiac arrest patients receiving targeted temperature management: a causal machine learning analysis

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000604***.

Introduction. Recent large-scale multi-center clinical trials and meta-analyses in post-cardiac arrest patients failed to demonstrate efficacy of targeted temperature management (TTM). However, it is unclear if there are distinguishable subgroups in which TTM remains a viable treatment. Causal machine learning is a promising approach to investigate this question.
Objectives. The principal objective is to explore heterogeneous treatment effect (HTE) among adult cardiac arrest patients receiving TTM.
Methods. The analysis was carried out in two datasets: (a) the eICU Collaborative Research Database, which includes 2168 adult cardiac arrest patients eligible for TTM, with 464 receiving TTM; and (b) a randomized trial of 581 cardiac arrest patients with non-shockable rhythm, with 284 receiving TTM (Hyperion, NEJM 2019). We used data from the first 6 h following ICU admission as predictive variables. Clinical endpoints were survival at discharge and the last measured motor subscore of the Glasgow Coma Scale (mGCS) in eICU, while in Hyperion we examined survival and CPC scores at 90 days. We evaluated model performance by classification prediction on the data with a holdout estimator. To identify HTE, we employed several machine learning methods that have been successfully implemented in prior research: S-Learners with XGBoost, Bayesian Additive Regression Trees (BART), Neural Networks, and R-learners with CausalForestDML. We assessed HTE by fitting a logistic regression model with individualized treatment effect (ITE) predictions and treatment, as well as a model with an interaction term between ITE and treatment. A likelihood ratio test ($p > 0.05$) was used to evaluate whether the model with the interaction term was superior.
Results. In the outcome prediction task, all models performed well on test data for binary classification of outcome (Table 1). TTM was not identified as a significant predictive variable determining outcome after cardiac arrest. The CausalForestDML output did not predict that TTM has any effect in the studied samples (Figs. 1 and 2). Moreover, across all models, there was no evidence of HTE for either mortality and neurological outcome in cardiac arrest patients receiving TTM.

Table 1: (abstract 000604) Model performance and p-values for likelihood ratio test

Dataset	Outcome	Model	LLR p-value	AUC ROC	AUC ROC 95% CI
eICU	Mortality	Neural-Network	0.57	0.76	[0.73,0.80]
eICU	mGCS 6	Neural-Network	0.39	0.79	[0.76,0.83]
eICU	Mortality	XGBoost	0.68	0.77	[0.73,0.80]
eICU	mGCS 6	XGBoost	0.93	0.78	[0.74,0.81]
eICU	Mortality	BART	0.29	0.78	[0.74,0.81]
eICU	mGCS 6	BART	0.61	0.80	[0.76,0.83]
eICU	Mortality	Causal-Forest-DML	0.07	NA	NA
eICU	mGCS 6	Causal-Forest-DML	0.17	NA	NA
Hyperion	Mortality	Neural-Network	0.57	0.80	[0.71,0.88]
Hyperion	CPC 1–2	Neural-Network	0.39	0.83	[0.74,0.91]
Hyperion	Mortality	XGBoost	No Effect	0.76	[0.67,0.85]
Hyperion	CPC 1–2	XGBoost	No Effect	0.81	[0.68,0.91]
Hyperion	Mortality	BART	0.86	0.78	[0.70,0.86]
Hyperion	CPC 1–2	BART	0.75	0.85	[0.75,0.93]
Hyperion	Mortality	Causal-Forest-DML	0.07	NA	NA
Hyperion	CPC 1–2	Causal-Forest-DML	0.20	NA	NA

Conclusions. Our analysis confirms prior work that TTM does not improve survival or neurological outcome either in the short-term or at 90 days. Contrary to our primary hypothesis, we found no evidence of either HTE or ITE across subgroups. Our ongoing research is exploring HTE in other large cardiac arrest datasets, however the results to date indicate that alternative mechanisms are needed to explain the lack of efficacy of TTM as a treatment modality in the post-cardiac arrest setting.

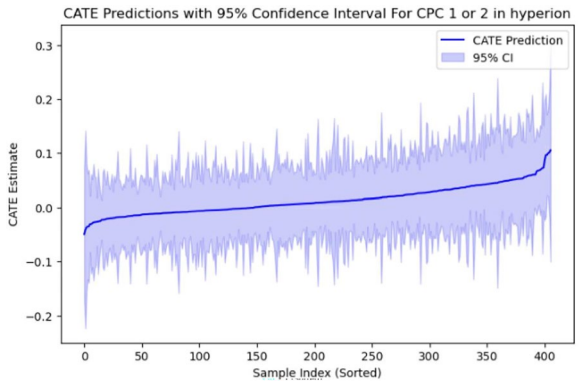


Fig 1 (abstract 000604) Conditional average treatment effect (CATE) predictions for CPC 1 or 2 in Hyperion Datase.

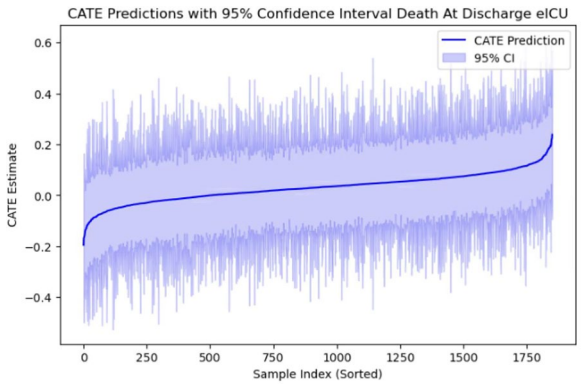


Fig 2 (abstract 000604) CATE predictions for death at discharge in eICU dataset

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3 Individualized Treatment Effects of Oxygen Targets in Mechanically Ventilated Critically Ill Adults (Buell et. al, JAMA 2024)
4 Targeted Temperature Management for Cardiac Arrest with Nonshockable Rhythm (Lascarrou et. al, NEJM 2019)
5 Targeted temperature management in adult cardiac arrest: Systematic review and meta-analysis (Granfeldt et. al, Resuciation 2021)
6 Hypothermia versus Normothermia after Out-of-Hospital Cardiac Arrest (Dankiewicz et. al, NEJM 2021)

Topic: Information systems and Data Science

000605

Early mastoid effusion on brain imaging is an independent prognostic marker after aneurysmal SAH

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000605***.

Introduction. Early mastoid effusion on brain imaging is an independent prognostic marker after aneurysmal SAH
Objectives. The clinical significance of mastoid effusion (ME) in intensive care unit (ICU) patients has not been well elucidated. Recently, an association between ME and intracranial pressure (ICP) has been reported. We aimed to investigate the clinical implications of ME occurrence in the management of aneurysmal subarachnoid hemorrhage (aSAH) patients and its association with the prognosis.
Methods. Data for patients aged > 18 treated for aSAH in a single institution between January 2020 and December 2022 were retrospectively reviewed. Brain CT or MRI images obtained within the first 14 days after the onset of SAH were evaluated for the presence of ME defined as opacification or air-fluid level in the mastoid air cells. We reviewed the patients' demographic information, neurological and medical status at admission, aneurysm and treatment characteristics and clinical outcomes, and analyzed their association with the occurrence of ME.
Results. A total of 114 patients was included for the study. ME was observed in 40 patients (34.5%) within the first 14 days, at a mean of 5.0 ± 3.5 days after the onset of SAH. In multivariate analysis, patients with ME were associated with a higher incidence of tracheostomy (Odds ratio [OR] 10.034, $p = 0.024$), radiologic vasospasm (OR 4.987, $p = 0.018$), higher APACHE II score (OR 1.138, $p = 0.013$), and a poor clinical outcome (OR 4.289, $p = 0.041$) defined as modified Rankin Scale > 2 at 90 days. Poor clinical outcome was independently associated with ME (OR 5.003, $p = 0.006$).
Conclusions. This study demonstrated that ME was observed in 34.5% of aSAH patients, and was associated with poor clinical outcomes. ME may serve as a simple and useful prognostic factor for predicting poor outcomes in aSAH patients.

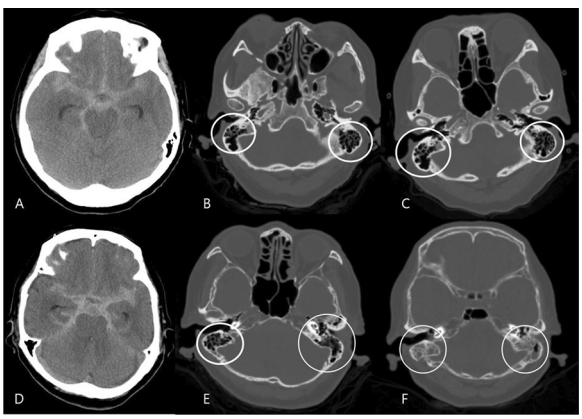


Fig 1 (abstract 000605) Mastoid effusion (ME) in patients with subarachnoid hemorrhage (SAH). (A-C) Case with absence of ME. A 66-year-old female patient with an initial Fisher grade III SAH. The initial brain CT scan showed no evidence of ME. A follow-up CT scan two week later also showed no signs of ME (white circle). The patient's modified Rankin Scale (mRS) score at post-operative 90 days was 0. (D-F) Case with presence of ME. An 80-year-old female patient with Fisher grade III SAH on the initial CT scan, with no signs of ME. Two weeks later, a follow-up CT scan revealed bilateral ME (white circle). The patient had an mRS score of 4 at post-operative 90 days

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Topic: Neurointensive care

000606

Stimulation of apoptotic and pyroptotic pathways and suppression of endogenous immunity are associated with the severity and mortality of septic patients.

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000606.

Introduction. Sepsis is a life-threatening pathological condition with devastating effects on all organ functions. Patients who survive during the initial phase, either enter a persistent hyperinflammatory state resulting in multiple organ failure or move into a chronic immunosuppressive state, both characterized by high mortality rates.
Objectives. To investigate the pyroptotic and apoptotic alterations and the immunosuppressive signals (HLA-DR + innate immunity cells) observed in septic pediatric and adult patients.
Methods. The sample of this prospective single-centre study consisted of adult and pediatric ICU patients with sepsis (S) compared to non-infectious inflammation (I) and healthy controls (C). Whole blood samples were collected within 24 h of ICU admission, following consent, and caspases 1 (pyroptosis), 3, 7, 8 (apoptosis) and CD14 + / HLA-DR + cells (immunosuppressive signal) were determined by flow cytometry in peripheral blood mononuclear cells. Demographics, clinical data and outcomes were recorded.
Results. Out of 120 patients enrolled in the study, n = 51 were adults (sepsis (S) 13, SIRS (I) 10, healthy controls (C) 28) and n = 69 were pediatric patients (28 (S), 31 (I) and 10 (C)). Pyroptotic lymphocytes expressing caspase 1 (AUROC 0.676, p = 0.033), apoptotic lymphocytes expressing caspase 3/7 (AUROC 0.731, p = 0.001), and pyroptotic monocytes expressing caspase 1 (AUROC 0.716, p = 0.009) highly predicted mortality in septic patients. Moreover, apoptotic neutrophils expressing caspase 3/7 (AUROC 0.813, p < 0.001) and caspase 8 (AUROC 0.860, p < 0.001), as well as apoptotic monocytes expressing caspase 8 (AUROC 0.839, p < 0.001) were also identified as mortality predictors. (Fig. 1) CD14 + /HLA-DR + expressing monocytes were significantly reduced in sepsis as compared to healthy controls (p = 0.05).
Conclusions. Increased stimulation of pyroptotic lymphocytes and monocytes along with apoptotic lymphocytes have a highly prognostic value for non-survivors. Apoptosis of neutrophils and monocytes also indicates a significant risk of mortality in sepsis. Low HLA-DR expression in septic patients demonstrated an immunosuppressive state.

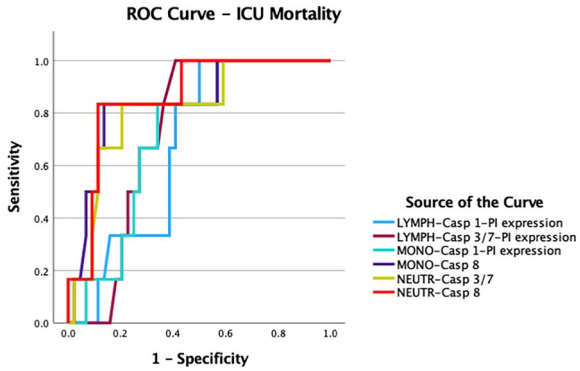


Fig 1 (abstract 000606) ROC curve demonstrating ICU mortality by stimulation of pyroptosis and apoptosis in septic patients

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3 Research grant from Special Account for Research Funds of University of Crete (ID: 11,528 /01.03.2024).

Topic: Sepsis

000609

Health professionals' perceptions of implementing a novel family support intervention in intensive care units (FICUS): findings from a multicenter, quantitative study

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000609.

Introduction. The FICUS cluster-randomized controlled trial (cRCT) (Naef et al., 2022) compares a nurse-led and interprofessionally delivered family support intervention (FSI), implemented using a tailored strategy (Verweij et al., 2023), to usual care. The FSI includes a family care pathway with three core components: engagement and liaison, communication, and support. Designated family nurses were responsible for delivering the FSI to families from admission to the intensive care unit (ICU) through to the post-ICU phase. We examined the implementation of the FSI along the FICUS cRCT (Oesch et al., 2023).
Objectives. To investigate the FSI's acceptability, appropriateness, feasibility, normalization, expected sustainability, and its perceived benefit from health professionals' (HP) perspective.
Methods. This multicenter, cross-sectional, quantitative study included an online survey sent to 518 HPs (September 2023–April 2024) from eight ICUs at the end of an 18-month trial period, during which these ICUs delivered the FSI to family members who participated in the FICUS cRCT. The survey consisted of psychometrically validated instruments to assess the level of FSI normalization (G-NoMAD) (Freund et al., 2023), acceptability (Acceptability of Intervention Measure), appropriateness (Intervention Appropriateness Measure), feasibility (Feasibility of Intervention Measure) (Kien et al., 2021), and self-developed questions to assess the FSI's perceived benefit and expected sustainability after 12 months. Data were analyzed using descriptive statistics as well as mixed linear effects and logistic regression to identify predictors of FSI normalization, sustainability, and benefits.

Results. Overall, 228 participants (44%) completed the survey. The FSI's level of normalization (scale range: 20–100) was high (median = 82; 78% of scale range). Higher FSI normalization in ICU teams was predicted by the perceived need for the FSI and higher levels of acceptability, appropriateness and feasibility. Expected sustainability after one year was predicted by the FSI's feasibility. Perceived benefit of the FSI for family members, patients, or HPs' own work was positively associated with acceptability, appropriateness, and normalization. In addition, the perceived benefit of the FSI for ICU teamwork was predicted by HPs' perceived need for the FSI and its level of normalization.
Conclusions. This implementation study found that by the end of the FICUS cRCT, the FSI was highly normalized within the ICU teams. It was seen as an acceptable, appropriate, and feasible intervention, offering benefits for families, team collaboration, and HPs' individual work. Feasibility was identified as a key predictor of the FSI's expected sustainability. Further research is needed to explore FSI implementation in routine ICU care beyond the trial context and to assess its long-term sustainability in critical care settings.

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Topic: Health Services Research and Outcome

000612

Inflammation lingers: are steroids enough for deceased donor management?

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000612***.

Introduction. The process of death in deceased organ donors triggers a systemic inflammatory response potentially contributing to organ damage and less favourable recipient transplant (Tx) outcomes [1–4]. Current UK guidelines emphasise early donor steroid administration to modulate inflammation and maximise organ utilisation [5]. However, the dynamics of specific inflammatory mediators during the donor management period (DMP) are poorly understood, and their prognostic value for Tx outcomes remains undetermined.
Objectives. Using kidney donor plasma samples from the Quality in Organ Donation (QUOD) biobank [6] and linked recipient data, we studied the trajectories of three specific cytokines, Interleukin (IL)-8, IL-6 and C-reactive protein (CRP) (representative of early, intermediate and late-stage inflammation) during the DMP and determined their association with short- and long-term Tx outcomes.
Methods. We analysed samples from donation after brain death donors (DBD) (n = 50) and donation after circulatory death donors (DCD) (n = 50). DMP time points considered were; T1 (shortly after donor identification and consent) and T2 (at time of preparation for retrieval). Cytokines were analysed using Luminex immunoassay. Primary outcome was delayed graft function (DGF), defined as need for dialysis within 7 days post-Tx. Secondary outcomes were high serum creatinine at 3- and 12-months post-Tx, defined as > 104 µmol/L in males, or > 84 µmol/L in females. Tertiary outcomes were low estimated glomerular filtration rate (eGFR) at 3 and 12 months post-Tx, defined as < 60 mL/min/1.73 m^2.
Results. DGF was observed in 25% of recipients, while 82% and 75% presented with high 3-month and 12-month serum creatinine. Low 3- and 12-month eGFR was observed in 65% and 61%, respectively. IL-8 dropped to 8% of baseline levels (from T1 to T2) in DBD donors ($P \leq 0.0001$), but only dropped to 38% of baseline levels in DCD donors ($P \leq 0.01$). Conversely, IL-6 was seen to rise to 14 times that of T1 levels in DBD ($P \leq 0.05$) and to 63 times that of T1 in DCD ($P \leq 0.001$). CRP levels were increased to 70 times ($P \leq 0.0001$) and 22 times ($P \leq 0.0001$) that of T1 levels in DBD and DCD donors, respectively. Patients with poor creatinine clearance and poor eGFR function at 3 and 12 months had significantly higher levels of CRP and IL-8 than those patients with the respective better outcomes. Despite the stark increase in IL-6, no association was found with outcome.
Conclusions. Current immunomodulation protocols suppress NF-κB–driven cytokines such as IL-8 [7], while IL-6 and CRP increase, suggesting a differential regulatory effect of steroids that spares components of the acute-phase response. Inflammation persists in deceased donors [8,9] and is associated with less favourable Tx outcomes. The data support the growing evidence for more targeted immunomodulators in the DMP.

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Topic: Brain death, organ donation and transplantation

000613

Implementation of an early warning score-based track-and-trigger system with proactive round improves outcomes in septic patients: a before-and-after study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000613***.

Introduction. Early detection and timely intervention, including sepsis bundles, are critical for improving sepsis outcomes [1]. Sepsis, in particular, may benefit from Rapid Response Systems (RRS), which have a similar concept [2]. In 2023, our hospital implemented a new surveillance and proactive response system for high-risk inpatients. This implementation increased RRS activations from 10.3 to 74.1 per 1,000 admissions between 2022 and 2024.
Objectives. To evaluate whether this new surveillance-based proactive intervention system improved outcomes in septic patients.
Methods. This single-center, retrospective, before-and-after study included patients aged ≥ 20 years with unplanned ICU/HCU admissions due to sepsis in 2022 and 2024. Sepsis was defined as qSOFA ≥ 2 with positive cultures or suspected infection. ICU/HCU admission within 24 h of hospitalization, COVID-19, post-emergency operative, or palliative cases were excluded. In February 2023, our hospital implemented a digital dashboard that automatically calculates AI-based Early Warning Scores (EWS) and initiated nurse practitioner (NP)-led proactive round twice daily on daytime weekdays for high-risk inpatients as RRT (Rapid Response Team). The primary outcome was ICU/HCU discharge mortality. Secondary outcomes included 24-h and 30-day mortality after RRS activation, intubation and vasopressor duration, CRRT use, ICU/HCU length of stay, and adherence to key sepsis bundle components prior to RRS intervention related to ICU/HCU admission.
Data from 2023 were excluded due to transitional effects. Comparative analysis was performed between 2022 and 2024 using the Wilcoxon rank-sum test for continuous and the Chi-square test for categorical variables. We also performed multivariate logistic regression to evaluate the association between the new system and outcomes. Additionally, a survival analysis was conducted for the primary outcome stratified by the presence of new system and compared using the log-rank test. All analysis was conducted by R (v4.4.3).
Results. Among 334 unplanned ICU/HCU admissions, 77 met inclusion criteria (26 in 2022; 51 in 2024). No significant differences were observed in basic demographics, including National Early Warning Score (NEWS) on RRS activation, dialysis, blood culture positive rate, or DNAR status. Preemptive RRT round involvement increased significantly in 2024 (4% vs. 28%, p = 0.03), indicating the impact of the new proactive surveillance system. ICU/HCU discharge mortality (27% vs. 6%, p = 0.025) and 30-day mortality (42% vs. 10%, p = 0.002) decreased significantly in 2024. Vasopressor duration also decreased (1.5 days vs. 1 day, p = 0.02), while intubation duration showed a non-significant difference (p = 0.06). Among sepsis bundle components, only blood culture collection prior to ICU/HCU admission improved (46% vs. 78%, p = 0.009).
Multivariate logistic regression showed that the new system was independently associated with reduced ICU/HCU mortality (aOR 0.36, 95%CI:0.16–0.81, p = 0.014, Table). DNAR status was positively associated with mortality (aOR 7.1, 95%CI:1.23–41, p = 0.03). Age, sex, and NEWS score were not significant predictors. Kaplan–Meier analysis showed significantly higher survival with the new system in 2024 (log-rank test, p < 0.001, Figure).

Table. (abstract 000613) Multivariate Logistic Regression for ICU/HCU Discharge Mortality.

Variable	Adjusted OR	95% CI	p-value
Age (year)	1.01	0.97 – 1.06	0.548
Sex (female)	0.57	0.10 – 3.15	0.524
New System (2024)	**0.36**	**0.16 – 0.81**	**0.014**
NEWS on RRS activation	1.01	0.81 – 1.25	0.956
DNAR status	**7.09**	**1.23 – 41.00**	**0.029**

Conclusions. Implementing an EWS-based track-and-trigger system, with a proactive round, was associated with improved outcomes in septic patients requiring ICU/HCU admission. Notably, both ICU/HCU discharge and 30-day mortality were significantly reduced, and vasopressor duration was shortened. These findings suggest that a proactive surveillance and response system could enhance early sepsis management. Adherence to most sepsis bundle elements remains suboptimal, indicating a possibility for further improvement.

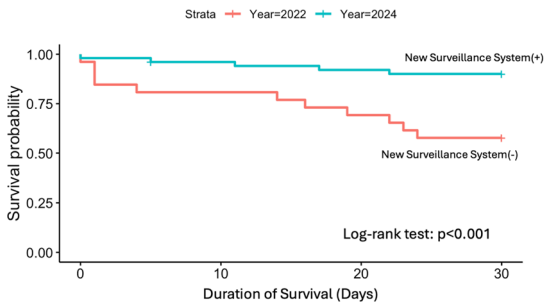


Figure (abstract 000613) Survival analysis with log-ran test
Kaplan–Meier survival curve comparing survival between patients in 2022 and 2024 (before and after system implementation).
Survival was significantly improved in 2024 with the new system (log-rank test, p < 0.001).

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Topic: Infections and prevention

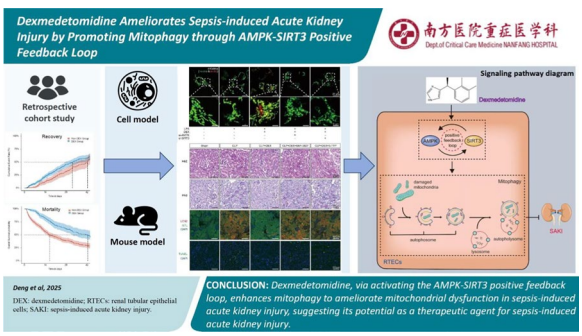
000614

Dexmedetomidine ameliorates sepsis-induced acute kidney injury by promoting mitophagy through AMPK–SIRT3 positive feedback loop

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000614***.

Introduction. In recent years, the therapeutic potential of dexmedetomidine in septic shock and sepsis-induced acute kidney injury (SAKI) has garnered increasing attention. Several studies have demonstrated that dexmedetomidine activates both AMPK and SIRT3, and a positive feedback loop may exist between these two proteins.
Methods. This study aims to further explore the efficacy and underlying mechanism of dexmedetomidine in ameliorating SAKI through

retrospective cohort study, molecular docking simulations, cellular and animal experiments.
Results. We analyzed 704 septic shock patients from the MIMIC-IV database and found that dexmedetomidine treatment was associated with improved renal function recovery and reduced in-hospital mortality. Dexmedetomidine alleviated mitochondrial dysfunction in SAKI through the promotion of mitophagy. Molecular docking simulations revealed a strong binding affinity of dexmedetomidine to both AMPK and SIRT3. Knocking out either AMPK or SIRT3 results in a decrease in the expression and activity of the other, indicating the existence of a positive feedback loop between them. Also, this study revealed that dexmedetomidine enhances mitophagy and alleviates mitochondrial dysfunction through the AMPK-SIRT3 positive feedback loop. Dexmedetomidine improves survival rates and attenuates renal injury in mouse model of SAKI, which was reversed by inhibiting AMPK or SIRT3.
Conclusions. These findings indicate that dexmedetomidine, via activating the AMPK–SIRT3 positive feedback loop, enhances mitophagy to ameliorate mitochondrial dysfunction in SAKI, suggesting its potential as a therapeutic agent for SAKI.



raphical Abstract: Dexmedetomidine ameliorates sepsis-induced acute kidney injury by promoting mitophagy through AMPK–SIRT3 positive feedback loop. Dex: dexmedetomidine; Rtecs: renal tubular epithelial cells; Saki: sepsis-induced acute kidney injury.

Reference
1 This study was supported by the department of critical care medicine, Nanfang hospital, Southern Medical University

Topic: Sepsis

000616
Hemodynamic impact of volatile sedation in ARDS patients undergoing V-V ECMO: a prospective observational study
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Introduction. Critically ill patients undergoing venovenous extracorporeal membrane oxygenation (V-V ECMO) often require prolonged deep sedation(1–3). Inhaled sedation has emerged as a feasible alternative to intravenous (IV) sedation for patients with respiratory failure requiring V-V ECMO and controlled mechanical ventilation(4).
Objectives. We aimed to evaluate the hemodynamic changes during the transition from IV to volatile sedation in this patient population.
Methods. This prospective, observational, single-center study included consecutive adult ARDS patients who received volatile sedation during V-V ECMO at IRCCS San Gerardo dei Tintori (Monza, Italy), between May 2022 and February 2025.
Hemodynamic parameters, doses of vasoactive drugs, sedative medications, and sedation levels were recorded every 2 h since ECMO commencement. Ventilatory parameters and blood gas analyses were collected every 8 h, and laboratory tests were performed daily. We analysed data from the last 24 h of intravenous sedation and the first 24 h of volatile sedation, limiting our analysis to the controlled mechanical ventilation (CMV) phase. A general linear mixed model, fitted using the restricted maximum likelihood method, using patient as a random effect, was used to assess differences in hemodynamic parameters before and after the transition to isoflurane.
Results. Seventeen patients were included in the analysis. The most common cause of ARDS was bacterial pneumonia (8 patients, 47%), followed by viral pneumonia (6 patients, 35%), autoimmune disease (2 patients, 12%) and trauma (1 patient, 6%). The median duration of IV sedation before transitioning to volatile sedation was 3 days [interquartile range, IQR 1–5], while the median duration of isoflurane sedation was 5 days [IQR 3–9].
Bispectral index (BIS) levels remained stable before and after switching to isoflurane (respectively, 40 ± 6 vs 44 ± 11, p = 0.09). Mean dosage of noradrenaline significantly decreased during volatile sedation ($p < 0.01$) (see Fig. 1), while systolic arterial pressure and cardiac output remained stable (115 ± 18 during IV sedation vs 114 ± 16 mmHg during volatile sedation, p = 0.31 and 6.8 ± 1.6 during IV sedation vs 7.3 ± 1.7 l/min during volatile sedation, p = 0.83). A mild but significant increase in heart rate after transitioning to volatile sedation was recorded (respectively, 86 ± 17 vs 93 ± 15 bpm, $p < 0.01$). Trend of hemodynamic parameters during the transition to volatile sedation are displayed in **Fig. 2**.
Conclusions. Switching to volatile sedation during V-V ECMO is feasible and is not associated with an impairment of hemodynamics.

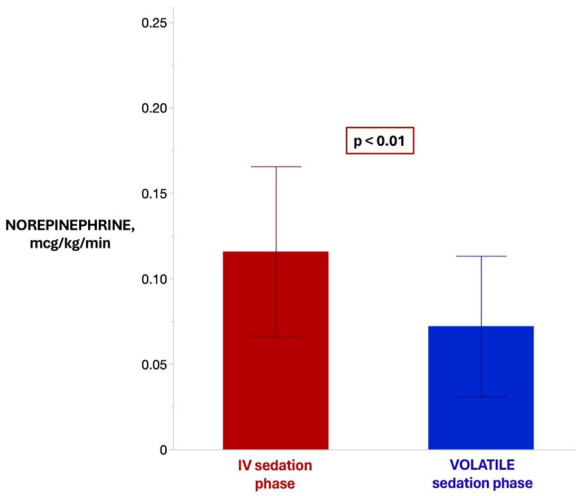


Fig 1 (abstract 000614) Mean norepinephrine dosage during intravenous and inhaled isoflurane sedation

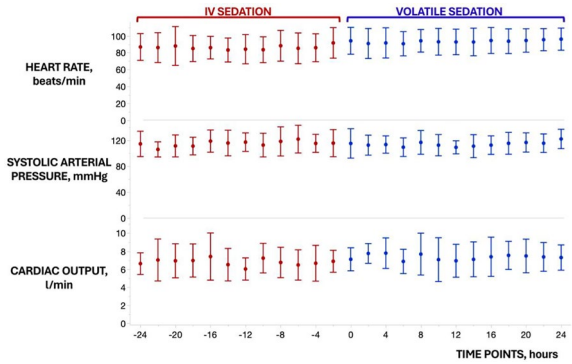


Fig 2 (abstract 000614) Hemodynamic parameters during the last 24 h of intravenous sedation and the first 24 h of volatile sedation

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Topic: Acute respiratory failure and mechanical ventilation

000620

Microcirculatory dysfunction assessment by retinal optical coherence tomography angiography in septic shock

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Introduction. Sepsis is a life-threatening organ dysfunction caused by a dysregulated host response to infection1. Microcirculatory dysfunction is a hallmark of septic shock and is associated with increased organ failure and mortality2–4. *Optical coherence tomography angiography* (OCTA) is a novel, non-invasive imaging technique that provides high-resolution, reproducible images of the retinal microcirculation within seconds 5,6. The interpretation of OCTA findings is fully automated7. Additionally, the retinal microcirculation may reflect changes occurring in more critical vascular beds, such as the brain, more accurately than sublingual vessels. This study aimed to evaluate the feasibility of using OCTA to assess microcirculatory dysfunction in septic shock.

Objectives. To characterize alterations in retinal microcirculation during septic shock using OCTA.

Methods. We conducted a prospective cross-sectional case–control study in the Intensive Care Department of Hospital da Luz Lisboa. Adult patients (≥18 years-old) with septic shock (defined by Sepsis-3 criteria1 and a cardiovascular SOFA sub-score8 ≥ 3 points after adequate volume resuscitation) were enrolled. Patients with known retinal disease were excluded. Healthy, age- (± 5 years) and sex-matched volunteers were recruited as controls. OCTA of both eyes was performed within 24 h of septic shock diagnosis. Retinal microcirculatory parameters were compared between groups using the paired Wilcoxon signed-rank test.

Results. We included 30 patients and 30 controls. Sixty percent were females. Median age was 71 years (interquartile range [IQR]: 48–81) in patients and 73 years (IQR: 48–80) in controls. Patients had a median APACHE II score of 18 (IQR: 13–22) and SOFA score of 7 (IQR: 5–9) on admission.

Most perfusion and vessel density metrics of retinal microcirculation were significantly lower in patients with septic shock, particularly in peripheral retinal regions (Table 1). These findings were consistent in both eyes. No significant differences were found in foveal avascular zone parameters.

Table 1 (abstract 000620) Differences in OCTA retinal microcirculatory variables between septic shock patients and controls.

	Right eye			Left eye		
	Patients	**Controls**	***p*-value**	**Patients**	**Controls**	***p*-value**
Perfusion density central (%)	21	25	0.254	17	28	0.052
Perfusion density inner (%)	43	45	**0.036**	39	45	**0.017**
Perfusion density outer (%)	45	47	**0.019**	44	47	**0.017**
Perfusion density full (%)	44	46	**0.027**	42	46	**0.012**
Vessel density central (mm/mm2)	9.9	11.1	0.278	7.8	12.6	**0.030**
Vessel density inner (mm/mm2)	18.3	18.6	0.066	16.8	18.7	**0.012**
Vessel density outer (mm/mm2)	18.5	19.1	**0.032**	18.0	19.0	**0.029**
Vessel density full (mm/mm2)	18.0	18.6	**0.047**	17.4	18.7	**0.016**
Foveal avascular zone area (mm2)	0.2	0.2	0.447	0.2	0.2	0.608
Foveal avascular zone perimeter (mm)	2.0	2.0	0.285	1.9	1.8	0.820
Foveal avascular zone circularity	0.7	0.7	0.216	0.7	0.7	0.561

Conclusions. Our findings confirm the presence of retinal microcirculatory alterations during septic shock and demonstrate that OCTA is a feasible non-invasive bedside tool for their assessment. OCTA may overcome the limitations of hand-held vital microscopes currently used for microcirculatory monitoring. Future steps will include longitudinal profiling of these microcirculatory changes throughout the course of septic shock, as well as the potential integration of retinal OCTA-based microcirculatory monitoring into hemodynamic management algorithms.

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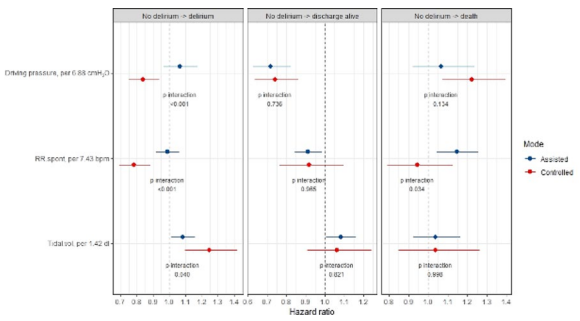
Topic: Sepsis

000621

Higher tidal volume is associated with a higher risk of delirium during controlled ventilation and attenuated during assisted ventilation

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Introduction. Ventilator-associated brain injury (VABI) may contribute to delirium during mechanical ventilation, but the relationship between ventilatory settings and delirium risk has not been established (1, 2).
Objectives. To establish whether ventilator settings, including tidal volume, inspiratory pressure, respiratory rate, and mode of mechanical ventilation ("controlled" versus "assisted", defined by the presence or absence of patient-triggered breaths), are associated with the rate of delirium during mechanical ventilation.
Methods. We analyzed data from a prospective longitudinal cohort study, the Toronto Intensive Care Observational Registry, which included all patients receiving mechanical ventilation for at least 4 h across 9 intensive care units in the Greater Toronto Area between April 2014 and February 2023. As part of routine clinical practice in these ICUs, nurses use the Confusion Assessment Method-ICU or the Intensive Care Delirium Screening Checklist to assess patients for delirium. Patients with delirium at baseline (time 0) were excluded, and an administrative censoring time of 30 days was used. The association between daily ventilator settings and the development of delirium was evaluated using cause-specific Cox proportional hazards models adjusting for confounders including organ dysfunction and sedation depth. The landmarking approach was used to handle daily updated time-dependent covariates. Death and discharge were considered as competing events. Separate models were constructed for each primary exposure of tidal volume, inspiratory pressure, and respiratory rate, with an interaction term for ventilation mode (assisted versus controlled).
Results. A total of 1935 patients were available for analysis (20,847 patient-days of mechanical ventilation) (**Table**). Higher tidal volume during controlled ventilation was independently associated with a higher hazard of developing delirium (adjusted hazard ratio [aHR] 1.24 per 142 mL increase, 95% confidence interval CI, 1.10–1.41). This association was significantly attenuated during assisted ventilation (adjusted HR 1.08, 95% CI 1.01–1.16, p = 0.04 for interaction) (**Figure**). Conversely, even after including sedation level as covariate, higher respiratory rate during controlled ventilation was associated with a lower hazard of developing delirium (adjusted HR 0.78 per 7 breath per minute increase, 95% CI 0.69–0.89) and this was significantly attenuated during assisted ventilation (adjusted HR 0.99, 95% CI 0.92–1.06, p < 0.001 for interaction). Higher inspiratory pressure during controlled ventilation was associated with a higher hazard of death (aHR 1.22 per 7 cm H2O increase, 95% CI 1.07–1.40) and a lower hazard of delirium (aHR 0.84, 95% CI 0.75–0.94).TABLE.
Conclusions. Higher tidal volume and lower respiratory rate during controlled mechanical ventilation are associated with a higher hazard of developing delirium over time, possibly reflecting VABI. Maintaining respiratory muscle effort during mechanical ventilation may mitigate VABI and reduce the risk of delirium.



Adjusted associations between ventilator settings and the cause-specific hazards of of delirium, death, or discharge, according to whether the patient was undergoing controlled ventilation (no patient-triggered breaths) or assisted ventilation (patient-triggered breaths).

Table 1 Baseline Clinical Characteristics of the study cohort

DEMOGRAPHICS	
n=1,935	
Age (years)	59 (17)
Male	1,218 (63)
Weight (kg)	81 (30)
REASON FOR ADMISSION	
Cardiovascular	221 (11)
Hematologic	30 (2)
Metabolic	53 (3)
Neurologic	185 (10)
Other medical diseases	89 (5)
Renal disease	15 (1)
Respiratory	713 (37)
Sepsis	282 (15)
Trauma	205 (11)
Cardiovascular	221 (11)
Gastrointestinal	141 (7)
TYPE OF INTUBATION	
Endotracheal	1,873 (97)
Tracheostomy	62 (3)
RECEIVING PRESSORS	
Yes	1,246 (64)
No	689 (36)
ARTERIAL BLOOD GASES	
pH	7.4 (0.1)
pO_2	100 (42)
PCO_2	43 (12)
PaO2/FIO2	218 (109)
VENTILATORY PARAMETERS	
Respiratory rate ventilator (breath per min)	22 (6)
Respiratory rate total (breath per min)	22 (6)
PEEP (mmHg)	8 (3)
FiO_2 (%)	50 (20)
Tidal volume (ml)	400 (100)
Tidal volume/PBW (ml/kg)	6 (1)
Minute ventilation	9.5 (3.5)
Plateau pressure (mmHg)	17 (7)
Driving pressure (mmHg)	11 (4)
Peak inspiratory pressure (mmHg)	25 (7)
Ventilatory ratio	1.6 (0.7)
Elastance (ml/cmH_2O)	2.7 (2.1)
Mechanical power (J/min)	15 (8)
VENTILATION MODE	
Assisted	537 (72)
Controlled	1,398 (72)

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Topic: Acute respiratory failure and mechanical ventilation

000622

A multi-component intervention of environment control in the ICU to improve sleep: a pilot randomized control trial

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000622***.

Introduction. In patients with critical illnesses, sleep and circadian rhythms are significantly disrupted, and these disturbances have been linked to deleterious outcomes, including increased mortality. Factors inherent to the intensive care unit (ICU) environment, such as exposure to suboptimal light and noise levels during daytime and nighttime hours, or inflexible schedules of daily care activities, have been identified as playing a pivotal role in sleep disturbances. The present study hypothesizes that a multicomponent intervention is a viable strategy for implementation in the ICU, with the potential to enhance sleep quality in critically ill patients.

Objectives. To evaluate the feasibility of implementing a multi-component intervention of the environment in an intensive care Unit (ICU) to promote sleep in critically ill patients and to determine the impact of the intervention on the quantity assessed by polysomnography and other semi-quantitative methods compared to standard care. In addition, we will compare the effect of both strategies on delirium and circadian rhythm biomarkers.

Methods. Prospective, two parallel groups, unblinded pilot randomized controlled trial. Adult patients with at least 48 h of invasive mechanical ventilation and no sedation or superficial sedation during the last 24 h were recruited between October 2022 and December 2024. Participants were randomized to receive a multi-component ICU environmental control intervention (dynamic light therapy, auditory masking, and rationalization of ICU nocturnal patient care activities) or to standard care. A responsible family member of each participant consented to participate in the study. The setting was an intensive care unit in a tertiary care teaching hospital in Santiago, Chile. The primary outcomes were the feasibility of enrolling and retaining participants and fidelity to the intervention, which was recorded daily until seven days of follow-up or until ICU discharge. Secondary outcomes were sleep quantity and quality, the prevalence of delirium at day three post-randomization, and neuropsychological impairment at six months post-ICU discharge.

Results. After screening, 17 patients were randomized (See Fig. 1), and sixteen participants were included in the final analysis. Table 1 shows the participants' main demographic and clinical characteristics by group. Concerning the primary outcomes, 17 patients were randomized to the intervention group (n = 9) and the control group (n = 8). Of the randomized patients, 78% (n = 7) and 100% (n = 8) were in the ICU until the night of day three of the study, respectively. One patient did not receive the intervention due to death during the first 3 days of the intervention. Regarding the intervention fidelity, the enrollment rate was 94%, with only one family member refusing the participation of their loved one in the study.

Our primary outcomes were time in slow wave sleep-N3 and time in Rapid eye movement-REM assessed by PSG. While no statistically significant differences were found between groups in total sleep time or REM/N3 sleep on day 3, the within-group analysis showed an increase in slow-wave sleep (N3) in the intervention group. Notably, the melatonin peak was higher among those receiving the intervention, supporting its role in circadian rhythm regulation. There were no significant differences between both groups regarding other interest outcomes, such as sleep quality assessed by the questioner, the oscillation of plasma concentrations of cortisol, and the incidence of delirium.

Conclusions. The study demonstrated the feasibility and acceptability of sleep-promoting interventions in high-acuity ICU settings, with high patient satisfaction and good protocol adherence. However, challenges in evaluating sleep using polysomnography and the limited sample size suggest the need for more scalable, cost-effective measurement tools in future studies.

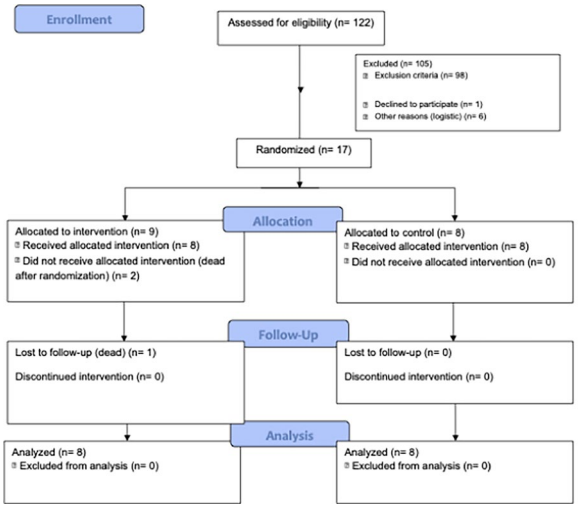


Fig 1 (abstract 000622) Flowchart of included and excluded patients

Table 1 Demographic and clinical characteristics by group

Characteristics	Environmental intervention n=8	Standard Care n=8	P-value
Age (years)	47.8 ± 13.7	63.7 ± 15.2	0.05
Female Sex	62.5 (5)	50 (4)	0.06
Educational Level (years)			
Diagnosis Medical Surgical			
Charlson Score	3.6 ± 2.2	5.8 ± 3.1	0.13
SOFA Score	6.1 ± 3.6	7.5 ± 3.4	0.46
APACHE II Score	13.6 ± 6.9	16.6 ± 9.3	0.5
Days of MV before to study	9.3 ± 4	6.9 ± 3.2	0.23
Days of MV	9.6 ± 7.1	5.3 ± 3.2	0.16
ICU LOS (days)	16.5 ± 7.9	16.2 ± 6.9	0.97
Hospital LOS (days)	41.2 ± 48.9	31.1 ± 28.9	0.64
Tracheostomy	62.5 (5)	50 (4)	0.15
Survival	100 (8)	87.5 (7)	0.3

Abbreviations: SOFA, Chronic Health Evaluation II and Sequential Organ Failure Assessment Score; APACHE II, Acute Physiology and Chronic Health Disease Classification System II; MV, mechanical ventilation; ICU, intensive care unit; LOS, Length of stay.

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g*, *SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

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3 Government of Chile's National Fund for Scientific and Technological Development (FONDECYT) (1,201,772).

Topic: Nursing care and physiotherapy

000623

Temporal dynamics of cytokines outperform traditional biomarkers in predicting sepsis mortality: a joint modeling approach

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000623***.

Introduction. Numerous biomarkers have been proposed for sepsis management due to their associations with inflammatory processes. While many studies have confirmed their associations with patient outcomes, few have explored their temporal dynamics or investigated how changes in these biomarkers over time relate to outcomes.
Objectives. This study employed a statistical framework known as joint modeling, which integrates the analysis of longitudinal biomarker trajectories with survival outcomes, aiming to investigate the associations between biomarker dynamics and sepsis outcomes.
Methods. We retrospectively reviewed patients diagnosed with sepsis between January 2019 and July 2024 at Zhongshan Hospital, affiliated with Fudan University in Shanghai, China. Biomarkers, including white blood cell count (WBC), neutrophils, lymphocytes, C-reactive protein (CRP), procalcitonin (PCT), interleukin-6 (IL-6), interleukin-8 (IL-8), interleukin-10 (IL-10), interleukin-2 receptor (IL-2R), interleukin-1β (IL-1β), and tumor necrosis factor (TNF), measured within the first 7 ICU days were included for analyses. Baseline characteristics were compared between survivors and non-survivors. To assess the associations between biomarker trajectories and survival, both proportional hazards models and joint modeling framework were applied. The analyses considered both the absolute values and the rates of change (slopes) of these biomarkers in relation to survival outcomes.
Results. The study included 664 sepsis patients (200 female; mean age 66.6 ± 14.7 years), with 227 in-hospital deaths. Abdomen and lung were the two main infections. Surgery was associated with lower in-hospital mortality (HR = 0.60, P = 0.010), while higher SOFA scores (HR = 1.09, P < 0.001) and AKI with shock (HR = 1.77, P = 0.015) were associated with increased mortality. No significant associations were found between the absolute values of biomarkers measured during the first 7 ICU days and in-hospital mortality. However, significant associations were observed between in-hospital mortality and the trajectories (slopes) of IL-6 (HR = 1.0023; 95% CI: 1.0006–1.0040; P = 0.007), IL-1β (HR = 0.9947; 95% CI: 0.9911–0.9994; P = 0.030), and IL-2R (HR = 1.0009; 95% CI: 1.0001–1.0017; P = 0.015). The trajectories of cytokines are presented in Fig. 1.
Conclusions. This study underscores the added prognostic value of cytokine dynamics in sepsis. While traditional biomarkers such as WBC, CRP, and PCT showed no significant association with in-hospital mortality when evaluated over time, the slopes of specific cytokines, e.g., IL-6, IL-1β, and IL-2R, were significantly associated with patient

outcomes. These results suggest that dynamic changes in cytokines provide superior prognostic insight compared to conventional markers and may serve as more reliable indicators for risk stratification and clinical management in sepsis.

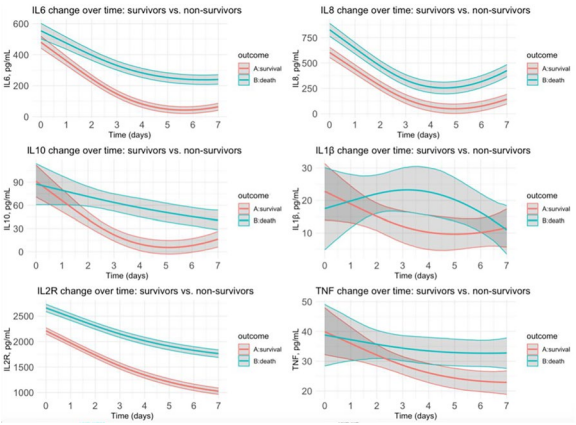


Fig 1 (abstract 000623) Trajectories of IL-6, IL-8, IL-10, IL-2R, IL-1β, and TNF in sepsis survivors and non-survivors

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3 This research received funding from Shanghai Magnolia Talent Program: Pujiang Project(24PJA016).

Topic: Sepsis

000624

Prognostic impact of diaphragm dysfunction and dyspnea at weaning from ventilatory support and ICU discharge: a prospective observational study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000624***.

Introduction. Diaphragm dysfunction and dyspnea are common in patients undergoing invasive or non-invasive ventilatory support. This study aimed to evaluate whether diaphragm dysfunction and dyspnea, assessed 1) within the 24 h following the weaning from ventilatory support and 2) at the time of intensive care unit (ICU) discharge, are associated with adverse outcomes during a 90-day follow-up after inclusion.
Methods. This is a prospective, observational study currently conducted in a medical ICU. Eligible patients were [md1] adults weaned from ventilatory support (invasive mechanical ventilation or non-invasive ventilation/high-flow nasal cannula therapy during ≥ 48 h). Diaphragm dysfunction was[md2] assessed by ultrasound (diaphragm thickening fraction < 20% and/or diaphragm excursion < 1 cm [md3]), and dyspnea was assessed using a visual analog scale (VAS), within the 24 h after weaning from ventilatory support and at ICU discharge. The primary outcome was a composite endpoint including mortality, readmission (hospital or ICU) or need for ventilatory support or respiratory complications (pneumonia and/or atelectasis) during a 90-day follow-up after inclusion.
Results. Herein, we report preliminary findings from the first patients enrolled in the study. As of today, 23 patients with complete follow-up have been included after a median (interquartile range [IQR 25–75]) duration of 6 [4–8] days of ventilatory support. Within the 24 h following the weaning from ventilatory support, diaphragm dysfunction was present in 43% of the patients and dyspnea (VAS > 3) in 35%. At ICU discharge, these proportions were 40% and 15%, respectively. Thirteen patients met the composite outcome during a 90-day follow-up after inclusion. After weaning from ventilatory support, dyspnea-VAS was significantly higher in patients who met the composite outcome whereas the diaphragm excursion was not (Fig. 1C).
Multivariate logistic regression found that dyspnea VAS within the 24 h following weaning from ventilatory support was associated with the composite endpoint (OR 1.1–2.8, 95% CI 0.07–1), independently of the presence of diaphragm dysfunction. Conversely, diaphragm dysfunction at weaning showed no independent association after adjusting for dyspnea.
Conclusions. These preliminary results suggest that dyspnea at the time of weaning from ventilatory support is associated with adverse outcomes. Diaphragm dysfunction, at weaning or at ICU discharge, was not associated with outcomes. A larger sample of patients is needed to confirm these preliminary results.

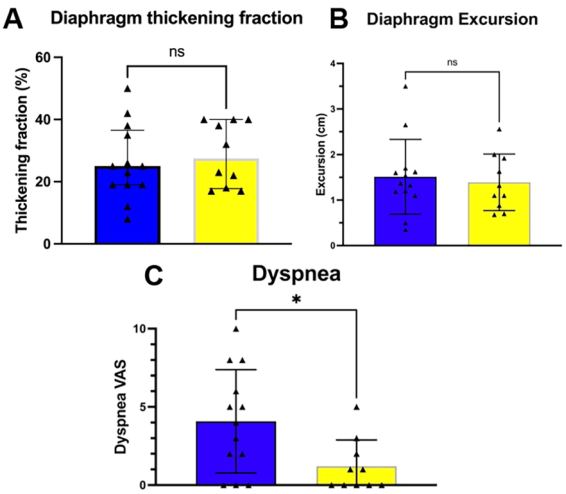


Fig 1 (abstract 000624) Diaphragm thickening fraction (A), diaphragm excursion (B) and dyspnea visual analogical scale (C) within the 24 h following the weaning between patients who met (blue bars) and who did no met (yellow bars) the primary endpoint (mortality, readmission, need for ventilatory support or respiratory complication) at day 90

Topic: Acute respiratory failure and mechanical ventilation

000625

Factors associated with delayed separation attempt in a population of ICU mechanically ventilated patients: insights from the WEAN-SAFE cohort.

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000625***.

Introduction. The amount of time spent on invasive mechanical ventilation is a major prognostic factor, and it is essential to initiate the weaning process as early as possible.
Objectives. The objective of our study was to identify the factors associated with the absence of a separation attempt in patients who met predefined weaning eligibility criteria.
Methods. The international observational study WEAN SAFE (WorldwidE AssessmeNt of Separation of pAtients From ventilator assistancE) assessed the weaning process in a large "real life" cohort of patients who received invasive mechanical ventilation for at least two calendar days [1]. The weaning eligibility criteria for a separation attempt (WEC) were as follows: FiO_2 < 50%, PEEP < 10 cmH_2O, and no use of neuromuscular blocking agents or high-dose vasopressors. A separation attempt was defined (1) in intubated patients as a spontaneous breathing trial (SBT) or a direct extubation without SBT and (2) in tracheostomized patients as a low respiratory support trial or a T-tube trial.
Each day that WEC were met but no separation attempt was performed, clinicians were asked to report the reason(s) why on a dedicated daily form and to specify whether they considered the patient to be in the weaning phase.
To better understand the barriers to weaning in patients undergoing intermediate or prolonged weaning [1] who met eligibility criteria for a separation attempt, we analyzed the prevalence of reported reasons for not performing a separation attempt and its evolution over time.
Results. Among the 1800 patients included (60% male; age 66.5 ± 16 years; 70% admitted for medical reasons), a median of 5 [2–11] daily reports per patient were available. Days patients met WEC but did not have a separation attempt accounted for 56% of the total duration of ventilation. The weaning failure rate at day 90 was 55% (n = 990), and ICU mortality was 48% (n = 870).
Seven main reasons were reported (Figure), with multiple reasons cited for 40% of the reporting days. Their evolution over the course of ventilation is shown in the Figure.
On the first day patients fulfilled WEC (regardless of ventilation duration) and no performed separation attempt, the main reasons cited were altered consciousness (35%, n = 887), unresolved respiratory failure (20%, n = 506), and muscle weakness (12%, n = 319).
On the last day without a separation attempt, altered consciousness remained the most frequent reason (29%, n = 700), but the proportion of muscle weakness increased (19%, n = 440). For 18% (n = 417) of patients, no reason was documented on the last day they met WEC and did not have a separation attempt.
Patients were considered to be in the weaning phase by clinicians in only 42% of daily occurrences on which WEC were present.
Conclusions. Altered consciousness and unresolved respiratory failure are the main reasons for not performing a separation attempt on the first day when weaning eligibility criteria are met. Later on, muscle weakness becomes the primary reported reason. Potential eligibility for weaning may be largely underestimated.

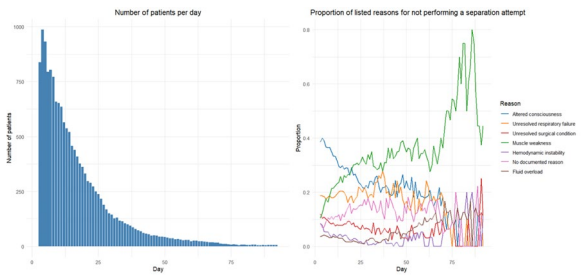


Fig 1 (abstract 000625) Evolution over time of the proportion of reasons for not performing a separation attempt in patients with CESA from initiation of invasive mechanical ventilation.
Day 0 is the day on which invasive mechanical ventilation was started.

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Topic: Acute respiratory failure and mechanical ventilation

000628

A review of adult critical care calls to the out-of-hours resident pharmacist service: a retrospective single centre observation study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000628***.

Introduction. Pharmacy departments provide out-of-hours (OOHs) services to ensure timely access to critical medicines and advice internationally [1–3]. OOHs services are particularly important for adult critical care areas given the acuity and complexity of this patient cohort [4]. CC patients are complex due to pharmacokinetic-pharmacodynamic changes in critical illness, the need for dynamic dose optimisations in organ dysfunction and extracorporeal support (renal replacement therapy and extracorporeal membrane oxygenation), and frequent route of administration changes to medicines [5].There is good evidence describing general on-call pharmacy services internationally, however limited evidence exists reporting the characteristics of out-of-hours calls from adult critical care units.
Objectives. To evaluate the characteristics of out-of-hours calls from adult critical care units to the on-call Resident Pharmacists, to inform service provision to this high-risk speciality.
Methods. Retrospective review of all adult critical care out-of-hours calls received by Resident Pharmacists from August 2023 to July 2024 at a large tertiary centre. Data collected included ward location, query type, name and category of drug, route of administration, day of the week, date and time of call received and time to resolution of call.
Results. We identified 5085 out-of-hours calls from adult critical care area, representing 15.3% of all calls received by the Resident Pharmacist. Most calls related to male patients 2364 (46.5%), with a mean ± SD of 56.6 ± 17.5 years. The greatest proportion of calls was received on a Thursday 806 (15.9%), and January 2024 was the busiest month 528 (17.6%). Most calls were for medication supply 4885 (96.1%), and fewer calls for medicine advice 200 (3.9%). We report 5915 medication requests, with total parenteral nutrition the most requested medicine 255 (4.3%), followed by anidulafungin 175 (3.0%). Anti-infectives was the most requested category of medicine 921 (18.1%).
Conclusions. Calls from adult critical care units represented a large proportion of calls received by the Resident Pharmacist out-of-hours. The provision of out-of-hours pharmacy services to adult critical care is essential in supplying time critical medications and medications advice to optimise patient care. Further work should explore impact of calls on avoidable patient harm, effect of CC pharmacist support and the number medications requests that were not actioned due to inappropriateness of request.

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Topic: Health Services Research and Outcome

000631

Early source control in an animal model of sepsis is associated with lower bacterial load and reduced inflammation

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000631***.

Introduction. Sepsis is one of the most common causes of hospital admission and a leading cause of in-hospital mortality. Source control of the infection is considered essential in the management of these patients, but the optimal timing remains unclear.
Objectives. To evaluate the impact of source control performed at different time points (early: 6 and 12 h; late: 18 and 24 h) on hemodynamics, bacterial load, systemic and pulmonary inflammatory response, and mortality using a rat model of sepsis induced by cecal ligation and puncture (CLP).
Methods. An abdominal sepsis model was performed in all animals using CLP, followed by surgical source control at different times: 6 h, 12 h, 18 h, and 24 h (n = 15 rats per group). A sham control group and a CLP group without source control were also included. All rats received fluid resuscitation and broad-spectrum antibiotics starting at 0 h after CLP and every 12 h until killing at 72 h. We analyzed weight loss, mean arterial pressure (MAP), plasma lactate, bacterial load (CFU/µL), cultures, and inflammatory cytokines in plasma and bronchoalveolar lavage (BAL), as well as lung histology at 72 h. Survival rate was assessed at 72 h in all groups.
Results. Animals that underwent early source control showed significantly less weight loss (– 23 g vs – 43 g; p = 0.012) compared to late source control. MAP (69.33 mmHg vs 51.00 mmHg; p = 0.03) and lactate levels (2.15 mmol/L vs 2.82 mmol/L; p = 0.03) improved significantly in the early source control group. Cultures (blood, peritoneal) showed growth of gram-negative bacteria (Escherichia coli, Proteus mirabilis, Bacteroides fragilis). Bacterial load, total protein count, and pro-inflammatory markers (TNF-α and IL-6) in plasma were significantly reduced in the early control group. Additionally, early source control significantly reduced pulmonary inflammation (TNF-α, IL-1β, IFN-γ, and others) and especially pulmonary bacterial load compared to the late group. The early source control group showed a non-significant trend toward higher survival compared to the late control group (70% vs 53%).
Conclusions. Delayed source control in an animal model of abdominal sepsis is associated with increased bacterial load, poorer hemodynamic recovery, and greater systemic and pulmonary inflammation. Moreover, earlier source control shows a trend toward higher survival.

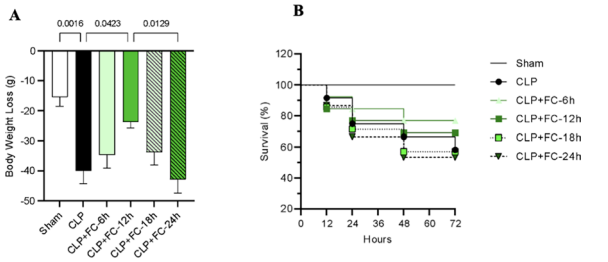


Fig 1 (abstract 000631) Body weight and survival. (A) Body weight measured at 72 h in all groups. Values represent group mean ± SEM. (B) Representation of the survival rate in all groups

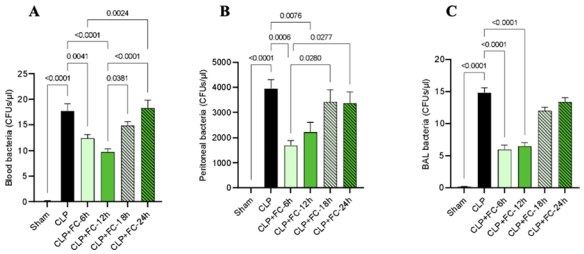


Fig 2 (abstract 000631) Bacterial counts. (A) Blood bacterial counts, (B) peritoneal bacterial counts, (C) BAL bacterial counts

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Topic: Sepsis

000633

Contributors to fluid overload and mortality in critically ill children: the role of fluid creep, output reduction, and renal angina index

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000633***.

Introduction. Fluid overload (FO) is associated with increased morbidity and mortality in critically ill paediatric patients. The Renal Angina Index (RAI) has emerged as a validated tool for predicting acute kidney injury (AKI), a condition associated with significant morbidity and mortality.
Objectives. This study investigates the relationship between FO, renal dysfunction, and mortality in the paediatric intensive care unit (PICU), focusing on fluid input versus output contributions. Additionally, we assess the role of early FO, fluid creep, and the Renal Angina Index (RAI) in predicting adverse outcomes.
Methods. This retrospective cohort study included critically ill children (1 month–18 years) admitted to an academic PICU for ≥ 96 h between 2020 and 2024. Patients with chronic kidney disease or congenital heart disease were excluded. Fluid balance, renal function (RAI, creatinine clearance), and illness severity scores were analyzed. FO was defined as cumulative fluid balance > 5% or > 10% of body weight. The primary outcome was PICU mortality; secondary outcomes included AKI incidence, mechanical ventilation duration, and PICU length of stay.

Results. Among 217 patients, total fluid balance was more than twice as high in non-survivors (2125 ± 2157 ml vs. 791 ± 629 ml, p = 0.001), along with significantly greater total FO% (10.8 ± 9.8% vs. 5.6 ± 8.8%, p = 0.014) and a higher proportion of patients with FO > 5% or > 10%. Fluid creep on day 1 correlated with RAI (r = 0.29, p < 0.001) and was an independent mortality predictor (OR 1.01, 95% CI 1.0–1.02, p = 0.02). Reduced fluid output contributed more significantly to FO than increased intake. ROC analysis indicated that cumulative fluid balance (AUC 0.72, 95% CI 0.59–0.85, p = 0.001), cumulative FO% (AUC 0.68, 95% CI 0.55–0.80, p = 0.006), and RAI (AUC 0.69, 95% CI 0.58–0.80, p = 0.001) demonstrated similar predictive accuracy for mortality.
Conclusions. FO, particularly fluid creep and reduced output, is a key determinant of mortality in critically ill children. RAI may aid in early risk stratification, guiding fluid management strategies to improve outcomes.

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2 none

Topic: Acute Kidney Injury and haemofiltration

000634

Risk factors and outcomes of upper extremity vein thrombosis in critically ill patients: a retrospective cohort study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000634***.

Introduction. Upper extremity deep-vein thrombosis (DVT) is often under-recognized and perceived as having less clinical significance than lower extremity DVT. Our objective was to evaluate the risk factors and outcomes of critically ill patients with upper extremity vein thrombosis**.**
Methods. We evaluated patients in the intensive care unit of King Abdulaziz Medical City, a tertiary-care hospital with > 1000 beds in Riyadh, Saudi Arabia, who had Doppler ultrasound for suspected upper extremity vein thrombosis between January 2022 and December 2023. We compared patients who had upper extremity DVT to those who did not and examined their outcomes including the incidence of pulmonary embolism and hospital mortality.
Results. Among the 421 patients included in this study, Doppler ultrasound was performed a median of 13 days after hospital admission, targeting the right upper extremity in 48.7% of patients, the left in 37.3% and bilaterally in 14.0%. A total of 216 patients (51.3%) had either upper extremity DVT and/or superficial vein thrombosis (SVT). DVT was found in 128 patients (30.4%) and occurred on the right in 63.3%, left in 32.8% and bilaterally in 3.9%. The most affected veins were the internal jugular (53.9%), brachial (29.7%) and subclavian (26.6%). Patients with and without DVT had similar baseline comorbidities except for cancer, which was more common in patients with DVT (24.2% versus 16.4%, p = 0.06). On multivariable logistic regression analysis, the predictors of DVT were the presence of central venous catheters in the internal jugular or subclavian vein (odds ratio 2.14, 95% confidence interval 1.33–3.43) and peripherally inserted central lines (odds ratio 1.74, 95% confidence interval 1.08–2.80). SVT was diagnosed in 147 patients (40.1% had concomitant upper extremity DVT). The affected veins were the cephalic (61.2%) and basilic (45.6%). Pulmonary embolism occurred in 53 patients (12.6%) with a similar incidence in patients with or without upper extremity DVT (14.1% and 11.9%, respectively, p = 0.55%) and in patients with and without SVT (12.2% and 12.8%, respectively, p = 0.88). Patients with DVT had higher hospital mortality (46.9% versus 30.7% for patients without DVT; p = 0.001), while SVT was not associated with increased mortality (37.4% versus 34.7% for patients without SVT; p = 0.58).
Conclusions. Almost one in two patients who had upper extremity ultrasound for suspected vein thrombosis had either DVT or SVT. The presence of a central venous catheter was a predictor of DVT. Patients with SVT or DVT had similar rates of pulmonary embolism compared to other patients. Upper extremity DVT, but not SVT, was associated with higher hospital mortality.

Topic: Haematologic-oncologic issues in the ICU

000637

Temporal course of autonomic dysfunction in severe traumatic brain injury

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000637***.

Introduction. Early autonomic dysfunction (eAD) is a recognized critical but understudied component of secondary injury in severe traumatic brain injury (TBI). Using high-resolution physiologic waveform data obtained from multi-modal monitoring in the BOOST-3 trial, we analyzed measures of autonomic nervous system function over the first five days post-injury.
Methods. We performed a retrospective analysis of cardiac waveform data collected via Moberg analytics from 42 patients enrolled in BOOST-3 with available data. BOOST-3 is a randomized clinical trial to determine the comparative effectiveness of two strategies for monitoring and treating patients with TBI in the intensive care unit setting. eAD metrics were derived from continuous arterial blood pressure (ABP) and electrocardiogram (ECG) waveforms. The primary analysis focused on changes in key AD indices, including time-domain (root mean square of successive differences [RMSSD], standard deviation of NN intervals [SDNN], percentage of successive normal-to-normal intervals differing by more than 50 ms [pNN50] and baroreflex sensitivity), frequency-domain metrics (low to high-frequency ratio [LF/HF]), and signal entropy over the first 5 days following injury. We analyzed beat-to-beat measurements averaged over one hour epochs.
Results. Preliminary analysis of the first 42 patients revealed significant variation in eAD parameters within the first 24 h (Fig. 1). Specifically, RMSSD decreased from a median of 26 ms on day 1 to 21 ms by day 5. Similarly, SDNN decreased from 31 ms on day 1 to 27 ms by day 5. The LF/HF ratio decreased from 1.3 on day 1 to 1.1 by day 5. Baroreflex sensitivity (BRS) showed a rise and fall, with median values peaking to 8.7 ms/mmHg and decreasing to 5.2 ms/mmHg by day 5.
Conclusions. eAD is prevalent in severe TBI and evolves over time, with significant changes in key metrics such as RMSSD, SDNN, pNN50, LF/HF, and BRS, indicating reduced parasympathetic and increased sympathetic activity. This study leverages high-resolution physiologic monitoring to characterize these changes, providing insights into potential prognostic and therapeutic implications. Further analysis of the full dataset will refine our understanding of eAD in severe TBI.

Metrics	Day 1	Day 2	Day 3	Day 4	Day 5
LF to HF ratio	1.28	1.18	1.15	1.04	1.07
pNN50	1.50	2.53	1.68	2.08	1.22
RMSSD	26.16	26.00	23.53	23.83	21.16
SDNN	31.38	33.26	29.26	30.86	26.96
HR	77.17	73.65	74.77	73.76	79.37
ICP	12.84	13.55	13.02	11.82	11.61
MAP	86.14	87.79	85.62	88.79	88.58
Sample entropy	1.40	1.44	1.41	1.41	1.42
BRS	5.13	8.72	7.44	6.88	5.23

Fig 1 (abstract 000637) Daily median values for autonomic nervous system metrics

Reference
1 NIH/NINDS 2R01NS130832-01

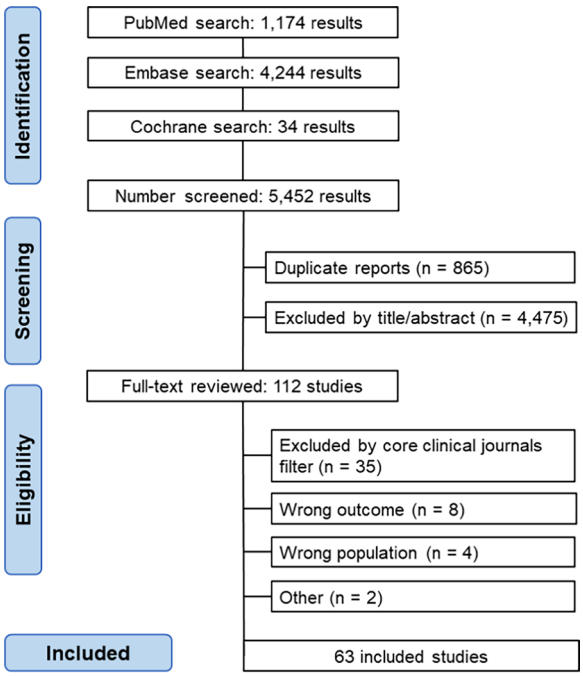
Topic: Neurointensive care

000638

Underrepresentation and mortality outcomes of oncology patients in randomized clinical trials in intensive care medicine: a systematic review.

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Introduction. Cancer patients increasingly require intensive care due to complications related to malignancy or its treatment. Yet, their representation in randomized controlled trials (RCTs) that shape critical care guidelines remains unclear. This systematic review aimed to evaluate how oncology patients are included, excluded, and analyzed in critical care setting RCTs focused on mortality outcomes.
Objectives. To assess the inclusion or exclusion of oncology patients in intensive care units (ICU) RCTs and analyze the mortality outcomes specifically within this subgroup.
Methods. We performed a systematic search of PubMed, Embase, and the Cochrane Library for multicenter RCTs published between January 2010 and January 2025. Eligible studies enrolled adult ICU patients and reported mortality as a primary or co-primary endpoint. We excluded trials focused exclusively on trauma, cardiac surgery, or COVID-19. We used Pubmed's core clinical journals filter as inclusion criteria. Two independent reviewers extracted data on oncologic exclusion criteria, the proportion of cancer patients enrolled, and whether subgroup analyses involving malignancy were conducted.
Results. A total of 63 RCTs met inclusion criteria encompassing 110,908 patients. Among these, 34 trials (54%) did not specify the inclusion or exclusion of oncology patients, and 11 trials (17.4%) explicitly excluded them. Only 18 articles (28.5%) allowed the inclusion of patients with cancer. Among these, 17 articles reported the number of cancer patients enrolled, with proportions ranging from 0.5% to 33%, with most of them (n = 13) reporting a prevalence less than 20%. None of the trials performed dedicated subgroup analyses assessing mortality outcomes specifically in oncology patients. No RCT was designed specifically to assess outcomes in critically ill oncology populations.
Conclusions. Critically ill cancer patients are substantially underrepresented in large ICU RCTs, with the majority of trials either excluding them or failing to report their inclusion status. Even when included, subgroup analyses are infrequent and often inadequately powered to inform oncologic subpopulations. This limits the generalizability of ICU trial data to cancer patients and undermines evidence-based decision-making in this growing and high-risk population. Future studies should prioritize transparent reporting, inclusive eligibility criteria, and oncologic stratification to improve the applicability of critical care research to patients with cancer.



PRISMA flow diagram of study screening and selection.

PRISMA flow diagram of study screening and selection.

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7 No acknowledgments

Topic: Haematologic-oncologic issues in the ICU

000639

Use of an artificial intelligence tool to identify diffencial patterns in sepsis detection between hospital departments

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Introduction. Sepsis is a heterogeneous syndrome that can present with a wide variety of signs and symptoms.
Objectives. To describe the diversity of variables that trigger an artificial intelligence (AI) tool for early sepsis detection, depending on the hospital department responsible for the patients.
Methods. We developed an AI tool for early sepsis detection by retrospectively analyzing a database that included both patients identified as having sepsis by the sepsis team and others without sepsis. The database comprised all patients over 14 years old admitted to our hospital between 2014 and 2018. We then studied structured variables that triggered the alert in departments with at least 90 septic patients.
Results. Records from 203,755 patients were used to develop the final model. An ensemble approach combining machine learning models and a Sepsis-2-based model was selected for its superior performance (ROC AUC = 0.95). A total of 61 structured variables were found to be significant. Departments included in the analysis were Emergency (ED), Intensive Care Unit (ICU), Surgery (SUR), Gastroenterology (GE), Internal Medicine (IM), Infectious Diseases (ID), Pulmonology (PN), Oncology (ONC), and Urology (URO). The number of significant variables per department is shown in Table 1.

Table 1. (abstract 000639) Number of significant variables per department

Department	Number of significant variables	%
ED	58/61	95,08%
SUR	56/61	91,80%
URO	53/61	88,33%
ONC	52/61	85,24%
PN	49/61	80,32%
IM	40/61	65,57%
ID	26/61	42,62%
GE	25/61	40,98%
ICU	23/61	37,70%

The significant variables for sepsis detection varied across departments. Table 2 presents the most relevant variables. Interestingly, some variables included in the SOFA score were not significant in the overall model.

Table 2.(abstract 000639) Significant (1) and non-significant (0) variables across departments. MAP: mean arterial pressure, CRP: C-reactive-protein, PT: prothrombin time.

Variable	SUR	GE	IM	ID	PN	ONC	ED	URO	ICU	Overall
Age	1	0	0	0	0	0	1	0	0	1
Heart rate	1	1	1	0	0	0	1	1	0	1
Resp rate	1	0	0	1	1	0	1	0	0	1
FiO2	1	1	1	1	1	1	0	1	1	1
SpO2	1	1	0	0	0	0	1	0	0	1
MAP	0	0	1	1	1	1	1	0	0	0
Temp	1	1	1	1	1	1	1	1	1	1
Lactate	1	1	1	1	1	1	1	1	1	1
Procalcitonin	1	0	1	1	1	1	1	0	1	1
CRP	1	0	1	0	0	1	1	1	0	1
Creatinine	1	0	0	0	0	1	1	1	1	1
Bilirubin	1	0	0	0	0	1	1	1	1	1
Leukocyte	1	1	1	0	0	0	1	1	0	1
Platelets	1	0	0	0	1	1	1	1	1	0
PT	1	0	1	0	1	1	1	1	1	1

Conclusions. An AI-based tool was able to detect different patterns in structured variables for patients with sepsis across various departments. Some variables included in current sepsis criteria were not relevant in our model, while others not typically considered proved useful.

Topic: Sepsis

000641

Effectiveness of preperitoneal packing and arterial embolization in polytrauma patients with pelvic fracture and active bleeding

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000641***.

Introduction. Pelvic fractures represent a potentially life-threatening source of hemorrhage in trauma patients. Due to the complex anatomy and the risk of massive bleeding, rapid and coordinated intervention is essential. Current management relies on multimodal strategies aimed at achieving hemodynamic stability and controlling the source of bleeding. Among the most widely used therapies are preperitoneal packing, selective arterial embolization, and external fixation. The choice and sequence of these interventions depend on the patient's clinical status and the resources available. This clinical challenge provides an opportunity to evaluate and compare which of these strategies offers the best outcomes for hemorrhage control and patient survival in our center.
Objectives. To evaluate the effectiveness and safety of preperitoneal packing (PPP), arterial embolization (AE), their combination, and external fixation in polytrauma patients with pelvic fractures and active bleeding treated at Parc Taulí University Hospital (2006–2024).
Methods. A retrospective study of 87 patients classified into four groups according to the intervention received: PPP (Group 1), AE (Group 2), combination of PPP and AE (Group 3), and external fixation (Group 4). Clinical, demographic, and intervention-related data were collected, including mortality, complications, and effectiveness. Statistical tests were used to identify significant differences between groups.
Results. The mean age was 48.3 years, with a male predominance (72.4%). The most common traumas were traffic accidents (34.5%) and falls (33.3%). AE was performed in 78.2% of patients, with an effectiveness of 85.3%. PPP was used in 32.2% (Groups 1 and 3). In Group 3, 60.7% of those treated with PPP required AE due to persistent bleeding. External fixation was used in 9.2% (Group 4).Overall mortality was 32.2%, highest in Group 1 (45.5%), followed by Group 3 (41.2%) and Group 2 (31.4%), with no deaths in Group 4. Although mortality was higher in Group 1 compared to Group 3, the difference was not statistically significant (p = 0.273).Group 3 showed worse indicators:

higher ISS (48.8 ± 13.8; p = 0.016), ABC score (3.0 vs. 2.0 in Group 1, 1.0 in Groups 2 and 4; p < 0.001), shock index (1.5 vs. 1.3 in Group 1, 1.1 in Group 2, and 1.0 in Group 4; p < 0.001), and more pre-intervention transfusions (4.6 vs. 2.0 in Group 1; p = 0.013). Acute mortality (< 48 h) was higher in Groups 1 and 3 (29.4% and 27.3%, respectively; p = 0.317), mainly caused by hemorrhagic shock, affecting 13.8%. Late mortality (4.6%) was linked to multiorgan failure due to sepsis, predominantly in Group 1 (18.2%) and Group 3 (11.8%). Packing removal time was longer in Group 1 (52.5 h) compared to Group 3 (48.0 h; p < 0.001).

Conclusions. In our study, arterial embolization (AE) was effective (85.3%) in controlling hemorrhage. However, 60.7% of patients initially treated with preperitoneal packing (PPP) required AE, suggesting that combined strategies may be useful in more severe cases. Higher mortality in Groups 1 and 3 may reflect greater injury severity. Acute deaths were mainly due to hemorrhagic shock, while late mortality was associated with multiorgan failure.

Topic: Trauma

000643

Association between albumin administration and outcome in patients with acute brain injury: a post hoc analysis of the TRAIN study

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Introduction. The role of albumin administration in patients with acute brain injury (ABI) remains controversial. While previous studies have focused on mortality, data on neurological outcome and adverse events are limited. We therefore aimed to explore the association of albumin exposure and neurological outcome in ABI patients.

Methods. We conducted a post hoc analysis of the TRAIN study, a randomized controlled trial evaluating two different transfusion strategies in ABI patients. Patients were analyzed according to whether they received albumin during their ICU stay. The primary outcome was unfavorable neurological status at 180 days (e.g. Glasgow Outcome Scale Extended ≤ 4). Secondary outcomes included mortality, ICU and hospital length of stay and serious adverse events. Multivariable logistic regressions were performed to identify predictors of different outcomes.

Results. A total of 820 patients were included (albumin group: n = 109; non-albumin group: n = 711).

Baseline characteristics were overall balanced, although the albumin group was older and had a higher prevalence of diabetes, cancer and subarachnoid hemorrhage, as initial reason of admission. No significant difference was found in the occurrence of the primary outcome (72.0% vs. 67.1%; relative risk 1.07, 95% CI 0.94–1.22, p = 0.32) between groups and albumin administration was not an independent predictor of unfavorable neurological outcome in the multivariate analysis (OR 1.08, 95% CI 0.77–1.51, p = 0.65). Similarly, the cumulative dose of albumin was not independently associated with neurological outcome (OR 0.998, 95% CI 0.9992 – 1.0004, p = 0.43). Notably, albumin use was associated with a significant reduction in cerebral ischemia (5.5% vs. 12.1%, RR 0.46, p = 0.04), although this association was no more significant in the multivariate analysis (OR 0.52, 95% CI 0.26–1.06, p = 0.07). Conversely, albumin administration was associated with an increased risk of acute respiratory distress syndrome and sepsis (adjusted OR 2.00, 95% CI 1.16–3.43, p = 0.012 and OR 1.65, 95% CI 1.07–2.53, p = 0.022, respectively).

Conclusions. In this post hoc analysis of a prospective trial, albumin administration was not associated with unfavorable neurological outcome or mortality in a heterogeneous population of ABI patients. While albumin exposure was associated with a reduction in the occurrence of cerebral ischemia, a higher incidence of ARDS and sepsis was observed in patients receiving albumin.

Topic: Neurointensive care

000645

The use of an intravenous heparin protocol to increase the filter lifespan during continuous renal replacement therapy: a quality improvement project

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000645***.

Introduction. Unplanned interruption of continuous renal replacement therapy (CRRT) is common in critically ill patients with acute kidney injury and may lead to undertreatment and blood loss. Studies on systemic heparinization to prolong CRRT filter lifespan have shown mixed results. We evaluated whether using an intravenous heparin infusion protocol during CRRT increased filter lifespan in patients in a medical intensive care unit (ICU).

Methods. This clinical audit was a part of a quality improvement project to improve CRRT in the medical ICU of the Intensive Care Department of King Abdulaziz Medical City, a large tertiary care hospital in Riyadh, Saudi Arabia. In 2017, the department implemented a quality improvement project to prolong CRRT filter lifespan that included optimization of CRRT prescription, and an intravenous heparin infusion protocol based on bleeding risk assessment. The protocol targeted low therapeutic partial thromboplastin times for patients receiving CRRT and having a low bleeding risk. In this audit, we evaluated patients in the ICU who needed CRRT between February 2023 and March 2024. We prospectively collected data on the start and end times of CRRT filters, reason for CRRT termination, and heparin protocol use. The primary outcome in this study was CRRT filter lifespan.

Results. During the study period, 86 patients had CRRT requiring 314 filters (range: 1 to 15; 310 filters had data on lifespan). The median filter lifespan was 20 h (interquartile range: 10–41; mean: 27 ± 22 h). The most common reasons for CRRT termination included filter clotting (n = 78, 25.2%), high transmembrane pressure (n = 77, 24.8%), procedures outside the ICU (n = 33, 10.6%), and completion of the entire 72-h use period (n = 32, 10.3%). Intravenous heparin infusion protocol was used in 76 of 310 filters (24.5%). The median filter lifespan was 23 h (interquartile range: 10–57; mean: 33 ± 25 h) with the heparin protocol versus 19 h (interquartile range: 9–36; mean: 25 ± 21 h) without the protocol (P = 0.01). Excluding CRRT sessions terminated for performing procedures, the median filter lifespan was 23 h (interquartile range: 10–63, mean: 34 ± 26 h) with heparin versus 19 h (interquartile range: 9–36; mean: 25 ± 21 h) without (P = 0.01). Filter clotting was reported in 22 of 76 filters (28.9%) with the heparin protocol and 56 of 234 filters (23.9%) without the heparin protocol (P = 0.38). High transmembrane pressures were reported in 12 of 76 filters (15.8%) with heparin and 65 of 234 filters (27.8%) without (P = 0.04).

Conclusions. Intravenous heparin infusion targeting low therapeutic partial thromboplastin times was used in only a quarter of ICU patients who needed CRRT and was associated with approximately 30% increase in filter lifespan.

Topic: Acute Kidney Injury and haemofiltration

000646

Plasma renin concentrations and kinetics as a potential predictive marker of hemodynamic response to second-line vasopressor in refractory shock

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Introduction. Vasodilatory shock is frequently associated with dysregulation of the renin–angiotensin system (RAS) classical pathway, marked by reduced angiotensin II (Ang II) and elevated plasma renin concentrations (PRC) [1]. In a secondary analysis of a randomized trial [2], higher PRC were associated with a greater response to exogenous Ang II [3]. However, emerging evidence indicates that elevated PRC independently predicts adverse clinical outcomes in the broader critically ill population [4].
Objectives. To evaluate PRC kinetics in refractory shock patients and its potential correlation with hemodynamic response to a second-line vasopressor therapy.
Methods. Adult (> 18 years) patients admitted to the ICU between 05/2024 and 04/2025 with refractory shock and included in an ongoing prospective registry were eligible for a second-line treatment with vasopressin (AVP) or Ang II, according to the treating physician. We analyzed collected blood samples to evaluate PRC before the start of the second vasopressor infusion and at 24 h post-administration (T0 and T24). We considered 172.7 pg/mL as the upper threshold of PRC, as indicated in the literature for patients with refractory shock [3]. Also, patients were considered "responders" if any relative decrease in PRC was observed from baseline value.
Results. At T0, plasma renin samples were available from 34 patients, of whom 26 had high and 8 normal levels. Main characteristics were comparable between the two groups. However, the high-renin group showed significantly higher median norepinephrine (NE) doses (1.05 [IQR 0.79–1.75] vs. 0.77 [0.71–0.83] mcg/Kg*min, p = 0.02) and vasoactive-inotropic scores (VIS) (111 [80.5–179] vs. 79.5 [70.8–84.3], p = 0.02) at T0. Of 27 patients with PRC samples at T0 and T24, 11 (40.7%) were classified as responders (median relative decrease -61.2 [from -76.4 to -18.0] %). Comorbidities were similar between responders and non-responders, except for a lower prevalence of hypertension (36.4% vs. 87.5%, p = 0.01), and less angiotensin-converting enzyme inhibitors exposure in responders (9.1% vs. 50%, p = 0.04). Responders had significantly lower median PRC at T0 (200.0 [96.8–879.0] vs. 1513.0 [420.0–4642.0] pg/mL, p = 0.04), despite similar severity scores. Responders had higher mean arterial pressure at T0, required lower NE over time and had reduced VIS at T24, despite similar fluid balance. No significant differences in the responders rate was observed between the two drugs.
Conclusions. In our mixed cohort of refractory shock patients, higher baseline PRC were associated with increased NE requirements and higher VIS. A 24-h decline in PRC was associated with improved hemodynamic profile, regardless of the fluid administration.

Table 1 Demographic and clinical characteristics of renin responders and non-responders

CHARACTERISTICS	Responders (n. 11)	Non Responders (n. 16)	*p-value*
Age, median (IQR)	62.0 (54.0-64.5)	63.5 (55.3-73.0)	0.54
Male, n. (%)	7 (63.6)	15 (93.8)	0.13
RAS baseline			
Renin (pg/ml), median (IQR)	200.0 (96.8-879.0)	1513.0 (420.0-4642.0)	**0.04**
Aldosterone (ng/ml), median (IQR)	102.0 (66.3-289.0)	151.0 (79.3-221.0)	0.72
Aldosterone/renin ratio (pmol/mUi), median (IQR)	0.86 (0.29-2.22)	0.19 (0.05-0.29)	**0.04**
Comorbidities, n. (%)			
Hypertension	4 (36.4)	14 (87.5)	**0.01**
Drug history, n. (%)			
ACEi	1 (9.1)	8 (50.0)	**0.04**
ARB	0 (0)	4 (25.0)	0.12
Type of shock, n. (%)			
Septic	5 (45.5)	5 (31.3)	0.69
Cardiogenic	1 (9.1)	4 (25.0)	0.62
Mixed	2 (18.2)	5 (31.3)	0.66
Other	3 (27.3)	2 (12.5)	0.37
Shock management			
MAP (mmHg) before starting 2nd vasopressor, median (IQR)	70.0 (69.0-77.5)	64.0 (61.0-67.5)	**0.01**
Serum lactate before starting 2nd vasopressor (mmol/L), median (IQR)	3.2 (2.2-5.4)	4.2 (3.7-7.2)	0.27
Steroids, n. (%)	10 (90.9)	14 (87.5)	1.00
NE dose (mcg/Kg/min) before starting 2nd vasopressor, median (IQR)	0.80 (0.74-0.88)	0.95 (0.78-1.83)	0.13
Second line vasopressor Vasopressin, n. (%) Angiotensin II, n. (%)	 6 (54.5) 5 (45.5)	 14 (87.5) 2 (12.5)	 0.06 0.06
Post second-line vasopressor			
MAP (mmHg) at 24 hrs, median (IQR)	72.0 (69.0-79.0)	68.0 (65.5-73.5)	0.16
Serum lactate at 24 hours (mmol/L), median (IQR)	2.3 (1.7-2.5)	3.9 (1.5-5.5)	0.35
NE dose (mcg/Kg/min) at 24 hrs, median (IQR)	0.21 (0.16-0.37)	0.74 (0.36-1.12)	**0.01**
Second line vasopressor Vasopressin (UI/h) Angiotensin II (ng/kg/ml)	 0.10 (0.00-0.95) 12.0 (5.0-15.0)	 1.00 (0.15-1.20) 0.0 (0.0-0.0)	 0.44 0.16
Vis Score at 24 hrs, median (IQR)	26.0 (19.5-34.7)	91.2 (43.4-124.0)	**0.01**
Fluid balance at 24 hours (ml), median (IQR)	2583 (1187-3338)	3779 (1904-4939)	0.15
Outcomes			
ICU death, n. (%)	4 (36.4)	11 (68.8)	0.12

RAS: renin-angiotensin system; ACE-i: angiotensin-converting enzyme inhibitors; ARBs: Angiotensin II receptor blockers; MAP: mean arterial pressure; NE: norepinephrine; ICU: intensive care unit

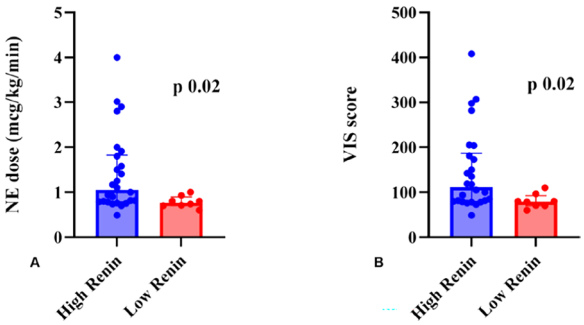


Fig 1 (abstract 000646) Difference in norepinephrine dose (A) and VIS score (B) between high-renin and low-renin groups

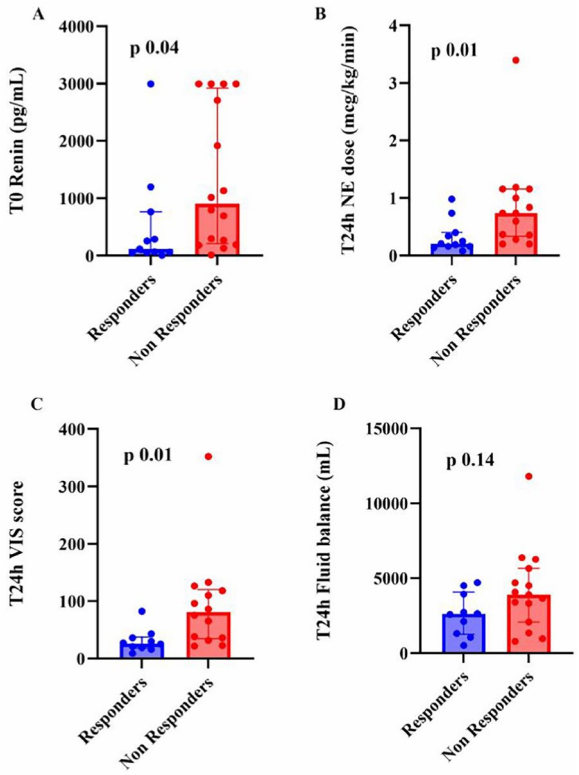


Fig 2 (abstract 000646) Difference in plasma renin concentration at T0 (A), norepinephrine dose (B), VIS score (C) and fluid balance at T24 (D) between responders and non-responders.

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Topic: Cardiovascular issues in ICU

000647

Association between thrombocytopenia and development of acute respiratory distress syndrome in critically ill patients

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000647.

Introduction. Given that platelets support the integrity of the alveolar-capillary membrane (1), it is conceivable that thrombocytopenia may be associated with development of acute respiratory distress syndrome (ARDS). Yet, clinical studies confirming such an association are limited.

Objectives. We endeavoured to examine whether thrombocytopenia is independently associated with development of ARDS in critically ill patients.
Methods. First, we performed a systematic review and meta-analysis of observational studies reporting the number of patients at risk for ARDS with, versus without thrombocytopenia who eventually developed ARDS. Next, we performed a secondary analysis using individual patient-level data from three large randomized controlled trials conducted in North America by the Prevention and Early Treatment of Acute Lung Injury (PETAL) Network [namely, VIOLET, CLOVERS and ASTER](2–4) to estimate whether thrombocytopenia (defined as < 100,000 platelets/μL) was independently associated with development of ARDS.
Results. In the meta-analysis, six observational studies (seven cohorts) involving 3647 critically ill patients were included. Patients with versus without thrombocytopenia were more likely to develop ARDS [43.0% versus 32.0%; relative risk 1.46, 95% confidence intervals (CI) 1.19–1.80; $p < 0.001$]. In the secondary analysis, data from 2927 critically ill patients were analyzed. After adjustment for confounders, such as sex, age, extrapulmonary sepsis as a primary risk factor for ARDS and hematologic malignancy, thrombocytopenia was independently associated with development of ARDS (2884 patients, 102 events; odds ratio 1.86, 95% CI 1.13–3.06; $p = 0.015$).
Conclusions. Both the meta-analysis of observational studies and the secondary analysis of randomized controlled trials suggest that thrombocytopenia may be associated with development of ARDS. These findings may further elucidate the role of platelets in ARDS.

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Acknowledgements
This secondary analysis was prepared by using LOTUS FRUIT, VIOLET, CLOVERS and ASTER PETAL research materials obtained from the Biologic Specimen and Data Repository Information Coordinating Center (BioLINCC) of the National Heart, Lung, and Blood Institute (NHLBI). The article does not necessarily reflect the opinions or views of the researchers who performed these trials or the NHLBI. The authors acknowledge the incredible work by the PETAL Network researchers, without which this study would not have been possible.

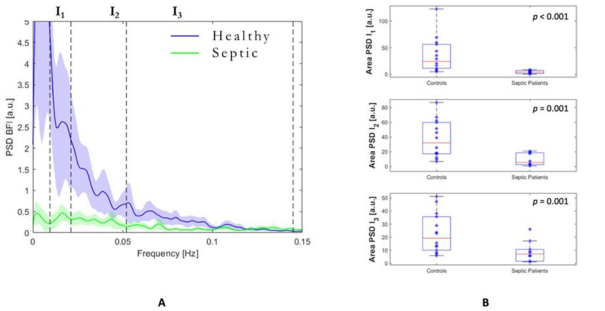
Topic: Acute respiratory failure and mechanical ventilation

000648

Non-invasive diffuse optics assessment of NO-dependent endothelial function in septic patients admitted to the ICU

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000648***.

Introduction. Microvascular blood flow oscillations correlate with various physiological processes based on their frequency range [1]:
·[0.6–2.0 Hz]: cardiac activity.
·[0.145–0.6 Hz]: respiratory activity.
·[0.052–0.145 Hz] (I3): myogenic activity.
·[0.021–0.052 Hz] (I2, low frequency or LF): neurogenic (sympathetic) activity.
·[0.0095–0.021 Hz] (I1, very low frequency or VLF): endothelial activity mediated by nitric oxide (NO).
While laser Doppler flowmetry (LDF) and photoplethysmography (PPG) are useful for studying superficial tissues like the skin, they do not provide insights into deeper tissues. In a previous study in healthy volunteers, we demonstrated that microvascular blood flow oscillations can be monitored on the skeletal muscle using a hybrid time-domain near-infrared spectroscopy (TD-NIRS) and diffuse correlation spectroscopy (DCS) device [2].
Objectives. To assess the ability of TD-NIRS/DCS derived microvascular blood flow oscillations to detect differences between healthy volunteers and septic patients admitted in the ICU.
Methods. A hybrid TD-NIRS/DCS device was used to measure healthy volunteers and septic patients admitted to the ICU. The technology enables simultaneous measurement of oxy- and deoxy-hemoglobin concentrations and microvascular blood flow. Hemoglobin concentrations are used to derive tissue oxygen saturation (StO2), while diffuse laser speckles influenced by red blood cell motion are used to derive the microvascular blood flow index (BFI). StO2 and BFi were monitored on the thenar eminence during a 900-s period. Power spectral density (PSD) of BFi was computed for each frequency using the Welch algorithm, employing Hamming windows of 300 s with a 50% overlap. Mann–Whitney U-test was used for performing comparisons between healthy subjects and septic patients.
Results. Fourteen healthy volunteers and ten ICU septic patients were included in the analysis. Healthy volunteers were younger than septic patients (27 ± 3 vs 64 ± 8 years). All septic patients were stable, under mechanical ventilation, with normalized mean arterial pressure (MAP) values (79 ± 14 mmHg). Eight patients were receiving norepinephrine (0.5 ± 0.6 mcg/kg/min). Baseline microcirculatory status was similar in terms of tissue oxygenation (StO2 60 ± 6 vs 58 ± 11%, p ns) and microvascular blood flow (BFi 18·10–9 ± 9·10–9 vs 20·10–9 ± 16·10–9 cm2/sec, p ns). The PSD of BFI was significantly higher in healthy subjects in all the low frequency ranges: 37.1 ± 25.3 vs 7.9 ± 8.2 a.u. ($p = 0.001$) for LF (I2); and 35.9 ± 32.5 vs 4.1 ± 3.3 a.u. ($p < 0.001$) for VLF (I1) (Fig. 1).
Conclusions. Non-invasive diffuse optics technology can detect distinct patterns of microvascular blood flow oscillations in healthy individuals and septic patients. Sepsis-related changes in endothelial activity within the NO-dependent range can be effectively monitored at the bedside using TD-NIRS/DCS on skeletal muscle. These findings warrant further investigation to elucidate their clinical relevance.



Panel A: (abstract 000648) comparison of the PSD of BFI measured on healthy volunteers and ICU patients, on the thenar eminence (solid lines represent the mean PSD values, while shaded regions indicate the standard error). Panel B: absolute area of PSD BFI of healthy subjects and ICU septic patients

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Topic: Sepsis

000649

Association between humoral immunity proteins and mortality in sepsis: a systematic review and meta-analysis

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000649***.

Introduction. Humoral immune proteins, including immunoglobulins, complement proteins, and antimicrobial peptides, play critical antimicrobial and immunomodulatory roles. We hypothesised that circulating levels of these proteins are lower in sepsis non-survivors than in survivors.
Objectives. To evaluate the relationship between circulating levels of humoral immunity proteins, specifically immunoglobulins, complement and antimicrobial peptides, and mortality among critically ill septic patients.
Methods. A systematic review and meta-analysis were conducted using PubMed and Embase databases up to January 2025. Inclusion criteria were papers describing adult ICU patients with sepsis that reported plasma levels of immunoglobulins, complement proteins or antimicrobial peptides, comparing survivors and non-survivors. Complementary data were sourced from the MIMIC-IV database and three proteomic studies. Random-effects meta-analyses provided standardized mean differences (SMD) with 95% confidence intervals (CI).
Results. Thirty-six studies with 6,330 patients were included. Thirteen studies reported data on immunoglobulin levels, 17 on complement proteins, and 7 on antimicrobial peptides. The MIMIC-IV database provided data on an additional 2452 patients on immunoglobulins and complement proteins. Higher levels of C3 (0.53 [0.12 to 0.94]) and C4 (0.42 [0.14 to 0.71]), and lower levels of IgA (-0.21 [-0.36 to -0.06]) and C4a (-1.17 [-1.77 to -0.56]) on ICU admission were significantly associated with survival. C3a levels were lower in survivors but the difference was not statistically significant (Figs. 1 & 2). Levels of IgG, IgM, other complement proteins, and heparin binding protein were similar between survivors and non-survivors. Proteomic data confirmed a

rapid depletion of complement proteins within 72 h in non-survivors. In the longitudinal analysis of MIMIC-IV data, survivors exhibited relative stability in IgG, IgA, IgM and complement proteins C3 and C4 between days 0–1 and 2–5, whereas non-survivors showed significant declines over the same period.

Conclusions. Lower levels of complement proteins are associated with mortality in sepsis. These findings highlight the potential of targeting complement pathways as a therapeutic strategy in sepsis.

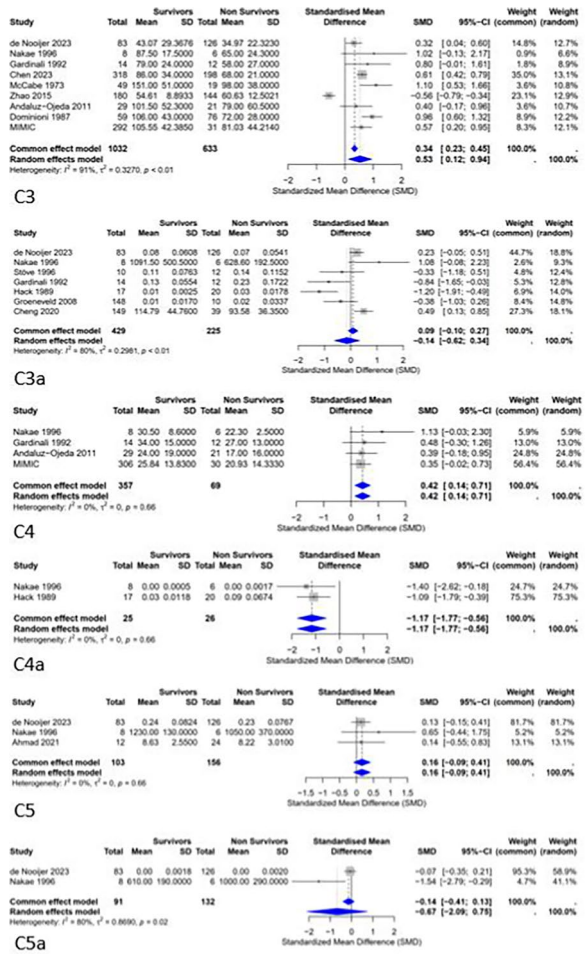


Fig 1 (abstract 000649) Meta-analysis of complement proteins in septic shock patients. Forest plots comparing the levels of different complement proteins between survivors and non-survivors in the ICU. Each individual study is represented by a square, with its size proportional to the study's weight in the meta-analysis. Horizontal bars indicate 95% confidence intervals. The blue diamond represents the pooled effect estimate from the random-effects model. Heterogeneity values (I^2) *are provided for each analysis.*

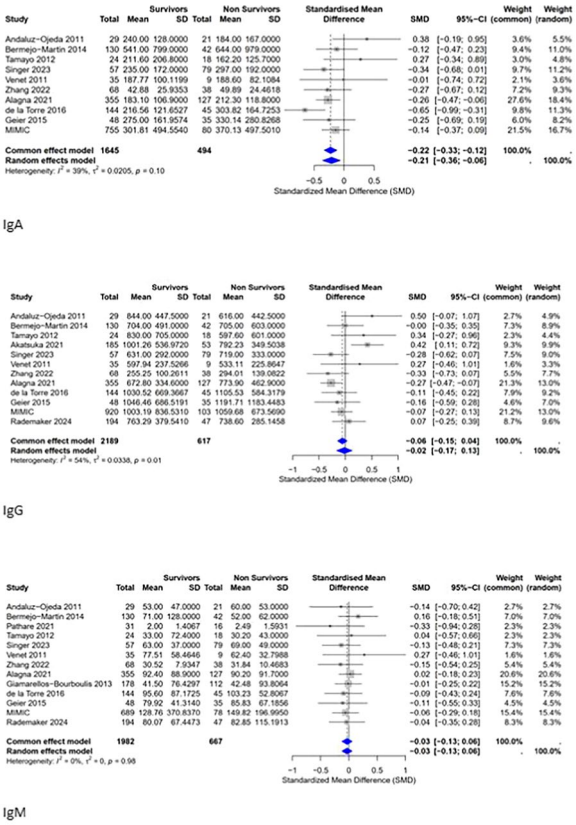


Fig 2 (abstract 000649) Meta-analysis of immunoglobulins in septic shock patients. Forest plots comparing the levels of different complement proteins between survivors and non-survivors in the ICU. Each individual study is represented by a square, with its size proportional to the study's weight in the meta-analysis. Horizontal bars indicate 95% confidence intervals. The blue diamond represents the pooled effect estimate from the random-effects model. Heterogeneity values (I^2) *are provided for each analysis.*

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3 None.

Topic: Sepsis

000650

Pathogens and antibiotic resistance patterns from bloodstream infections in Greek adult intensive care units: preliminary results from the BACT.GR 2024 study

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000650.

Introduction. Bloodstream infections (BSIs) are frequent ICU acquired infections in intensive care units (ICUs) in Greece and are often caused by multidrug resistant (MDR) pathogens which impacts length of stay, costs and mortality. Previous publications involve predominantly single center studies and data on a national level is scarce.
Objectives. The Section of Infection Prevention and Management of the Hellenic Society of Intensive Care Medicine designed the BACT.GR 2024 study to ascertain the prevalence and microbial etiology of BSI episodes in Greek ICUs on a national scale.
Methods. A prospective, observational two-month point prevalence study was performed between November and December 2024. All ICU-acquired BSIs in patients with a central venous catheter were included. Definitions and methodology were according to CDC-NHSN and ECDC guidelines. Demographic, clinical and microbiological data were collected anonymously using Redcap software. Pathogen identification and antimicrobial sensitivity was determined according to EUCAST criteria (applied currently by Greek Microbiology Departments).
Results. 295 patients with BSI were reported from 43 adult ICUs. In total, 392 isolates were recovered in 338 BSI episodes. 227(58%) isolates were Gram negative, 88 (22.4%) Gram positive and 77(19.6%) fungi. The most common Gram negative pathogens were *Acinetobacter baumannii* (30.4%) and *Klebsiella pneumoniae* (29.96%). Detailed information on pathogens and antibiotic susceptibility is presented in the following Table.

Isolates		**Percent (%) susceptible to**				
Gram negative	**N (%)**	**Meropenem**	**Colistin**	**Ceftazidime Avibactam**	**Imipenem Relebactam**	**Meropenem Vaborbactam**
A. baumannii	69 (30.4)	2	36	-	-	-
K. pneumoniae	68 (29.96)	5	42	36	30	31
P. aeruginosa	45 (19.82)	25	90	45	37	-
Other Gram(-)	45 (19.82)					
Total Gram negatives 227						
Gram positive	N (%)	Gentamycin	Vancomycin			
Enterococcus sp.	46 (52.27)	42	57			
S. aureus	1 (1.14)		100			
Coagulase negative Staphylococcus spp.	29 (32.95)		100			
Other Gram(+)	12 (13.64)					
Total Gram positives 88						
Fungi	N (%)	Fluconazole	Anidulafungin	Micafungin	Caspofungin	Ampho. B
Candida auris	39 (50.65)	3	95	81	75	70
C. parapsilosis	16 (20.78)	46	100	100	72	100
C. albicans	14 (18.18)	100	90	90	92	100
Other fungi	8 (10.39)					
Total fungi 77						

Conclusions. Gram-negative pathogens predominate in the etiology of BSIs in Greek ICUs, mainly multidrug resistant *A. baumannii and K. pneumoniae*. High resistance rates of *K. pneumoniae* to newer BL/BLI's is an alarming issue. Among Gram-positive bacteria, *c* exhibits 43% non-susceptibility to vancomycin. Half of fungemias is due to *Candida auris.* Our results raise concerns for empirical and targeted antimicrobial regimens, as well as, for infection prevention and control issues in Greek ICUs.

Reference

1 None

Topic: Infections and prevention

000652

Effectiveness of protocolised early rehabilitation in adult ICU patients compared to standard care: a systematic review

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000652.

Introduction. Intensive Care Unit–Acquired Weakness (ICU-AW) is a syndrome characterised by diffuse, symmetrical, and generalised muscle weakness that prolongs the duration of invasive mechanical ventilation (IMV) and ICU stay, and affects short- and long-term functionality. It includes polyneuropathy, myopathy, and neuromyopathy, conditions that may persist for months or years after hospital discharge, significantly reducing quality of life. Immobility is a key risk factor for the development of ICU-AW; therefore, early rehabilitation (ER) has been proposed as a preventive strategy. ER in the ICU (ER-ICU) includes physiotherapy, occupational therapy, and other interventions, initiated once physiological stability is achieved and maintained throughout the ICU stay, ideally within 1–2 days of IMV initiation. Studies have reported mixed findings regarding its impact on IMV duration, ICU-AW incidence, and mortality. This systematic review assesses the effectiveness of protocolised ER-ICU compared with standard care in reducing ICU-AW and improving short- and long-term functionality.
Objectives. To determine the effectiveness of protocolised ER-ICU compared to standard care in reducing ICU-AW incidence and functional decline.
Methods. A systematic search was conducted in PubMed, Scielo, Scopus, EMBASE, Web of Science, Cochrane Central Register, JBI, and CINAHL, with no restrictions on date or language. Two independent reviewers selected studies and assessed methodological quality using JBI checklists. A narrative synthesis and meta-analysis were performed. PROSPERO Registration: CRD42023388385.
Results. A total of 1,974 articles were identified. After screening, 151 full texts were reviewed and 31 studies were included. Meta-analysis showed no significant differences in ICU mortality or mobilisation-related adverse events. ICU length of stay was reduced by 2.22 days in the ER-ICU group [95% CI: -3.51; -0.93], and hospital stay by 2.68 days [95% CI: -5.01; -0.34]. The reduction in ICU-AW incidence was not statistically significant [-0.12; 95% CI: -0.33; -0.07].
Conclusions. Protocolised ER-ICU was associated with shorter IMV duration and ICU stay, with no significant difference in ICU-AW incidence or increase in adverse events. Additionally, patients experienced less functional decline at hospital discharge.

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Topic: Nursing care and physiotherapy

000655

Dynamic assessment of recirculation and non-shunted pulmonary blood flow in V-V ECMO using oxygen-flow relationship analysis

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Introduction. Veno-venous extracorporeal membrane oxygenation (V-V ECMO) is a life-support modality for severe respiratory failure. Recirculation of oxygenated blood and the relationship between extracorporeal and pulmonary blood flow significantly impact treatment efficacy. Determination of pulmonary blood flow using gas exchange analysis and adapted thermodilution have been hypothesised for ECMO [1, 2], but current monitoring techniques lack reliability and validation during V-V ECMO [3].
Objectives. To develop a method for assessing recirculation and pulmonary blood flow during V-V ECMO using dynamic oxygenation-to-flow relationships.
Methods. We hypothesised that the relationship between ECMO blood flow (QECMO) and membrane oxygen transfer (VO_2ECMO) in relationship to total oxygen transfer (lung and membrane; VO2Total) would allow determination of recirculation and pulmonary blood flow; 1) at low recirculation fractions the ratio of VO_2Total to maximum blood flow (Qmax) equals the slope of VO_2ECMO versus QECMO ($\Delta VO_2/\Delta Q$), which would allow calculation of non-shunted pulmonary blood flow; 2) the extent of increased recirculation at higher QECMO could be estimated from the deviation from the initially established $\Delta VO_2/\Delta Q$.
The hypothesis was tested using a simulation model of V-V ECMO [4] with changing QECMO (0.5–5.0 L/min) and the following variables: cardiac output (5 L/min), recirculation fraction (0–30%), fraction of inspired oxygen (60% for ventilator and membrane), 0% shunt, and a fixed VO_2Total. Simulation of progressive recirculation started at 0% for ECMO flows up to 1/3 of cardiac output and then increased linearly with ECMO flow.
Results. Modelling analysis confirmed a linear relationship between VO2ECMO and QECMO (with constant recirculation fractions), representing the oxygen-carrying capacity per unit of blood (Fig. 1A). The maximum theoretical QECMO, where the linear relationship intersected with VO_2Total, equalled non-shunted pulmonary blood flow (Fig. 1A) and could be calculated as:
Qmax = (VO_2Total*ΔQECMO)/ΔVO_2ECMO.
Recirculation caused a proportional decrease in VO2ECMO and underestimation of Qmax (Fig. 1A).
In cases of progressive recirculation with increasing blood flow, simulated VO_2ECMO would deviate from projected values determined at low QECMO where recirculation is assumed to be constant (Fig. 1B). This deviation for a target blood flow is proportional to the recirculation fraction (RF), quantified as:
RF = 1—measured VO_2/projected VO_2.
Conclusions. This novel approach estimated recirculation and non-shunted pulmonary blood flow during V-V ECMO by determination of total gas exchange before and after a stepwise change in QECMO. By analysing the dynamic relationship between ECMO flow and oxygen transfer, clinicians may better guide real-time ECMO therapy towards maximum oxygen delivery. If cardiac output is estimated using other methods [5, 6], the proposed approach may provide a tool to estimate pulmonary shunt fraction.

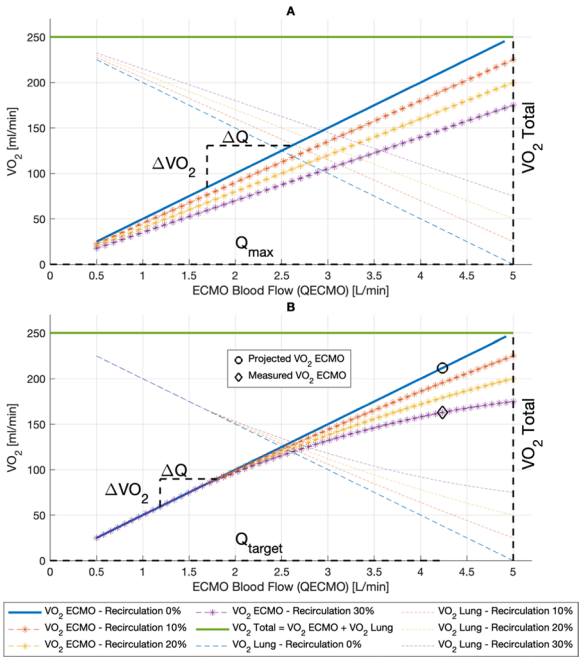


Fig 1 (abstract 000655) Relationship between ECMO blood flow and oxygen transfer during V-V ECMO. (A) Oxygen transfer over the membrane lung (VO_2ECMO) increased linearly with ECMO blood flow (QECMO) at low flow. The slope of this linear portion ($\Delta VO_2/\Delta Q$) and measurement of VO_2Total (which equals VO_2Lung + VO_2ECMO), allowed determination of the theoretical maximum oxygenation capacity (Qmax), where ECMO delivers total oxygenation. **(B)** At higher recirculation fractions, the measured VO_2ECMO (diamond marker) for a targeted blood flow (Qtarget) deviated from the projected linear relationship (circle marker). The magnitude of this deviation is inversely proportional to the recirculation fraction, allowing its calculation as 1 – measured VO_2/projected VO_2. Colours represent varying recirculation fractions.

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Topic: Acute respiratory failure and mechanical ventilation

000658

Characterization and prognosis of patients with sepsis, septic shock, and macrophage activation-like syndrome (MALS)

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Introduction. Excessive activation of macrophages in sepsis can result in certain patients displaying characteristics akin to those observed in macrophage activation-like syndrome (MALS).
Objectives. To identify and characterize the differences between patients meeting MALS criteria and the rest of the cohort.
Methods. A retrospective cohort study was conducted including patients with septic shock and severe sepsis activated under the Sepsis Code of our center between April 2018 and November 2024. Inclusion criteria: severe sepsis or septic shock (Sepsis-2 definitions), determination of ferritin levels. Exclusion criteria: none. MALS criteria were defined by a ferritin level > 4400 ng/mL obtained within the first 12 h of sepsis/septic shock development.
Demographic, comorbidity, infection-related, and sepsis-evolution variables were studied. A descriptive analysis was performed using median and interquartile range for quantitative variables and frequency and percentage for categorical variables. An exploratory univariate analysis was then performed using the Chi-square test for categorical variables and the Mann–Whitney U test for continuous variables. Statistical significance was defined as $p < 0.05$. Statistical analysis was performed using StataBE 18.5 (StataCorp 2023). The study was approved by the ethics committee under registration number PR(AG)336/2016.
Results. A total of 375 patients were included. The majority were males (236, 62.9%) with a median age of 61.5 years (51–71), and 164 (43.7%) presented some form of immunosuppression. The most common septic foci were respiratory (126, 33.9%) and abdominal (85, 22.8%).
Fifty patients (13.3%) met MALS criteria. These patients were generally younger than the rest of the cohort (58.5 years [47–64] vs. 62 [52–72] years, $p = 0.031$), more frequently immunosuppressed (60% vs 41.2%, $p = 0.04$), and exhibited worse outcomes (ICU mortality 72.9% vs. 28.2%, $p < 0.001$). Other differences in comorbidity and organ support can be found in Table 1.
Conclusions. Ferritin levels > 4400 ng/mL identified a subgroup of septic patients with more organ dysfunction and worse outcomes.

Table 1 Univariate analysis of differences between patients meeting MALS criteria and those who do not

Variable	Without MALS Criteria (n=325)	With MALS Criteria (n=50)	p-value
Sex (male)	205 (63.1%)	31 (62.0%)	0.310
Age (years)	62 (52–72)	58.5 (47–64)	0.031
Immunosuppression	134 (41.2%)	30 (60.0%)	0.040
Heart disease	51 (15.7%)	7 (14%)	0.749
COPD	56 (17.2%)	5 (10%)	0.333
Cirrhosis	29 (8.9%)	3 (6%)	—
Chronic kidney disease	48 (14.8%)	7 (14%)	0.666
APACHE II	22.5 (14–28)	23 (18–31)	0.262
SOFA	9 (6–12)	13 (10–16)	<0.001
Lactate (mmol/L)	2.3 (1.4–4.5)	4.6 (2.9–9)	<0.001
CRP (mg/dL)	15.4 (6.5–26.0)	18.3 (3.2–45.7)	0.259
PCT (ng/mL)	4 (0.8–21.6)	18.3 (3.2–45.7)	0.001
IL-6 (pg/mL)	375.1 (137.2–3995)	9599 (779–187598)	<0.001
P/F ratio (mmHg)	204 (136–320)	154 (102–245)	0.013
INR	1.3 (1.1–1.6)	1.5 (1.2–17)	0.002
Leukocytes (10^9/L)	12.1 (5.6–19.3)	3.6 (0.6–16.7)	<0.001
Platelets (10^9/L)	183 (89–270.5)	154 (102–245)	<0.001
Creatinine (mg/dL)	2.4 (0.89–2.33)	2.1 (1.4–2.7)	0.006
Total bilirubin (mg/dL)	0.86 (0.5–1.72)	1.5 (0.8–2.65)	0.003
Vasopressor support	251 (77.2%)	50 (100%)	<0.001
Invasive mechanical ventilation	187 (57.5%)	41 (82%)	0.004
CRRT	99 (30.5%)	34 (68%)	<0.001
ICU survival	186 (71.8%)	13 (27.1%)	<0.001
Hospital survival	211 (64.9%)	10 (20%)	<0.001

Abbreviations: COPD = chronic obstructive pulmonary disease; CKD = chronic kidney disease; APACHE = Acute Physiology and Chronic Health Evaluation; SOFA = Sequential Organ Failure Assessment; PCT = Procalcitonin; IL-6 = Interleukin 6; P/F ratio = Ratio between partial pressure of oxygen and inspired oxygen fraction; RRT = Renal replacement therapy.

N total number of participants for study, *g* Hedges' *g* effect estimate, with positive values reflecting improvement with telehealth, *p* significance value associated with *g*, *SMS* short message/messaging service, *DASS-21* Depression Anxiety Stress Scales -21-item, *PSI* Parenting Stress Index (includes 4th Edition), *PHQ* Patient Health Questionnaire (both 4- and 9-item), *PSS* Parental Stress Scale, *SIPA* Stress Index for Parents of Adolescents

Topic: Sepsis

000660

adult intensive care unit survivors and financial toxicity: a scoping review

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Introduction. Financial toxicity is an emerging issue among intensive care unit (ICU) survivors, defined as the economic burden resulting from medical expenses and loss of income. While this phenomenon has been widely studied in oncology patients, its impact on survivors of critical illness remains poorly understood. This scoping review examines the available evidence on financial toxicity in this population, as well as its effects on return to work and income loss.
Objectives. To systematically describe the scope and nature of the available evidence on financial toxicity in adult ICU survivors, identifying its impact on individual and family finances, return to employment, and long-term financial stability.
Methods. A scoping review was conducted following the Joanna Briggs Institute (JBI) methodology. Searches were carried out in databases such as MEDLINE, EMBASE, CINAHL, Web of Science, LILACS, and the Cochrane Library, as well as grey literature. Studies assessing financial toxicity in adult ICU survivors (≥ 18 years) were included without geographical or cultural restrictions. Article selection was performed

by two independent reviewers, and a descriptive analysis was applied to the extracted data.
Register OSF: Sepulveda, M. I., Pinto-Galleguillos, D., Rojas, V., Regueira, T., Secoli, S., & de Araujo, V. A. (2024, July 29). Adult Intensive Care Unit survivors and financial toxicity: a scoping review. Retrieved from osf.io/7jdc2.
Results. Sixteen studies were included, comprising prospective cohort designs, secondary analyses, and qualitative studies(1–16). Findings indicated that financial toxicity is common among ICU survivors, manifesting as high medical bills, reduced income, and reliance on external financial support. In studies from the USA and Europe, between 33 and 67% of patients were reported to experience significant financial hardship following ICU discharge (14,16).
Return to work was limited: 44% of patients with ARDS in the USA did not return to employment after 12 months (7), while 42% of critical illness survivors in the USA, UK, and Australia experienced employment changes due to post-ICU disability(3,11). The estimated income loss over a five-year follow-up period reached USD $200,000 per patient (12).
Conclusions. Financial toxicity severely affects survivors of critical illness, limiting their access to healthcare and worsening their quality of life. Financial support strategies and employment rehabilitation programmes are needed to mitigate its effects. Future research should focus on identifying populations at risk and evaluating policies aimed at reducing the economic impact of critical illness.

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Topic: Health Services Research and Outcome

000661

Albumin net leakage during and after liver transplantation

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000661***.

Introduction. In liver transplantation, human albumin is administered as maintenance fluid during surgery. Postoperatively, it is used to compensate for drain losses, ensure circulatory stability, and maintain a plasma albumin level of 25 g/L. However, evidence supporting this practice is limited. In a previous study conducted by our group, we observed net albumin leakage (NAL) in patients undergoing stable, uncomplicated liver transplantation, with significant albumin losses continuing until postoperative day 3 (POD3) (1).
Objectives. To assess NAL during and after surgery through postoperative day 7 (POD7) (primary aim) and continuing until hospital discharge or POD21 (PODlast) in adults undergoing liver transplantation at Karolinska University Hospital, Huddinge, Sweden. To investigate clinical factors associated with NAL.
Methods. Over a two-year period, a total of 131 adult patients were studied during and after liver transplantation, with 87 remaining hospitalized for more than seven days. NAL was assessed using mass balance calculations, *i.e.* comparing hemoglobin and albumin dilutions when all losses and gains of the two compounds are considered. A greater albumin dilution is interpreted as net albumin lost from the intravascular space. Data are presented as mean with 95% confidence intervals. T-tests were used to assess whether data differed from zero. NAL was correlated to albumin gains minus losses (ΔAlb) in 4 time intervals: from start of surgery until end of surgery (EOS), from EOS until POD3, from POD3 until POD7, and from POD7 until PODlast (GraphPad Prism 10).
Results. NAL at POD7 was 42 g (31–52, $p < 0.001$). NAL for the 4 time intervals was 23 g (19–28, $p < 0.001$), 0 g (–7–7, $p = 0.91$), 18 g (11–25, $p < 0.001$), and 22 g (10–33, $p < 0.001$), respectively. ΔAlb at the same time intervals was 42 g (37–46, $p < 0.001$), 7 g (–1–14, $p = 0.073$), 8 g (1–16, $p = 0.027$), and 25 g (12–37, $p < 0.001$), respectively. There was a positive correlation between NAL and ΔAlb for all time intervals that increased gradually over time from $r2 = 0.281$ for the first interval to $r2 = 0.835$ at the last.
Conclusions. NAL persisted throughout the surgery and continued until POD7 and PODlast. The correlation between NAL and ΔAlb increased over time towards a strong association. We suggest that over-substitution of albumin is a major contributor to NAL, especially in the postoperative period, after liver transplantation.

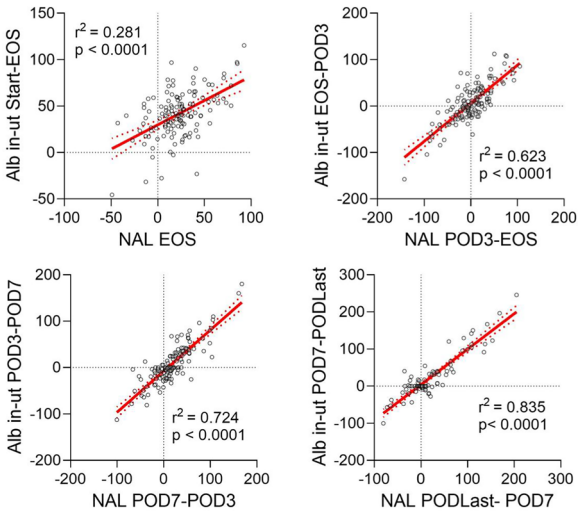


Fig 1 (abstract 000661) Net albumin leakage (NAL) vs albumin gains minus losses (Alb in–out) in four time intervals during and after liver transplantation. EOS = end of surgery, POD = post-operative day

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Topic: Metabolism, endocrinology, liver failure and nutrition

000662

Influence of sleep quality on pain in patients seen in post-ICU consultation

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000662***.

Introduction. Post-intensive care syndrome (PICS) describes the physical, cognitive and psychological sequelae that persist after an ICU stay. Chronic pain is a common manifestation, significantly affecting quality of life. This persistence of pain is often intertwined with sleep disturbances, creating a vicious cycle that hinders the patient's recovery and well-being. Understanding this relationship is crucial to comprehensively address PICS.
Objectives. To analyze the quality and characteristics of sleep disturbances suffered by patients and their influence on the subjective perception of pain after ICU stay.
Methods. Descriptive, observational and analytical retrospective study on a prospective database. We included critically ill patients who were consecutively admitted to an intensive care unit (ICU) of a tertiary level university hospital between November 2020 and August 2024, for more than 72 h, requiring some type of organic support and patients with a history of anxiety or depression. Variables related to sleep habits, time, quality, need for drugs to fall asleep and frequency of pain were analyzed. Quantitative variables are expressed as mean ± standard deviation or median (interquartile range), and qualitative variables as absolute and relative frequency. Comparison between dichotomous qualitative variables was performed using Pearson's χ^2.
Results. We analyzed 71 patients, with a mean age of 58.7 ± 13.7 years, of whom 43(60.6%) were male, with a mean BMI of 27.8 ± 6.9. The median ICU stay was 19 days (9.30). Of the 71 patients interviewed about their sleep characteristics, 34 patients (47.8%) reported taking more than 30 min to fall asleep as a significant problem,56 (78.8%) had frequent awakenings during the night, 46 (64.7%) needed to get up to go to the toilet, and 34 (47.8%) required two or more drugs to fall asleep. Of the patients who presented these sleep disturbances, a higher percentage of the patients who required a long time to fall asleep reported frequent or very frequent pain (51.7%vs. 45%, $p = 0.581$), a higher percentage of those who had nocturnal awakenings(100% vs. 82.5%, $p = 0.019$), a higher percentage of those who needed to get up to go to the toilet (82.8% vs. 70%, $p = 0.225$) and a higher percentage of those who required 2 or more drugs to fall asleep (55.2% vs. 35%, $p = 0.095$).
Conclusions. Patients who were admitted to the ICU and met criteria for requiring post-ICU consultation with sleep disturbances presented a higher frequency of subjective perception of pain, being statistically significant in those who presented nocturnal awakenings.

Topic: Health Services Research and Outcome

000663

Therapeutic drug monitoring of β-lactam antibiotics in critically ill patients

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000663***.

Introduction. Therapeutic drug monitoring (TDM) of antibiotics is an important tool for precision medicine, particularly in critically ill patients with variable pharmacokinetics (PK) and pharmacodynamics (PD).
Objectives. To investigate PK/PD target attainment of β-lactam antibiotics in critically ill patients and to identify predictors for suboptimal exposure.
Methods. A retrospective study on TDM of β-lactam antibiotics was conducted at AZ Sint-Jan Hospital, Bruges in 2023. All adults admitted to the intensive care unit (ICU) and receiving β-lactam antibiotics for > 24 h were included. The primary endpoint was PK/PD target attainment, defined as a steady-state concentration (Css) that was at least 4 times the minimum inhibitory concentration (MIC), epidemiological cut-off (ECOFF), or breakpoint (BP), and did not exceed 10 times the worst-case breakpoint (BP). (4xMIC/ECOFF/BP < Css > 10 × Worst-case BP). Predictors of non-attainment were analysed using binary logistic regression.
Results. In 63 patients, 91 TDM assessments were conducted. Most patients were male (61.9%), with a mean age of 68 years. Target attainment was achieved in 50.5% of patients, with 84.6% meeting the efficacy target (100% *f*T > 4xMIC). Lower target attainment was observed in augmented renal clearance (ARC) and obesity (BMI > 30 kg/m^2). Renal insufficiency (OR 0.11; 95% CI [0.026 – 0.479]) and obesity (OR 0.31; 95% CI [0.100 – 0.944]) were significant predictors of reaching the efficacy target, while ARC was a relevant predictor for non-target attainment (OR 1.60; 95% CI [0.523 – 4.891]). Overexposure (100% *f*T > 10xMIC) occurred in 40.3% of TDMs, particularly in patients with renal insufficiency and extracorporeal circuits. Obesity (OR 0.083; 95% CI [0.008 – 0.471]) was a significant predictor for reduced likelihood of overexposure, while extracorporeal circuits (OR 1.12; 95% CI [0.581 – 2.15]) and renal insufficiency (OR 0.80; 95% CI [0.316 – 2.027]) showed trends of increased and decreased odds, respectively.
Conclusions. Achieving adequate β-lactam exposure in critically ill patients is challenging due to variable PK and difficult-to-treat infections, and toxicity risks. We observed a high efficacy target attainment, with lower rates in patients with ARC and obesity. Overexposure was seen with extracorporeal circuits and renal insufficiency. Our study shows that TDM of β-lactam should be considered in these patients groups.

Topic: Pharmacology and Toxicology/Poisoning

000668

Toxic encounters: acute intoxication in a Portuguese intensive care unit

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000668***.

Introduction. Acute intoxication, whether it is intentional or unintentional, constitutes an important cause for admission in the emergency department. While clinical severity may vary, life-threatening presentations prompt haste in the diagnosis and treatment followed

by intensive care admission (ICU). ICU mortality can range between 0 to 6%.

Objectives. The present study characterizes the admissions due to acute intoxication in a Portuguese ICU and examines its incidence, epidemiological characteristics, morbidity and mortality.

Methods. A retrospective study was conducted in a 12-bed Portuguese ICU from January 2023 to January 2024. The center manages around 650 admissions annually. All patients admitted to the ICU with a diagnosis of intoxication, regardless of intentionality, were included. Data sources included hospital and ICU databases, with analysis focusing on demographic variables, diagnosis, scoring systems, treatments required, and outcomes. GraphPad Prism software was used to statistical analysis. Parametric and non-parametric data were appropriately handled, and correlations were examined with significance set at $p < 0.05$.

Results. Out of all ICU admissions, 30 patients were included (14 in 2023 and 16 in 2024), representing 2.3% of total ICU admissions. There was a clear preponderance of female admissions (73.3%). The mean patient age was 54 years (IQR 19 – 87). In general, male intoxicated patients were older than the female ones with medians of 59 and 49 years, respectively. Most patients were brought to the emergency department by non-differentiated pre-hospital teams. The vast majority of admitted intoxications were due to intentional poisoning with suicidal intent, accounting for 93.3% of admissions. This data is in line with the finding that 76.6% of the patients presented with major depressive disorder.

Almost two-thirds of the patients present mixed drug intoxication (= 18, 60%). The most common intoxication drugs were benzodiazepines (= 20, 66.7%), antidepressants (= 12, 40%) and antipsychotics (= 9, 30%). Analgesics, herbicides and anticonvulsants were the other drugs used (representing 13.3%, 13.3% and 10%). Single cases were reported with methamphetamines, carbon dioxide and caustic intoxication.

The median ICU stay was three days, with no readmissions within 48 h post-discharge. Mechanical ventilation was required in 76.7% of cases due to neurologic impairment with a median Glasgow Coma Scale of seven points. Notably, one patient needed renal replacement therapy due to severe metabolic acidemia related to herbicide intoxication.

No deaths were reported during the study.

Conclusions. In the present study, the high rate of pre-existing psychiatric illness and the predominantly suicidal-related intent brings forth the need for multidisciplinary therapeutic management. Prompt referral to specialized psychiatric consultation and continued follow-up are deemed necessary to prevent recurrence and the potentially life-threatening consequences in need of ICU care.

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Topic: Pharmacology and Toxicology/Poisoning

000670

Prognosis of cancer patients in the intensive care unit of a regional hospital

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000670***.

Introduction. Cancer, considered globally, represents the first cause of death in men and the second cause of death in women, with an annual mortality rate of 204 deaths/100,000 inhabitants. Advances in early diagnosis and the development of new therapies have managed to prolong the survival of these patients and, as a consequence, the number of cancer patients admitted to intensive care units (ICU) for the management of complications related to cancer treatment, due to side effects or because they present a condition independent of cancer that is considered an indication for admission to the ICU is increasing.

Objectives. To analyze the clinical characteristics and prognosis of patients with a history of cancer (CH) admitted to the Intensive Care Unit of Punta de Europa University Hospital, as well as factors associated with mortality.

Methods. A retrospective descriptive analysis of a prospective cohort conducted in a 12-bed ICU between 2019 and 2024. Demographic variables, comorbidities, severity scores, treatment received, mechanical ventilation (MV), risk factors, ICU infections, antibiotic therapy, ICU and hospital stay were included. Statistical analysis: categorical variables (frequencies and percentages) and quantitative variables (mean and standard deviation or median and interquartile range). Comparisons: χ test (percentages), Student's t test (means), and Mann–Whitney U test (medians). Multivariate logistic regression. Statistical significance at $p < 0.05$.

Results. 2303 patients were included. CH (n = 333) vs. non-CH (n = 1970). Age (68 [58; 76] vs. 64 [53; 75], $p < 0.001$). APACHE II (13 [8; 18] vs. 9 [5; 15], $p = 0.001$), SAPS II (35 [23; 47] vs. 27 [18; 40], $p = 0.001$). Risk factors: ATB 48 h prior (38.7% vs. 17.7%, $p < 0.001$), TPN (28.8% vs. 10.5%, $p < 0.001$), neutropenia (5.1% vs. 1.4%, $p < 0.001$), CVC (81.7% vs. 47.2%, $p < 0.001$), MV (51% vs. 33.2%, $p < 0.001$), UC (88.3% vs. 60.3%, $p < 0.001$). MV time 1 [0; 3] vs. 0 [0; 1], $p < 0.001$. Length of stay: ICU (4 [2; 7.2] vs. 3 [2; 6]), hospital (13 [7; 24] vs. 8 [4; 15]); $p < 0.001$. In-hospital mortality: 105 (31.5) vs. 437 (22.2), $p < 0.001$.

Mortality analysis (CH patient): alive (n = 228) vs. dead (n = 105). APACHE II (12 [7; 16] vs. 16 [11; 21], $p < 0.001$). SAPS II (31 [21; 44] vs. 45 [32; 56], $p < 0.001$). GCS (15 [15; 15] vs. 15 [12; 15], $p < 0.001$). Comorbidity: immunosuppression 5.7% vs. 21.9%, $p < 0.001$. Risk factors: ATB 48 h prior (34.6% vs. 47.6%, $p = 0.033$), neutropenia (1.7% vs. 12.4%, $p < 0.001$), RRT (2.6% vs. 3.8%, $p < 0.001$), MV (41.7% vs. 71.4%, $p < 0.001$), UC (84.2% vs. 97.1%, $p < 0.001$), CVC (76.7% vs. 92.4%, $p = 0.001$). Vasopressin 1.3% vs. 9.5%, $p < 0.001$. Intra-ICU infection 9.6% vs. 24.8%, $p < 0.001$. MV time 0 [0; 1] vs. 2 [1; 7.5], $p < 0.001$. Hospital stay 14 [8; 25] vs. 11 [4; 23], $p = 0.009$.

Multivariate logistic regression: RRT (OR 5.99 [2.21–18.27], $p < 0.001$), SAPS II (OR 1.04 [1.02–1.05]), immunosuppression (OR 3.13 [1.33–7.57], $p = 0.009$), MV time (OR 1.06 [1.02–1.10], $p = 0.001$), surgical patient (OR 0.48 [0.26–0.87], $p = 0.017$).

Conclusions. Patients with CH admitted to the ICU have greater severity of illness, infectious risk factors, comorbidities, greater resource use, and a higher incidence of infections.

The use of extrarenal purification techniques, SAPS II at admission, immunosuppression, MV time and post-surgery admission behaved as predictors of mortality.

Topic: Haematologic-oncologic issues in the ICU

000672

Regional citrate anticoagulation for continuous renal replacement therapy during venovenous extracorporeal membrane oxygenation: a randomized crossover study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000672***.

Introduction. regional citrate anticoagulation (RCA) is the standard of care for CRRT anticoagulation. However, evidence on its use in CRRT circuits during extracorporeal membrane oxygenation (ECMO) is limited. In ECMO patients, CRRT circuit patency is usually preserved with systemic anticoagulation using unfractionated heparin (UFH). RCA may enhance CRRT circuit lifespan by reducing clotting, consumption coagulopathy, and associated complications.
Objectives. To evaluate whether the addition of RCA to CRRT circuits in patients on systemic UFH for venovenous (V-V) ECMO reduces circuit clotting. Secondary endpoints included the impact of CRRT anticoagulation regimen on platelet count, D-dimers, fibrinogen, and adverse events.
Methods. We conducted a prospective, randomized crossover study in ICU patients undergoing V-V ECMO and CRRT at IRCCS San Gerardo Hospital (Monza, Italy). Patients were randomized to start with either RCA + UFH or UFH alone, following the sequence in Fig. 1. CRRT circuit was integrated into the ECMO circuit, with the inlet line placed post-oxygenator and the outlet line between the centrifugal pump and the oxygenator. CRRT was performed using multiFiltratePRO (Fresenius). RCA was obtained with 4% sodium citrate to target a postfilter ionized calcium of 0.25–0.34 mmol/L. Circuits were electively replaced every 72 h as per manufacturer recommendations. Coagulation and blood gas analysis were assessed every 8 h; CRRT circuit pressures and settings were monitored every 2 h. Anticoagulation effect of RCA + UFH versus UFH was evaluated with thromboelastography (TEG). The study was registered at clinicaltrials.gov NCT 5148026.
Results. Fifteen patients were included, for a total of 61 circuits (31 RCA + UFH; 30 UFH). No clotting events were reported in the RCA + UFH group, compared to 6 (20%) in the UFH group. When censoring for non-clotting circuit replacements, log-rank analysis showed significantly longer circuit survival with RCA + UFH ($p = 0.009$, **Fig. 2**). Platelet counts showed an upward trend from baseline—defined as the value at new circuit start—during RCA + UFH, but declined with UFH alone. D-dimer trend significantly increased in the UFH group, while fibrinogen remained comparable (**Fig. 3**). Systemic anticoagulation remained comparable between RCA + UFH and UFH (aPTT ratio: median 1.28 [1.11–1.44] vs. 1.29 [1.18–1.45], $p = 0.134$; anti-Xa: median 0.25 [0.18–0.33] vs. 0.24 [0.17–0.32], $p = 0.985$). RCA + UFH significantly prolonged the circuit TEG R-time compared to UFH alone (median 90 [90–90]vs 30.1 [15.1–50.8] minutes, $p = 0.021$). No citrate-related complications were observed.
Conclusions. The addition of regional citrate anticoagulation significantly reduced CRRT circuit clotting rates in patients receiving systemic UFH during V-V ECMO. It was also associated with a favorable effect on platelet count and D-dimer levels. TEG analysis confirmed a stronger anticoagulant effect with RCA + UFH compared to UFH alone. The technique was feasible, safe, and did not increase the incidence of adverse events.

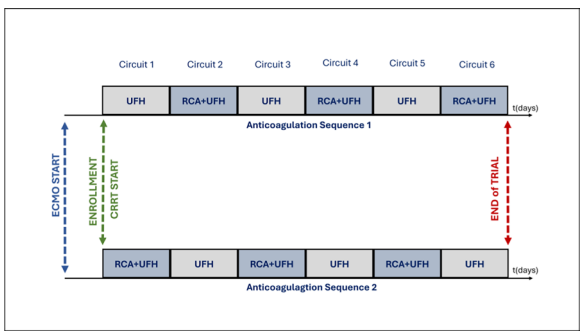


Fig 1 (abstract 000672) Sequences of anticoagulation regimen according to patient randomization

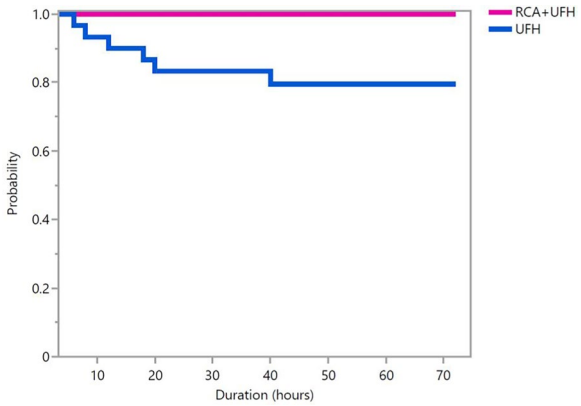


Fig 2 (abstract 000672) Time to clotting, according to the anticoagulation regimen (RCA + UFH vs UFH)

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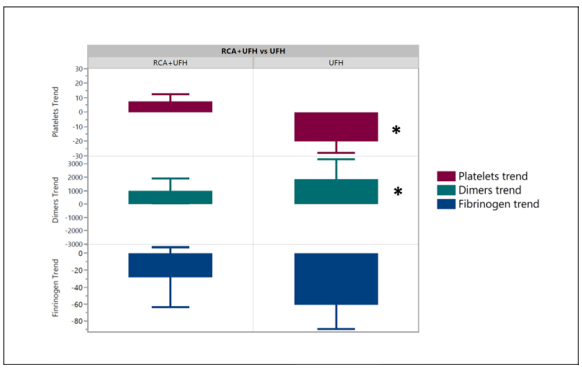


Fig 3 (abstract 000672) Change in platelets (PLT), dimers and fibrinogen (FBG) levels during RCA + UFH vs UFH. * $p < 0.05$ vs RCA + UFH

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Topic: Acute Kidney Injury and haemofiltration

000675

A Comparative Analysis of Trauma Scoring Systems for Mortality Prediction in Singapore

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000675***.

Introduction. Trauma severity scoring systems are widely used to guide clinical decision-making and monitor trauma patient outcomes. Despite their widespread use, identifying the most accurate scoring system remains challenging, with varying performance across different populations. To our best knowledge, no study has compared the predictive accuracy of these trauma scoring systems in Singapore.
Objectives. This study evaluates the performance of the Trauma and Injury Severity Score (TRISS), Injury Severity Score (ISS), and Revised Trauma Score (RTS) in predicting mortality among trauma patients at Singapore General Hospital (SGH) from 2015 to 2018, assessing their applicability in the local population.
Methods. A retrospective analysis was conducted on 1555 trauma patients with a median age of 67 years (IQR 41.0–79.0). Blunt trauma was the predominant mechanism (94.6%). Mortality prediction was assessed through sensitivity, specificity, and AUROC. ROC curve analysis was used to determine the ability of each score to distinguish survivors from non-survivors.
Results. The study found that TRISS demonstrated the highest predictive accuracy with an AUROC of 0.76 (95% CI: 0.69–0.83), combining moderate sensitivity (51.6%) and high specificity (92.5%), making it the most reliable tool overall. ISS showed moderate predictive performance, with an AUROC of 0.60 (95% CI: 0.59–0.72), with high specificity (90.0%) but low sensitivity (33.9%), indicating a propensity for under-triage. RTS, with a sensitivity of 99% and an AUROC of 0.28 (95% CI: 0.22–0.35), had extremely low specificity (3.5%), leading to significant over-triage.
Conclusions. Among the three scoring systems, TRISS showed the best overall predictive accuracy in the Singaporean cohort, with high specificity but moderate sensitivity. However, it missed nearly 50% of deaths, limiting its effectiveness as a standalone tool for high-stakes mortality prediction. While RTS effectively minimised missed deaths with its high sensitivity, its low specificity and poor discriminative power (AUROC) restrict its practical utility. The ISS showed limited predictive capability, with significant under-triage due to low sensitivity. These findings underscore the need for refined or locally tailored trauma scoring systems to improve mortality prediction and resource allocation in Singapore's trauma population.

Topic: Trauma

000676

A novel molecular classification of critical illnesses based on whole blood transcriptome analysis

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Introduction. Patients with critical illnesses have diverse etiologies and acute life-threatening conditions, and their pathologies are extremely heterogeneous. Conventional uniform treatment based on clinical diagnosis fails to adequately capture this diversity of pathophysiology and has limited therapeutic efficacy. In recent years, molecular-level analysis has proposed novel subgroups that transcend conventional classifications, increasing the need for personalized medicine according to the pathophysiology.
Objectives. The purpose of this study is to classify critical illnesses into novel molecular subgroups and extract molecular signatures that can be used as therapeutic targets through new classifications based on transcriptome analysis of whole blood.
Methods. This was a prospective multicenter study of patients with critical illnesses admitted to the ICU of tertiary care hospitals in Japan for at least one day. The study population was divided 2:1, with one cohort as the derivation cohort and the other as the validation cohort. Peripheral blood was collected at admission and whole blood RNA-seq was performed. Latent class analysis was applied to the expression data to identify endotypes. Differential gene expression analysis, pathway analysis, and upstream regulator analysis were used to evaluate the molecular characteristics of each endotype.
Results. Analysis was performed on 199 cases in the derivation cohort and 99 in the validation cohort, and three endotypes were identified. Endotype 1 was mainly infections with the highest severity and mortality in the elderly, endotype 2 was mainly trauma with the lowest severity and mortality, and endotype 3 was middle-aged patients with a variety of disease backgrounds. Endotype 1 showed activation of inflammatory responses as well as immunosuppression and suppression of metabolic functions including nucleic acid synthesis and mitochondrial function. Endotype 2 was characterized by activation of metabolic functions including lipid and steroid metabolism and leukocyte differentiation, in addition to activation of inflammatory and immune responses. Endotype 3 was characterized by a relatively low inflammatory response, immunosuppression including T-cell responses and antigen-presenting pathways, and suppression of metabolic functions including ribosome-related and RNA transcription. These analyses were generally replicated in the validation cohort, confirming consistent molecular pathogenetic features of each endotype.
Conclusions. Critical illnesses was classified into three endotypes based on molecular signatures across diseases based on gene expression profiles. Endotype 1 showed a high inflammation, low metabolism, and immunosuppressive pattern; endotype 2 showed a high inflammation, high metabolism, and immunoactive pattern; and endotype 3 showed a low inflammation, low metabolism, and immunosuppressive pattern.

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Topic: Translational biology

000677

Local validation of the STS risk score in adult rheumatic heart disease patients undergoing valve surgery at a tertiary hospital in the Philippines.

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Introduction. The Society of Thoracic Surgeons (STS) risk model is widely used to estimate surgical outcomes in cardiac procedures. However, its applicability in populations with rheumatic heart disease (RHD), particularly in low- and middle-income countries (LMICs), remains unvalidated.
Objectives. To evaluate the predictive performance of the STS score for postoperative outcomes in adult RHD patients undergoing valvular surgery at a tertiary hospital in the Philippines.
Methods. A total of 245 adult RHD patients who had valve surgery between 2017 and 2023 were included in this retrospective cohort

analysis. In-hospital mortality, surgical morbidity, prolonged ventilation, acute renal failure, reoperation, stroke, and prolonged hospital stay were among the outcomes that were examined. Multivariable associations, calibration (Hosmer–Lemeshow test, O:E ratios), and discrimination (AUC) were used to evaluate predictive ability.
Results. In-hospital mortality was 11.02%, whereas morbidity was 66.12%. STS scores correlated significantly with adverse outcomes, yet showed poor discriminative ability (AUC < 0.70) and suboptimal calibration. Complex procedures (e.g., MVR + AVR) and comorbidities such as liver disease and renal failure were significant predictors of poor outcomes.
Conclusions. The STS score demonstrates limited predictive utility in RHD patients in LMIC settings. A recalibrated or novel, locally adapted risk model is recommended to improve surgical planning and patient counseling.

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Topic: Cardiovascular issues in ICU

000678

Clinical characteristics and prognostic implications of respiratory comorbidities in OHCA patients: a nationwide study

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Introduction. Respiratory diseases are known risk factors for cardiovascular comorbidities, but their impact on outcomes after out-of-hospital cardiac arrest (OHCA) remains underexplored. Understanding the clinical characteristics and prognoses of OHCA patients with pre-existing respiratory diseases is crucial for improving post-arrest care and survival.
Objectives. To investigate differences in clinical features and post-resuscitation outcomes between OHCA patients with and without underlying respiratory diseases.
Methods. This retrospective cohort study used data from the Out-of-Hospital Cardiac Arrest Surveillance registry (2008–2023), provided by the Korea Disease Control and Prevention Agency. A total of 446,075 adult OHCA patients were included and categorized based on the presence (n = 22,407) or absence (n = 423,668) of pre-existing respiratory disease, which included asthma, COPD, tuberculosis, interstitial lung disease, and bronchiectasis. Baseline characteristics and clinical outcomes were compared between the groups. Cox proportional hazards models were applied to evaluate and compare predictors for 3-day and 1-year mortality according to the presence of respiratory disease, adjusting for age, sex, comorbidities, arrest characteristics, and in-hospital interventions. Subgroup analyses were performed among patients who survived to hospital admission (n = 66,500).
Results. Patients with respiratory disease were older (77 vs. 69 years; Table 1), had more comorbidities including hypertension, diabetes, heart disease, and renal disease, and experienced more witnessed arrests (53.3% vs. 45.1%). However, they presented with lower rates of initial shockable rhythm (6.8% vs. 13.0%) and received less AED use (11.9% vs. 18.6%). Respiratory causes of OHCA were significantly more prevalent in this group (9.1% vs. 0.3%). Despite slightly lower 1-day (81.8% vs. 85.0%) and 7-day mortality (88.0% vs. 89.2%), 1-year mortality was slightly higher in patients with respiratory disease (91.7% vs. 91.1%, p = 0.003). Kaplan–Meier curves showed the higher 7-day survival in patients with respiratory disease; however, this group exhibited lower survival rates at 90-days and 1-year (all log-rank p < 0.001; Fig. 1). In patients without pre-existing respiratory disease, older age, witnessed arrest, bystander CPR by EMS, non-shockable rhythm, and non-public arrest location were significant predictors of both 3-day and 1-year mortality in the overall cohort as well as in those who survived to admission (Table 2). Among patients with respiratory disease, these factors were also significantly associated with 3-day and 1-year mortality, except that non-shockable rhythm did not significantly affect mortality in those who survived to admission. Interventions such as CAG/PCI and TTM significantly reduced mortality in both groups, although their protective effects were attenuated in patients with respiratory disease.
Conclusions. OHCA patients with respiratory comorbidities had distinct clinical features. They demonstrated better short-term survival but slightly poorer long-term outcomes. Personalized post-resuscitation strategies are needed for this high-risk group, with particular attention to early identification of respiratory causes and targeted interventions.

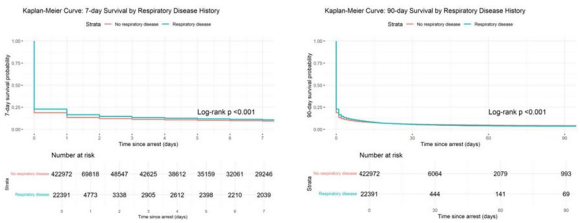


Fig 1 (abstract 000678) Kaplan–Meier curve for 7-day and 90-day survival by respiratory disease history

Table 1 Baseline characteristics

	Respiratory disease, no (n = 423,668)	Respiratory disease, yes (n = 22,407)	P-value
Age, years	69.0 [54.0 – 80.0]	77.0 [69.0 – 83.0]	<0.001
Sex, female	152115 (35.9)	7507 (31.5)	<0.001
Comorbidities			
HTN	113000 (26.7)	8537 (38.1)	<0.001
DM	75317 (17.8)	5171 (23.1)	<0.001
Heart	50729 (12.0)	4669 (20.8)	<0.001
Ischemic heart disease	3687 (0.9)	431 (1.9)	<0.001
Myocardial infarction	6671 (1.6)	444 (2.0)	<0.001
Congestive heart failure	4774 (1.1)	800 (3.6)	<0.001
Renal disease	17679 (4.2)	1221 (5.4)	<0.001
Respiratory disease	-		
Asthma	-	6977 (31.1)	
COPD	-	4679 (20.9)	
Tuberculosis	-	3114 (13.9)	
Others (IPF, bronchiectasis etc.)	-	1499 (6.7)	
Stroke	30851 (7.6)	1865 (8.3)	<0.001
Dyslipidemia	10422 (2.6)	755 (3.4)	<0.001
Alcohol, ex- or current	19297 (68.4)	933 (50.1)	<0.001
Smoking, ex- or current	11524 (52.2)	1077 (53.6)	0.236
Arrest characteristics			
Witnessed arrest	191033 (45.1)	11950 (53.3)	<0.001
Bystander CPR			<0.001
Yes (by non-EMS personnel)	65408 (15.4)	3980 (17.8)	
Yes (by EMS personnel)	25089 (5.9)	1924 (8.6)	
Initial rhythm			<0.001
Shockable	32350 (13.0)	1041 (6.8)	
Non-shockable	214519 (86.4)	14141 (92.7)	
AED use	46685 (18.6)	1829 (11.9)	<0.001
Location			<0.001
Public	83700 (19.8)	1530 (6.8)	
Non-public	268694 (63.4)	17188 (76.7)	
Other	13994 (3.3)	193 (0.9)	
Cause (disease)			<0.001
Cardiogenic	295037 (94.2)	18422 (87.7)	
Respiratory	944 (0.3)	1901 (9.1)	
Non-traumatic bleeding	3753 (1.2)	317 (1.5)	
Cancer or chronic organ failure	4591 (1.5)	123 (0.6)	
Others	8858 (2.8)	234 (1.1)	
Intervention			
CAG/PCI	15580 (3.7)	614 (2.7)	<0.001
TTM	12174 (2.9)	853 (3.8)	<0.001
CABG	168 (0.0)	5 (0.0)	0.267
ICD/pacemaker	2909 (0.7)	93 (0.4)	<0.001
Surgical airway management	589 (0.1)	11 (0.0)	<0.001
Airway management (intubation)	94742 (22.4)	4339 (19.4)	<0.001
ECMO	3070 (0.7)	108 (0.5)	<0.001
Outcome			
1-day mortality	358874 (85.0)	18312 (81.8)	<0.001
7-day mortality	377321 (89.2)	19711 (88.0)	<0.001
30-day mortality	384279 (90.8)	20418 (91.2)	0.082
1-year mortality	385505 (91.1)	20537 (91.7)	0.003

Table 2 Cox proportional hazard regression model to predict 1-year and 3-day mortality

(A) 1-year mortality

	Respiratory disease, no		Respiratory disease, yes	
Variables	HR (95% CI)	P-value	HR (95% CI)	P-value
All patients (n=446,075)				
Age per 10-year increment	1.05 (1.05-1.06)	<0.0001	1.13 (1.11-1.14)	<0.0001
Female sex	0.98 (0.97-0.98)	<0.0001	0.97 (0.94-1.00)	0.0622
Witnessed arrest	0.83 (0.82-0.84)	<0.0001	0.79 (0.76-0.81)	<0.0001
Bystander CPR by EMS personnel	0.80 (0.78-0.81)	<0.0001	0.68 (0.64-0.74)	<0.0001
Non-shockable rhythm at ER	1.50 (1.47-1.54)	<0.0001	1.23 (1.08-1.40)	0.0018
Non-public arrest location	1.02 (1.01-1.03)	<0.0001	1.26 (1.18-1.34)	<0.0001
CAG/PCI	0.29 (0.28-0.30)	<0.0001	0.42 (0.67-0.48)	<0.0001
TTM	0.26 (0.25-0.27)	<0.0001	0.29 (0.27-0.32)	<0.0001
ECMO	0.96 (0.92-1.01)	0.0851	0.94 (0.75-1.19)	0.6251
Patients survived to admission (n=66,500)				
Age per 10-year increment	1.10 (1.10-1.11)	<0.0001	1.18 (1.14-1.22)	<0.0001
Female sex	1.08 (1.05-1.10)	<0.0001	1.03 (0.94-1.13)	0.5160
Witnessed arrest	0.74 (0.72-0.76)	<0.0001	0.79 (0.71-0.87)	<0.0001
Bystander CPR by EMS personnel	0.79 (0.75-0.83)	<0.0001	0.82 (0.70-0.96)	0.0166
Non-shockable rhythm at ER	1.86 (1.77-1.99)	<0.0001	1.30 (1.00-1.71)	0.0543
Non-public arrest location	1.23 (1.19-1.28)	<0.0001	1.38 (1.19-1.59)	<0.0001
CAG/PCI	0.52 (0.50-0.54)	<0.0001	0.77 (0.66-0.90)	0.0014
TTM	0.64 (0.62-0.66)	<0.0001	0.71 (0.64-0.80)	<0.0001
ECMO	2.12 (2.00-2.25)	<0.0001	1.74 (1.33-2.27)	<0.0001

(B) 3-day mortality

	Respiratory disease, no		Respiratory disease, yes	
Variables	HR (95% CI)	P-value	HR (95% CI)	P-value
All patients (n=446,075)				
Age per 10-year increment	1.05 (1.05-1.05)	<0.0001	1.12 (1.11-1.14)	<0.0001
Female sex	0.97 (0.96-0.98)	<0.0001	0.96 (0.93-0.99)	0.0195
Witnessed arrest	0.84 (0.83-0.84)	<0.0001	0.79 (0.77-0.82)	<0.0001
Bystander CPR by EMS personnel	0.80 (0.78-0.81)	<0.0001	0.68 (0.63-0.73)	<0.0001
Non-shockable rhythm at ER	1.43 (1.40-1.47)	<0.0001	1.21 (1.05-1.39)	0.0080
Non-public arrest location	1.01 (1.00-1.02)	0.0228	1.24 (1.16-1.33)	<0.0001
CAG/PCI	0.25 (0.24-0.26)	<0.0001	0.35 (0.29-0.41)	<0.0001
TTM	0.14 (0.13-0.14)	<0.0001	0.14 (0.12-0.16)	<0.0001
ECMO	0.80 (0.76-0.85)	<0.0001	0.77 (0.57-1.04)	0.0878
Patients survived to admission (n=66,500)				
Age per 10-year increment	1.15 (1.13-1.16)	<0.0001	1.25 (1.18-1.32)	<0.0001
Female sex	1.01 (0.98-1.05)	0.5597	0.95 (0.83-1.08)	0.4456
Witnessed arrest	0.73 (0.70-0.76)	<0.0001	0.77 (0.67-0.88)	0.0002
Bystander CPR by EMS personnel	0.78 (0.72-0.83)	<0.0001	0.78 (0.61-0.99)	0.0414
Non-shockable rhythm at ER	1.64 (1.52-1.78)	<0.0001	1.35 (0.92-1.99)	0.1299
Non-public arrest location	1.24 (1.18-1.30)	<0.0001	1.46 (1.17-1.82)	0.0008
CAG/PCI	0.60 (0.57-0.64)	<0.0001	0.92 (0.73-1.16)	0.4826
TTM	0.43 (0.41-0.46)	<0.0001	0.78 (0.39-0.57)	<0.0001
ECMO	2.26 (2.09-2.43)	<0.0001	1.81 (1.24-2.65)	0.0020

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Topic: Cardiac arrest

000679

Cost-effectiveness of technologies implementation to reduce errors versus standard of care: a systematic review

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Introduction. Medication errors (ME) significantly impact patient safety and healthcare costs globally. Technologies such as Computerized Physician Order Entry (CPOE), Smart Pumps, Barcode Medication Administration (BCMA), and electronic Medication Administration Records (eMAR) have emerged to address this issue. This systematic review evaluates the cost-effectiveness of these technologies in reducing adverse drug events (ADE) and improving patient outcomes.
Methods. Following PRISMA guidelines, we included primary economic evaluations of CPOE, Smart Pumps, BCMA, and eMAR in hospitalized patients. Databases searched included PubMed, CINAHL, and Web of Science. Studies assessing cost-effectiveness, cost-utility, and cost–benefit analyses were reviewed. Data extraction focused on costs, effectiveness, and incremental cost-effectiveness ratios (ICER), analyzed through the JBI Dominance Ranking Matrix.

Results. Nine studies were included, predominantly from high-income countries. CPOE and Smart Pumps demonstrated cost-effectiveness in reducing ADE, with CPOE intercepting up to 96% of prescription errors and Smart Pumps preventing 86% of dose-related ADE. Cost savings ranged from €3.54 per ADE avoided with CPOE to €172,279 saved with Smart Pumps. Sensitivity analyses supported robust cost-effectiveness findings despite methodological heterogeneity.
Conclusions. CPOE and Smart Pumps are effective and economically viable in reducing ADE and improving safety outcomes in hospitals. Future research should address methodological gaps, including long-term patient and societal costs, to inform broader implementation strategies.

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Topic: Nursing care and physiotherapy

000683

Outcomes of adult patients treated with extra-corporeal membrane oxygenation following major cardiac surgeries

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000683***.

Introduction. Postcardiotomy cardiogenic shock (PCS) occurs in 0.2% to 6% of patients undergoing cardiac surgery, with approximately 0.5% requiring venoarterial extracorporeal membrane oxygenation (VA-ECMO) support. Survival rates remain low, ranging from 25 to 44%.
Objectives. This study aimed to evaluate risk factors influencing early mortality in PCS patients requiring VA-ECMO following major cardiac surgery.
Methods. We conducted a retrospective analysis of 300 consecutive patients (mean age: 62.9 ± 13.4 years; 133 females) who underwent VA-ECMO for PCS between 2005 and 2021. The primary outcome was early mortality. Univariate logistic regression analyses were performed to identify factors associated with early mortality.
Results. Advanced age (RR: 1.03; 95% CI: 1.01–1.05; P < 0.001), higher BMI (OR: 1.08; 95% CI: 1.01–1.15; P = 0.016), postoperative continuous renal replacement therapy (CRRT) (OR: 5.24; 95% CI: 3.12–8.78; P < 0.001), bleeding control (OR, 1.45; 95% CI, 1.01–2.07; P = 0.416) and RBC transfusion (OR: 1.13; 95% CI: 1.07–1.19; P < 0.001) were significantly associated with increased early mortality. ECMO-related complications included mediastinal bleeding in 172 patients (57.3%), reoperation for bleeding in 131 patients (43.7%), lower limb ischemia in 33 patients (11.0%), and cannulation-related complications in 36 patients (12.0%).
Conclusions. This study identifies advanced age, higher BMI, postoperative CRRT, inadequate bleeding control, and RBC transfusion as significant risk factors for early mortality in PCS patients requiring VA-ECMO. Effective management of these high-risk patients should prioritize meticulous bleeding control during surgery and timely intervention for postoperative bleeding, which could help minimize RBC transfusion and improve clinical outcomes.

Topic: Perioperative care

000684

The association of early or late combined infection with clinical outcomes in cardiogenic shock patients

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000684***.

Introduction. Mixed cardiogenic shock (CS) is defined as CS with at least one additional contributing cause to the shock. A considerable proportion of patients admitted to cardiac intensive care units (CICUs) present with mixed CS. [1,2] Infections are common predisposing factors for mixed CS due to their contribution to systemic vasodilation, however, data on the prognosis of mixed CS complicated by infection remain limited. This study compared the clinical picture and outcomes of isolated CS and mixed CS, stratified by the timing of infection.
Methods. We analyzed 878 adult CS patients admitted to a cardiac intensive care unit (CICU) providing level 1 critical care services

between 2012 and 2020. Patients were classified as isolated CS (non-infected), early mixed CS (infection identified within 48 h of CICU admission), and late mixed CS (infection identified after 48 h of CICU admission). The primary outcome was in-hospital mortality.

Results. Of 878 patients, 591 (67.3%) had isolated CS, while 287 (32.7%) had mixed CS (early: 18.1%; late: 14.6%). Demographics including etiology of CS were comparable across all groups. Pneumonia was the most common infection in mixed CS. Mixed CS patients experienced prolonged mechanical ventilation (isolated: 2.2 vs. early: 4.7 vs. late: 9.5 days; $p < 0.001$), and indwelling catheterization (2.0 vs. 7.0 vs. 25.2 days; $p < 0.001$). In late mixed CS patients, an increasing trend of nosocomial infection was observed with increasing of total catheterization day and CICU length of stay. In-hospital mortalities in both mixed CS groups were higher than in isolated CS (both $p < 0.001$), with no significant difference between early and late mixed CS. Survival rates were also a similar pattern during the follow-up. (In the tables below, groups with different letters are significantly different ($p < 0.05$)).

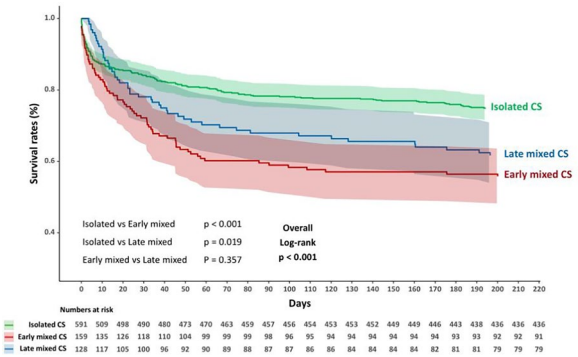
Conclusions. Mixed CS complicated by infection showed worse clinical outcomes than isolated CS, irrespective of the infection timing. Further research is needed to develop targeted treatment strategies tailored to this condition.

Cardiac intensive care unit management

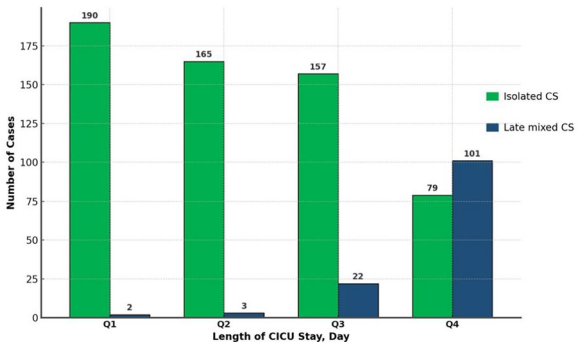
Variable	Isolated CS (n = 591)	Early mixed CS (n = 159)	Late mixed CS (n = 128)	P-value
Peak VIS within 48 h	18 (8–40)a	28 (17–128)b	35 (15–86)b	< 0.001
ECMO	77 (13.0)a	45 (28.3)b	38 (29.7)b	< 0.001
Indwelling catheter				
Central line	146 (24.7)a	73 (45.9)c	81 (63.3)b	< 0.001
Arterial line	295 (49.9)a	98 (61.6)b	90 (70.3)b	< 0.001
Foley catheter	105 (17.8)a	52 (32.7)b	40 (31.2)b	< 0.001
Total catheterization duration, day	2.0 (0.0–6.8)a	7.0 (1.4–23.9)c	25.2 (8.3–50.0)b	< 0.001
Mechanical ventilation	272 (46.0)a	119 (74.8)c	113 (88.3)b	< 0.001
Length of support, day	2.2 (1.0–4.8)a	4.7 (2.0–14.4)c	9.5 (4.8–15.6)b	< 0.001
CRRT				< 0.001
Known ESRD	22 (3.7)a	11 (6.9)a, b	11 (8.6)b	
Newly started	106 (17.9)a	67 (42.1)b	48 (37.5)b	

Clinical event and outcomes during CICU stay

Variable	Isolated CS (n = 591)	Early mixed CS (n = 159)	Late mixed CS (n = 128)	P-value
CICU mortality	90 (15.2)a	52 (32.7)b	39 (30.5)b	< 0.001
CICU length of stay, day	3.1 (1.9–6.0)a	6.2 (3.0–13.9)c	15.9 (9.9–23.5)b	< 0.001
CICU readmission	116 (19.6)a	48 (30.2)b	31 (24.2)a, b	< 0.001
In-hospital mortality	114 (19.3)a	59 (37.1)	44 (34.4)b	< 0.001
Hospital length of stay, day	12.7 (6.5–28.0)a	26.3 (12.0–61.0)c	41.7 (17.5–73.5)b	< 0.001

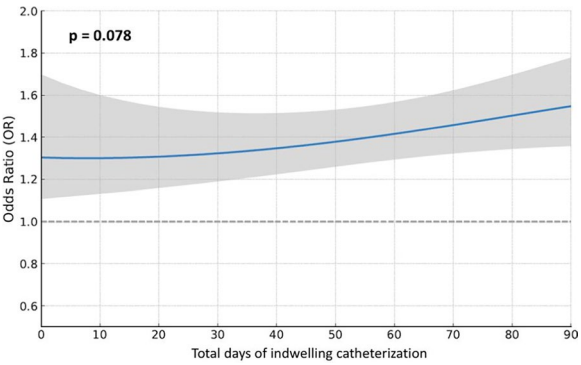


Kaplan–Meier curves illustrate the differences in survival rates among the three groups. Isolated CS exhibited better survival rates compared to both mixed CS groups. While the overall log-rank test yielded a statistically significant p-value, post hoc analysis revealed no statistically significant difference in survival rates between the late and early mixed CS groups.



When the total CICU stay duration was divided into quartiles, the late mixed CS cases first emerged in the third quartile, with a reversal in the proportions of late mixed CS and isolated CS observed in the fourth quartile

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A spline curve presenting the relationship between total indwelling catheterization duration and hospital mortality in patients with late mixed cardiogenic shock. The curve shows an increasing trend of odds ratio observed across the duration spectrum, however, there was no

statistically significant association between total catheterization duration and mortality risk (p = 0.078)

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Topic: Infections and prevention

000685

Development and validation of an interpretable machine learning model for in-hospital mortality prediction and risk stratification and antibiotic selection for respiratory sepsis: a multi-center cohort study

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Introduction. Sepsis, defined as life-threatening organ dysfunction due to a dysregulated host response to infection [1], affects over 19 million patients annually with mortality rates of 25–45% [2]. Early assessment using tools like APACHE II [3] and SOFA [1] is critical but limited by complexity and reliance on lab results [4]. Simplified systems (qSOFA, NEWS, MEWS) enable rapid bedside evaluation [5], yet their prognostic accuracy and consensus on clinical use remain debated [6]. Current tools focus on organ function but neglect infection-specific factors, necessitating integration of personalized infection characteristics for tailored interventions [7].
This study aims to develop a machine learning-based prognostic tool using a Chinese sepsis database, validated externally via MIMIC-IV and eICU-CRD, to enhance early risk stratification. Additionally, combining risk assessment with antibiotic selection, patients are stratified by mortality risk, enabling comparative evaluation of antibiotic regimens within homogeneous risk groups. This approach addresses empirical antibiotic challenges, balancing efficacy against resistance risks, particularly for moderate/high-risk patients.
Objectives. Developing a new accurate severity and prognostic model is crucial for early intervention and improved septic patient management.
Methods. A nation-wide Chinese Single-Disease Database of Sepsis (internal cohort) was retrospectively studied. Septic Risk Stratified (SRS) system was developed from the internal training cohort. The risk factors of SRS were selected by machine learning. Validation was performed in the internal, the Medical Information Mart for Intensive Care (MIMIC-IV) and eICU Collaborative Research Database (eICU-CRD) cohort. Evaluation metrics included discrimination (area under the ROC curve [AUROC]) and calibration. Three risk strata were identified and validated in all cohorts. We further investigated antibiotic usage across different RSR strata to understand the effectiveness of various antibiotic regimens in patients with respiratory infection in different sepsis risk levels.
Results. The study analyzed 116,852, 18,407, and 9,816 sepsis patients in the internal, MIMIC-IV, and eICU-CRD cohorts, respectively, with in-hospital mortality rates of 36.1%, 18.2%, and 17.1%. Initial lactate level, infection foci, PaO2/FiO2, age, Creatinine, Temperature, Norepinephrine, Glasgow coma scale (GCS), urinary infection foci, heart rate (HR), respiratory rate (RR), body mass index (BMI), Platelet, and white blood cell count (WBC) were included in RSR in the descending order of impacts. In the internal holdout validation cohort, the AUROC of RSR is 0.80 (95% CI 0.79 to 0.80). External validation showed that the RSR significantly outperformed the SOFA (internal validation: 0.80 vs. 0.67, p < 0.001; MIMIC-IV: 0.68 vs. 0.67, p = 0.01; eICU-CRD 0.73 vs. 0.70, p < 0.001) and APACHE II (internal validation: 0.80 vs. 0.66, p < 0.001; MIMIC-IV: 0.68 vs. 0.63, p = 0.002, eICU-CRD: 0.73 vs. 0.70, p < 0.001). In addition, our findings suggest tailored antibiotic strategies that could improve patient outcomes. Respiratory sepsis with Moderate Risk showed that Beta-lactam combined with quinolones had a protective effect compared to beta-lactam inhibitors alone. Carbapenems and glycopeptides were less effective compared to beta-lactam inhibitors alone.
Conclusions. The RSR system is a rapid and accurate severity and prognostic tool for early assessing in-hospital mortality risk in sepsis patients. The extended analysis of antibiotic usage in RSR-stratified patients underscores the importance of tailored antibiotic therapies for the Moderate Risk with respiratory sepsis.

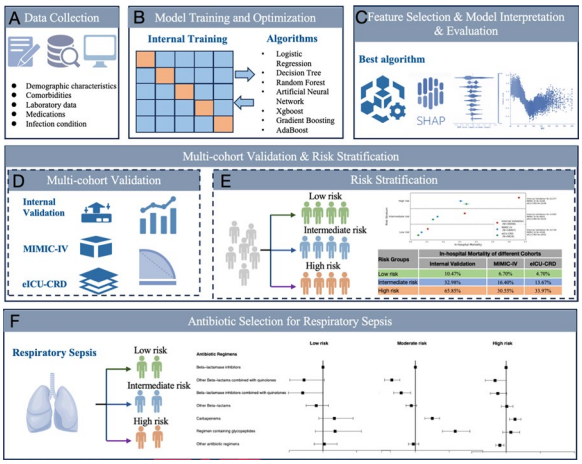


Fig 1 (abstract 000685) Overview of the study design and workflow. (A) Data collection. (B) Model training and optimization of different machine learning algorithms. (C) Feature inspection and model evaluation. (D) Internal and external validation of the simplified risk model. (E) Risk stratification of internal holdout and external validation cohorts. (F) Comparison of different antibiotic regimens in patients with respiratory infection

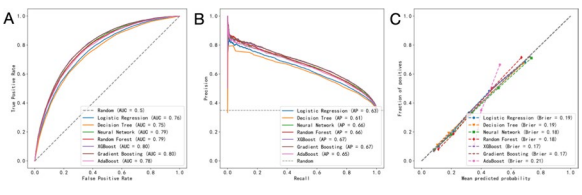


Fig 2 (abstract 000685) Comparison of models in sepsis patients of internal cohort. (A) ROC curves for different machine learning models on sepsis patients of internal validation cohort. (B) Precision recall curves for different machine learning models on sepsis patients of internal validation cohort. (C) Calibration plots for different machine learning models on sepsis patients of internal validation cohort

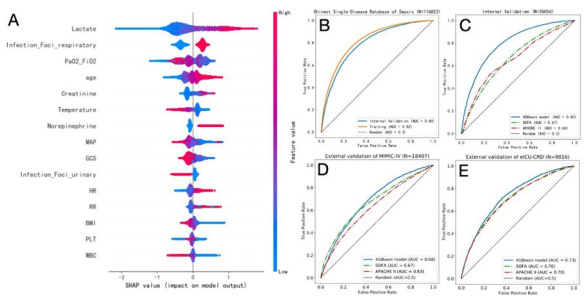


Fig 3 (abstract 000685) The optimal model's performance and comparison with SOFA and APACHE II scores. (A): SHAP summary plot for the top 15 features of the XGBoost model (full model). (B): ROC curve for simplified risk model of the internal training (N = 81,796) and holdout validation (N = 35,056) cohort from the Chinese Single-Disease Database of Sepsis. (C): ROC curve for the simplified risk model, SOFA and Apache II scores in the hold-out validation set of Chinese Single-Disease Database of Sepsis. P value of the simplified risk model vs the SOFA score < 0.001, P value of the risk model vs the Apache II score < 0.001. (D): ROC curves for the simplified risk model, SOFA and Apache II (most severe value in first 24 h) scores in the MIMIC-IV cohort. P value of the simplified risk model vs the SOFA score = 0.01, P value of the simplified risk model vs the Apache II score < 0.001.(E): ROC curves for the simplified risk model, SOFA and Apache II (most severe value in the first 24 h) scores in the eICU-CRD cohort. P value of the simplified risk model vs the SOFA score = 0.002, P value of the simplified risk model vs the Apache II score < 0.001.

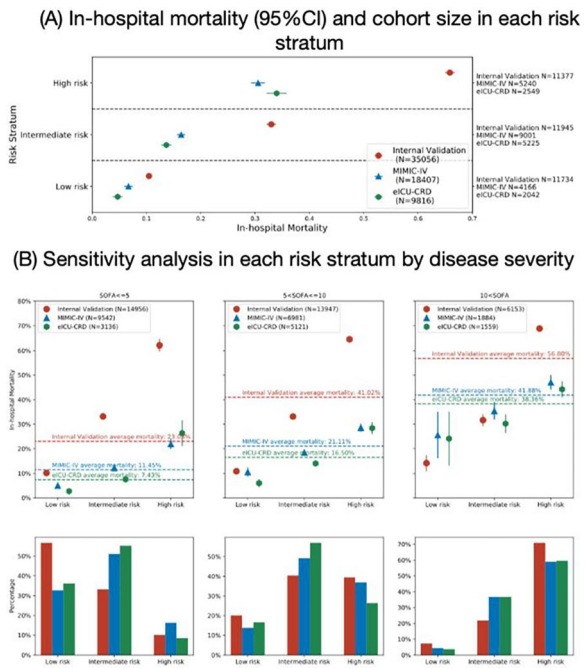


Fig 4 (abstract 000685) Risk stratification by the simplified machine learning model. (A) In-hospital mortality (95% CI) and cohort size in each risk stratum in different cohorts. In each cohort, the difference between neighboring strata was significant (p < 0.001). (B) Sensitivity analysis in each risk stratum by disease severity in MIMIC-IV and eICU-CRD cohort. The red color represents internal validation cohort; the blue color represents MIMIC-IV cohort; the green color represents eICU-CRD cohort; the dotted line perpendicular to the x-axis represents the average mortality of patients stratified by SOFA; the red dot, the blue triangle and the green dote represent in-hospital mortality stratified by SOFA and risk group in internal validation, MIMIC-IV and eICU-CRD cohort, respectively; error bar represent 95% confidence interval; no overlap of 95% confidence intervals indicates statistically significant differences between stratified groups; bars represent percentage of patients in each risk group stratified by SOFA

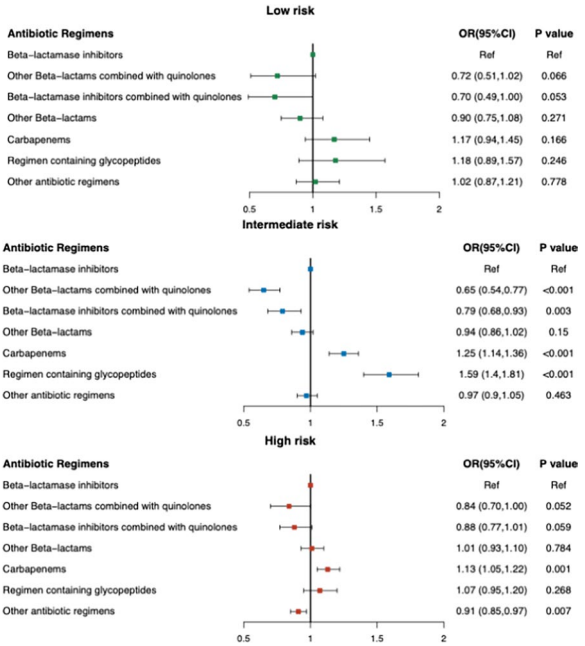


Fig 5 (abstract 000685) Comparison of ORs of simplified risk model stratification

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Topic: Sepsis

000687

Effect of positive pressure in airways on inspiratory thoracic cage excursion force: study on healthy volunteers

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***Intensive Care Medicine Experimental*, *2025*;13(1): *000687*.**

Introduction. Increased effort of breathing (EOB) in spontaneously breathing patients can be deleterious and lead to worse clinical consequences. Inspiratory thoracic cage excursion force (iTCEF) is a potential marker of EOB. Non-invasive ventilation (NIV) has been proved to decrease EOB.
Objectives. Aim of this study is to determine how iTCEF changes with positive pressure in the airways.
Methods. Study on healthy volunteers with no prior medical conditions was planned. EOB was measured with force sensitive respiration belt (Go Direct® Respiration Belt, Vernier, USA), iTCEF was registered as maximum (newtons), mean (newtons) and inspiratory time product (newtons sq/sec). NIV was generated with face mask and 5 cm water of PEEP and 7 cm of PS, FiO2 21%. iTCEF was registered in normal and NIV conditions. Statistical analysis was carried out with IBM SPSS statistics v23.
Results. Study on 30 healthy volunteers was conducted, data analysed of 28 of them due to fault in data gathering (age 23.89 ± 3.13, men 21.4%). No changes in spirometry evaluation were detected in any of the subjects prior the test. Three consecutive breaths were recorded with NIV and no NIV. Increase in all iTCEF parameters was noted with NIV: mean value (2.18 ± 1.02 vs 6.61 ± 4.67 $p < 0.001$, + 230%), maximum value (5.06 ± 2.40 vs 15.19 ± 12.53 $p < 0.001$, + 216%), newton time product (4.41 ± 3.51 vs 15.00 ± 17.11 $p = 0.001$, + 304%).
Conclusions. Increase in iTCEF is evident when NIV is applied. This is a likely finding if positive pressure is added and transferred to inspiration mechanics. Unfortunately, it is not possible to differentiate patient own efforts and machine pressure comparing mean, maximum and time product of inspiratory newtons.

Topic: Acute respiratory failure and mechanical ventilation

000688

ICU Outcomes in sepsis and septic shock: insights from a retrospective cohort study

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***Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000688*.**

Introduction. Sepsis and septic shock remain major causes of ICU admission and are associated with substantial mortality and resource utilization. Despite standardized management protocols, outcomes—particularly in septic shock—continue to be unsatisfactory.
Objectives. To describe the clinical characteristics, therapeutic interventions and outcomes of ICU patients with sepsis or septic shock, and to identify factors associated with ICU mortality.
Methods. This retrospective unicenter cohort study analyzed adult patients admitted to the ICU of a secondary hospital in Portugal, from July 2023 to December 2024 with a diagnosis of sepsis or septic shock, based on Sepsis-3 definitions. Data collected included demographics, infection source, APACHE II scores, antimicrobial timing, use of organ support (vasopressors, mechanical ventilation, renal replacement therapy), and ICU outcomes. The primary outcome was ICU mortality; secondary outcomes included ICU length of stay and requirement for organ support. Statistical analyses were performed using SPSS software,
Results. A total of 186 patients were included: 102 with sepsis and 84 with septic shock. Median age was 64 years (IQR 54–75); 58% were male. Predominant infection sites were respiratory (42%), intra-abdominal (25%), and urinary tract (14%). The septic shock group had a higher median APACHE II score (23 vs. 9, $p < 0.001$). Broad-spectrum antibiotics were initiated within 1 h in 70% of cases. As implied in the definition, all septic shock patients received vasopressors. Mechanical ventilation was used in 63% of cases; 22% received renal replacement therapy. Overall ICU mortality was 34%, significantly higher in the septic shock group (45%) versus the sepsis group (18%, $p < 0.001$).
Conclusions. Mortality and organ support requirements remain high in patients with septic shock. Timely antimicrobial therapy and early hemodynamic resuscitation are critical. These findings support the importance of early sepsis recognition and adherence to established ICU protocols to improve outcomes.

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Topic: Sepsis

000690

Early prediction of sepsis using multimodal clinical data and AI-driven analysis: a step towards reducing antimicrobial overuse

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***Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000690*.**

Introduction. Sepsis remains a leading cause of morbidity and mortality in hospitalized patients worldwide. While timely antimicrobial therapy is critical to improving patient outcomes, its overuse contributes to the growing threat of antimicrobial resistance (AMR), ultimately undermining the effectiveness of future treatments. These competing challenges highlight the urgent need for a reliable, early detection tool to enable timely and targeted therapeutic interventions.
Objectives. The primary objective of this study was to develop and validate an artificial intelligence (AI) model capable of predicting sepsis onset substantially earlier than current clinical practices allow. By identifying at-risk patients during a clinically relevant time window, our aim is to enable precise antimicrobial stewardship while reducing the misuse of broad-spectrum agents.
Methods. Data were retrospectively analysed from the MIMIC-IV database [1]. We incorporated high-frequency vital signs recorded in hourly intervals, less frequent laboratory test results, and static patient descriptors such as demographics and comorbidities. Sepsis-3 [2] and the suspicion of infection time was used to label the sepsis onset. A 6-h observation window was used to forecast sepsis risk within the subsequent 48-h period, reflecting the practical need for early, actionable insights. Using a sliding window method, a total number of 690,051 window samples were created, with 60% of them being positively labeled. Preprocessing techniques included forward-filling for missing values, imputation methods for underrepresented laboratory measurements, normalization of continuous features, and one-hot

encoding of categorical variables. We implemented a multi-view convolutional neural network (CNN) and evaluated its performance through a fivefold cross-validation analysis.

Results. Preliminary evaluations on mixed-patient cohorts demonstrated high accuracy, achieving an area under the receiver operating characteristic curve (AUROC) of 0.94 ± 0.003. Under a more stringent leave-group-out approach intended to mimic real-world deployment, the model maintained strong predictive capability with an AUROC of 0.86 ± 0.009. These findings illustrate the system's potential as a clinical decision-support tool for timely and targeted interventions, as well as the importance of rigorous evaluation to ensure real-world applicability.

Conclusions. An AI-driven model that uses multimodal clinical data may enhance early sepsis detection, enabling earlier clinical intervention according to international guidelines like the CMS SEP-1 [3], [4], thereby supporting the targeted use of antimicrobials and reducing the risk of AMR. Ongoing work involves refining the model with additional data sources such as clinical notes and imaging reports, conducting prospective validations, and an automated alignment of the tool with site-specific stewardship protocols for optimized antimicrobial management.

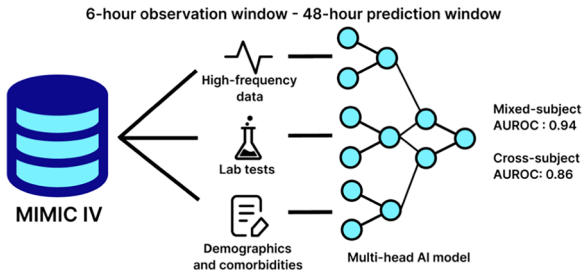


Fig 1 (abstract 000690) The proposed sepsis prediction framework. The model utilizes MIMIC-IV data to integrate high-frequency physiological signals, lab test results, and static patient descriptors (e.g., demographics and comorbidities) within a 6-h observation window to predict sepsis risk over a 48-h horizon. A multi-head AI architecture demonstrates robust performance, achieving an AUROC of 0.94 in mixed-subject evaluations and 0.86 in cross-subject evaluations, supporting its potential as a clinical decision-support tool.

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Topic: Sepsis

000692

Correlation of serum copeptin: c-reactive protein and procalcitonin levels with APACHE II score in sepsis

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000692.

Introduction. Sepsis affects nearly 48.9 million globally and accounts for 19.7% of deaths, with higher mortality in developing countries like India (27.6%, 33.2% Sepsis-3 positive) [1]. Rapid progression demands timely management and accurate prognostic tools. APACHE II remains a standard for sepsis assessment [2], but novel biomarkers like copeptin are gaining interest. Copeptin, derived from pre-pro-vasopressin, rises in early sepsis with hemodynamic stress [3], and unlike AVP, remains stable even in late stages [4]. It reflects AVP secretion accurately due to equimolar release [5], and is significantly elevated in septic shock (59–1572 pmol/l vs. 0.3–18 pmol/l in controls) [6]. CRP, induced by IL-6, rapidly increases in early sepsis from baseline < 8 mg/L [7]. PCT, a calcitonin precursor, normally < 0.05 ng/mL, surges to 1000 ng/mL in severe bacterial sepsis [8]. PCT aids in early detection, severity assessment, and guides antimicrobial therapy [9]. This study addresses limited Indian data on copeptin by evaluating its levels with CRP and PCT, correlating them with APACHE II scores.

Methods. This prospective observational study was conducted at Vardhman Mahavir Medical College & Safdarjung Hospital, a tertiary care level hospital in New Delhi over a period of 18 months and involved 46 patients over the age of 18 years diagnosed with sepsis according to sepsis-3 criteria [1]. Serum copeptin, CRP and PCT were measured within the first 24 h (day 1), 48 h (day 2) and 72 h (day 3). Survival at 28 days after admission was recorded.

Results. This study involved 46 patients (median age 51; 50% male/female); 63.04% died and 36.96% survived. APACHE II scores ranged widely, with most between 5 and 29. Procalcitonin, CRP, and copeptin levels were elevated throughout days 1–3, with copeptin rising from 38.02 ± 33.73 to 44.05 ± 46.43 ng/mL (Table 1). Copeptin correlated increasingly with APACHE II scores (r = 0.099 to 0.664; $p < 0.0001$) and significantly predicted mortality from day 2 onward (AUC day 3 = 1.0; 100% sensitivity/specificity at > 25.1 ng/mL) (Fig. 1). Non-survivors had significantly higher APACHE II scores and copeptin levels, especially on days 2 and 3 ($p < 0.0001$).

Table 1: (abstract 000692)—Descriptive statistics of copeptin at various time intervals

Copeptin(ng/mL)	Mean ± SD	Median (25th-75th percentile)	Range
At day 1	**38.02 ± 33.73**	**29(25.7–37)**	**8.5–200**
At day 2	**41.93 ± 42.26**	**34.75(22.275–40.375)**	**10.5–245**
At day 3	**44.05 ± 46.43**	**40.7(19–46.225)**	**8–262**

Conclusions. Our investigation revealed that copeptin levels, especially on days 2 and 3, are highly accurate predictors of mortality. The progressive improvement in predictive accuracy highlights the value of serial monitoring in critically ill patients. On day 3, copeptin levels > 25.1 ng/mL perfectly distinguished survivors from non-survivors (AUC = 1, p < 0.0001), with 100% sensitivity and specificity. On day 2, at a cutoff > 29 ng/mL, sensitivity was 93.1% and specificity was 94.12%. Day 1 showed weaker performance, with a cutoff > 43 ng/mL yielding 31.03% sensitivity but 100% specificity. These findings suggest copeptin as a useful marker for predicting sepsis-related mortality. The limitation of our study was that it was a single-center prospective observational study with a small sample size.

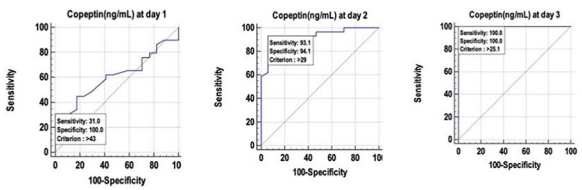


Fig 1 (abstract 000692) Receiver operating characteristic curve of copeptin at day 1, day 2 and day 3 for predicting mortality

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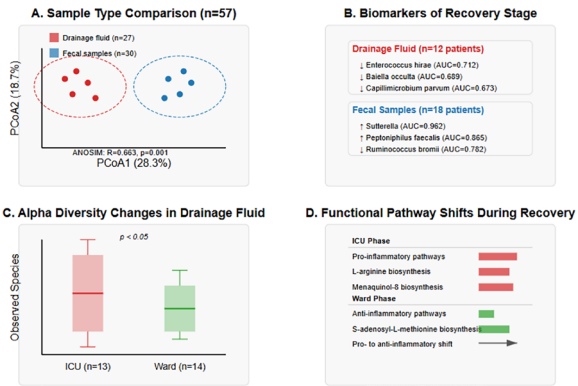
Topic: Sepsis

000693

Microbiome dynamics in drainage fluid and fecal samples during trauma recovery: a comparative analysis

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000693.

Introduction. The microbiome plays a crucial role in trauma recovery through interactions with host immunity. This study investigated microbiome dynamics in both drainage fluid and fecal samples during patient transition from ICU to ward settings to identify potential biomarkers associated with recovery stages.
Methods. We analyzed samples from 18 trauma patients treated at Chonnam National University Hospital Trauma Center (May 2023-June 2024), collecting 27 drainage samples from 12 surgical patients and 30 fecal samples from all 18 patients. Using 16S rDNA amplicon sequencing, we examined microbial diversity across recovery stages. Linear mixed-effects models were employed to identify significant microbes while accounting for clinical variables, with ROC analysis validating their predictive potential. Functional pathways were analyzed using PICRUSt2.
Results. Microbial compositions differed significantly between sample types (R = 0.663, p = 0.001). Alpha diversity indices in drainage samples decreased during the ward stage compared to the ICU stage for observed species and Chao1 indices. In drainage samples, nine genera and six species showed significant differences between stages, with *Enterococcus hirae* (AUC = 0.712), *Gaiella occulta*, and *Capillimicrobium parvum* decreasing in the ward stage. In fecal samples, 26 genera and 32 species differed significantly, with *Sutterella* (AUC = 0.962) and *Peptoniphilus faecalis* (AUC = 0.865) showing increased abundance during the ward stage. Functional pathway analysis revealed that L-arginine biosynthesis and menaquinol-8 biosynthesis pathways were more pronounced in the ICU stage, while S-adenosyl-L-methionine biosynthesis increased in the ward stage for both sample types.
Conclusions. This study suggests distinct microbiome signatures in drainage fluid compared to fecal samples, with specific microbial changes across recovery stages. The identified microbes show potential as candidate biomarkers for monitoring recovery status, with *E. hirae* in drainage fluid and *Sutterella* in fecal samples demonstrating promising predictive capability. While our findings provide initial insights into site-specific microbiome dynamics during trauma recovery, validation in larger, independent cohorts is necessary before clinical application.



Microbiome Dynamics in Drainage Fluid and Fecal Samples During Trauma Recovery

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Topic: Trauma

000694

Machine learning classifier model with clinical data to predict metabolic phenotypes in the critically ill

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Intensive Care Medicine Experimental*, *2025*;13(1)**: ***000694.

Introduction. Clustering algorithms have identified four distinct metabolic phenotypes in critically ill patients with vitamin D deficiency. This study aimed to predict these metabolic phenotypes using a machine learning classifier model trained on clinical data in place of metabolomics data.
Objectives. To develop and evaluate a machine learning classifier model for predicting metabolic phenotypes using clinical data from the Vitamin D Deficiency in Critically Ill Patients (VITdAL-ICU) trial.
Methods. We employed a gradient boosting model with tenfold cross validation. Our objective variable was the four previously identified metabolic phenotypes. First, we developed Model 1 incorporating all

demographic and laboratory variables as predictor variables. Then, we identified variable importance and extracted key predictors. Model 2 used the top 10 relatively important variables, while Model 3 incorporated the most commonly available variables that had high relative importance. We evaluated predictivity of Models 1, 2, and 3 with accuracy and area under curve (AUC) using bootstrapping methods. Finally, we investigated the associations between the treatment effect of vitamin D supplementation and 180-day mortality in each predicted phenotype.

Results. Model 1 demonstrated high accuracy of 100% (95% CI, 0.99–1.00) for predicting metabolic phenotypes. In Model 1 we identified more relatively important demographic and laboratory variables (Fig. 1 and 2). Model 2 using the top 10 relatively important variables (Fig. 1) showed an accuracy of 88% (95% CI, 0.85–0.91) with an AUC of 0.99 (95% CI, 0.98–0.99). Model 3 using the most commonly available variables (Fig. 2) showed an accuracy of 85% (95% CI, 0.81–0.88) with an AUC of 0.97 (95% CI, 0.96–0.98). Although the treatment effects of vitamin D supplementation in predicted phenotypes via both Model 2 and 3 were similar directions to that observed in identified metabolic phenotypes, the effects of vitamin D supplementation were not significant regarding 180-day mortality (predicted phenotype A: Odds ratio (OR) 1.14 [95%CI 0.57–2.26]; predicted phenotype B: OR 0.55 [95%CI 0.27–1.12]; predicted phenotype C: 0.62 [95%CI 0.23–1.69]; predicted phenotype D: OR 0.57 [95%CI 0.25–1.32], via Model 3).

Conclusions. We developed a machine learning classifier model using demographic and laboratory data to predict the four metabolic phenotypes with high predictivity. Further validation studies are needed as a next step to utilize clinical data to identify metabolic phenotypes.

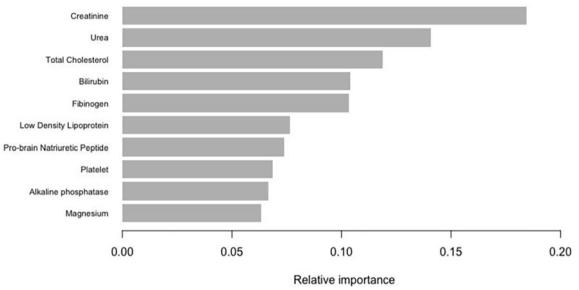


Fig 1 (abstract 000694) Top 10 relatively important demographic and laboratory variables

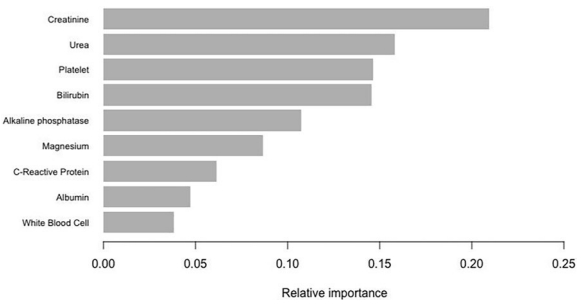


Fig 2 (abstract 000694) Most commonly available variables with high relative importance

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3 This work was supported by the National Institutes of Health [R01 GM115774]

Topic: Metabolism, endocrinology, liver failure and nutrition

000695

Septic shock: analysis of mortality in an intensive care unit of a regional hospital

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000695***.

Introduction. Sepsis is a state of multisystem dysfunction, which is caused by a dysregulated host response to infection. Several factors influence the severity, clinical manifestations and progression of sepsis.

Objectives. To analyze the factors associated with mortality in patients diagnosed with septic shock (SS) in the Intensive Care Unit of Punta de Europa University Hospital.

Methods. Retrospective descriptive analysis of a prospective cohort conducted in a 12-bed ICU between 2019 and 2024. Demographic variables, comorbidities, severity scores, treatment received, mechanical ventilation (MV), risk factors, ICU infections, antibiotic therapy, ICU and hospital stay were analyzed. Statistical analysis: categorical variables (frequencies and percentages) and quantitative variables (mean and standard deviation or median and interquartile range). Comparisons: χ test (percentages), Student's t test (means), and Mann–Whitney U test (medians). Multivariate logistic regression was used. Statistical significance at $p < 0.05$.

Results. 432 patients were included. Non-SS (n = 133) vs. SS (n = 299). SAPS II (32 [24; 49] vs. 39 [27; 53.5], p = 0.049). GCS (15 [7; 15] vs. 15 [13; 15], p = 0.028). Comorbidity: neoplasia (11.3% vs. 24.4%, p = 0.003). Infection (p < 0.001): secondary bacteremia (6% vs. 21.7%), CRB/unknown source (4.5% vs. 19.1%), abdominal infection (4.5% vs. 13%), UTI-SU (8.3% vs. 4.3%), VAP (18% vs. 7.7%).

Mortality analysis: alive (n = 152) vs. dead (n = 147). Sex: male (50.6% vs. 67.3%, p = 0.005). APACHE II (13 [9;18] vs. 15 [11; 20.5], p = 0.005). SAPS II (36 [25;50] vs. 41 [28;58], p = 0.041). Risk factors: neutropenia (3.9% vs. 10.2%, p = 0.042), RRT (9.2% vs. 31.9%, p < 0.001), MV (51.3% vs. 87.7%, p < 0.001), SU (96% vs. 100%, p = 0.029), tracheostomy (9.9% vs. 23.1%, p = 0.003). Comorbidities: DM (25% vs. 38.8%, p = 0.015). Infection (p < 0.001): secondary bacteremia (23% vs. 20.3%), CRB/unknown focus (10.5% vs. 27.9%), abdominal infection (17.1% vs. 8.8%), UC-infection (4.6% vs. 4.1%), VAP (4.6% vs. 10.9%). MV time (1 [0; 8] vs. 9 [3; 17], p < 0.001). ICU stay (7 [4; 13] vs. 12 [5; 21], p = 0.001). Multivariate logistic regression: RRT (OR 3.79 [1.87–8.07], p < 0.001), DM (OR 2.09 [1.15–3.87], p = 0.017), MV time (OR 1.21 [1.13–1.31], p < 0.001), intra-ICU infection (OR 2.55 [1.36–4.86], p = 0.004), ICU stay (OR 0.87 [0.81–0.92], p < 0.001).

Conclusions. Mortality in patients with septic shock was high (41%). RRT, diabetes, MV time, intra-ICU infection, and ICU stay were independently associated with mortality in septic shock in our patients.

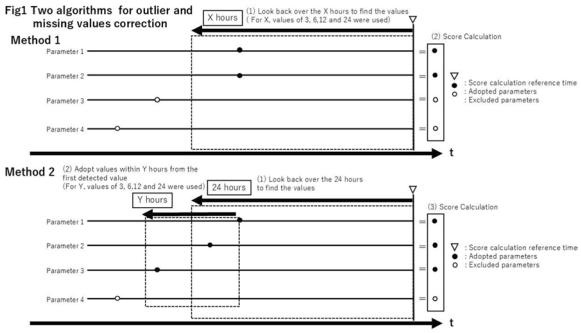
Topic: Sepsis

000696

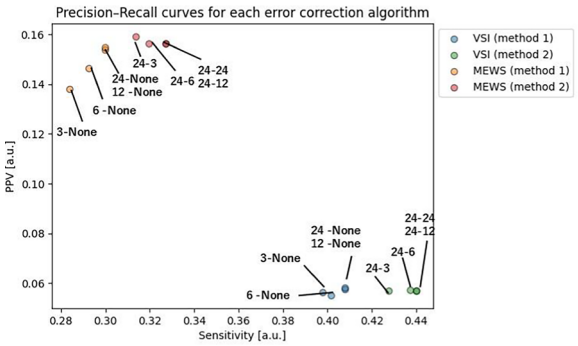
Optimal algorithm for outlier correction in vital signs used for early warning scores in general wards

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000696***.

Introduction. Early Warning Scores (EWS) utilizing vital signs enable the early detection and intervention of clinical deterioration in hospitalized patients. However, vital signs recorded in electronic medical records often include outliers or missing values due to input errors or technical issues. Appropriate correction of these abnormal values is essential for accurate scoring, yet little research has been conducted on the optimal correction methods.
Objectives. To develop and evaluate an optimal algorithm for correcting outlier and missing values in vital signs used for EWS calculation, with the goal of improving the predictive performance of EWS for unexpected ICU admissions and in-hospital mortality.
Methods. We analyzed data from adult patients admitted to general wards between June 1, 2023, and February 29, 2024. Two EWS systems were assessed: the Visensia Safety Index (VSI) and the Modified Early Warning Score (MEWS). The target events were unexpected ICU admissions or death. EWS performance was evaluated by determining whether an alert was triggered within 12 h prior to an event. Sensitivity (Sn) and positive predictive value (PPV) were calculated. Two algorithms were compared for outlier and missing values correction (Fig. 1):
Method 1: The most recent set of vital signs within the specified time window (3, 6, 12, or 24 h) prior to score calculation.
Method 2: Search up to 24 h back and use a value recorded within a specified time window (3, 6, 12, or 24 h) prior to the first detected value.
Results. We analyzed data from 16,486 patients. The incidence of unexpected ICU admission was 2.1%, and in-hospital mortality was 1.9%. For VSI, Method 1 yielded a sensitivity of 40.8% and a PPV of 5.84%. Method 2 improved sensitivity to 43.7% with a PPV of 5.74%. While PPV remained similar, sensitivity increased by approximately 3%. MEWS showed a similar trend: Method 1 had a sensitivity of 30% and PPV of 15.5%, whereas Method 2 improved sensitivity to 32% and PPV was 15.6%. Thresholds of VSI = 3 and MEWS = 7 were applied. Among variations of Method 2, a 24-h look-back period and a 6-h correction window was found to be the most effective setting (Fig. 2).
Conclusions. Correcting abnormal vital sign values using a defined time-window-based algorithm improved the sensitivity of EWS compared to simply using the most recent value. Implementation of this algorithm could enhance the accuracy of clinical decision support systems in general wards.



Method 1 The most recent set of vital signs within the specified time window (3, 6, 12, or 24 h) prior to score calculation



Method 2: Search up to 24 h back and use a value recorded within a specified time window (3, 6, 12, or 24 h) prior to the first detected value
'24–none' indicates using the latest available value within the 24-h look-back period.
'24–6' refers to using the most recent value within 6 h after the latest value found by looking back 24 h.

Topic: Information systems and Data Science

000698

Monocyte atlas in patients with sepsis-induced coagulopathy

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000698***.

Introduction. Sepsis-induced coagulopathy (SIC) is a life-threatening complication of sepsis. Excessive activation of monocyte-mediated immunothrombosis is the predominant mechanism underlying SIC. While prior flow cytometry (FCM)-based investigations have implicated distinct contribution of CD14 + and CD16 + monocyte in SIC pathogenesis, the limited resolution of FCM in delineating functionally heterogeneous subpopulation promoted the employment of single-cell RNA sequencing (scRNA-seq) for deeper molecular characterization. This approach allows precise identification of monocytes subpopulations and their potential roles in SIC.
Objectives. This study aimed to characterize the monocyte atlas in SIC.
Methods. A prospective cohort study was implemented for Sepsis-3.0-diagnosed patients in 2023 at the intensive care unit of Zhongda Hospital, with retrospective analysis of mHLA-DR (HLA-DR + /CD14 +) expression in septic cases from 2016 to 2022 [1]. Sepsis patients were categorized into two groups according to the SIC diagnostic criteria:

non-SIC (NSIC) group and SIC group [2]. Peripheral blood mononuclear cells from healthy controls (HC), SIC and NSIC patients were analyzed by scRNA-seq, with subsequent dimensionality reduction, clustering, and cell type annotation. Differential gene expressions were performed to identify functional features of distinct subpopulation. Cell Chat was used to decode intercellular signaling networks. The target subpopulation was validated by peripheral blood from sepsis patients.
Results. We identified 5 major cell types and 22 subpopulations in scRNA-seq analysis of PBMC from HC, SIC and NSIC group. Monocyte-DC compartment showed a significantly higher proportion in both SIC and NSIC groups compared to HC group. Cell Chat analysis indicated enhanced communication between monocyte-DC and platelets in the SIC group relative to the NSIC group, suggesting a key role of monocyte in thrombosis. To characterize the heterogeneous subpopulations of monocyte, we performed secondary dimensional reduction found that Monocyte-DC cells were classified into 9 subpopulations. Remarkably, the proportion of LGALS2 + CD14 + monocytes in CD14 + and global monocytes were significantly lower in SIC group compared to NSIC and HC groups. Meanwhile, LGALS2 + CD14 + monocytes showed a high level of HLA-DRA. To further demonstrate the association of LGALS2 + CD14 + monocytes and SIC, we conducted retrospective analysis of HLA-DR + /CD14 + in sepsis patients and found significantly reduced HLA-DR + /CD14 + expression in SIC group. The mRNA levels of LGALS2 in blood samples from SIC group were also significantly lower than NSIC group.
Conclusions. Our study employed single-cell resolution analysis to characterize SIC. We have identified a new monocyte subpopulation LGALS2 + CD14 + monocytes associated with SIC, and the specific function of this subpopulation in SIC needs to be further verified. These findings provide a conceptual advance for elucidating the molecular mechanisms underlying SIC pathogenesis.

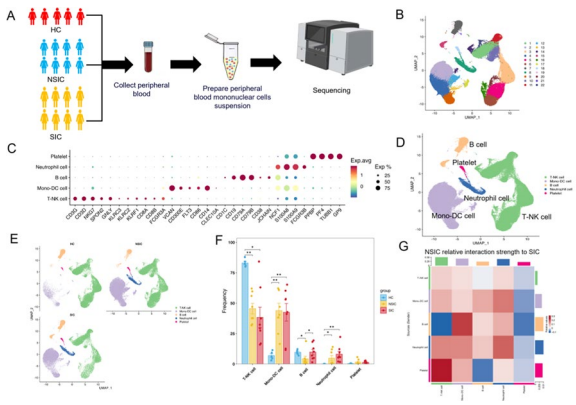


Fig 1 (abstract 000698) Single-cell atlas of PBMCs from SIC patients. A, Schematic diagram shows scRNA-seq pipeline of human PBMCs during SIC.**B**, UMAP visualization of scRNA-seq profiles for 141,507 PBMCs from 21 samples (5HC,8NSIC and 8 SIC) allocated into 22 subpopulations. **C**, Dot plot indicates expression level of canonical annotation marker gene. **D**, UMAP plots of PBMCs are colored by cell type. **E**, UMAP plots of PBMCs in HC group, NSIC group and SIC group, annotated by cell type as defined in Fig. 1C. **F**, Quantitative bar chart shows the comparison of percentage of each cell type between HC group, NSIC group and SIC group. **G**, Heatmap shows the relative interactions strength in NSIC group vs. SIC group. Statistics were analyzed by one-way ANOVA. Data are shown as means ± SD. *P < 0.05, **P < 0.01. PBMCs peripheral blood mononuclear cells, UMAP uniform manifold approximation and projection, scRNA-seq single-cell RNA sequencing, HC healthy controls, NSIC non-SIC, SIC sepsis-induced coagulopathy, Mono monocyte, DC dendritic cell, NK natural killer, SD standard deviation

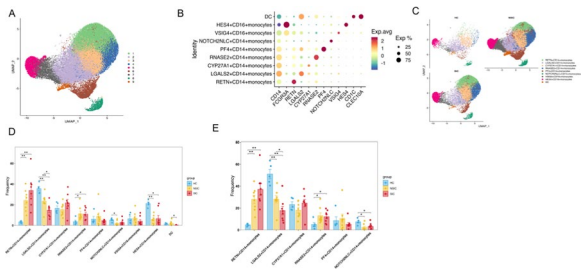


Fig 2 (abstract 000698) Single-cell atlas of Mono-DC type from SIC patients. A, UMAP plots of 47,612 monocyte-DCs allocated to 9 subpopulations from Fig. 1D. **B**, Dot plot shows the representative marker genes across the 9 subpopulations. **C**, UMAP plots of Mono-DC type in HC group, NSIC group and SIC group, annotated by cell type as defined in Fig. 2B. **D**, Quantitative bar chart shows the comparison of percentage of each subpopulation between HC group, NSIC group and SIC group. **E**, Quantitative bar chart shows the comparison of percentage of each subpopulation within the CD14 + monocytes between HC group, NSIC group and SIC group. Statistics were analyzed by One-way ANOVA. Data are shown as means ± SD. *P < 0.05, **P < 0.01. UMAP uniform manifold approximation and projection, HC healthy controls, NSIC non-SIC, SIC sepsis-induced coagulopathy, Mono monocyte, DC dendritic cell, SD standard deviation

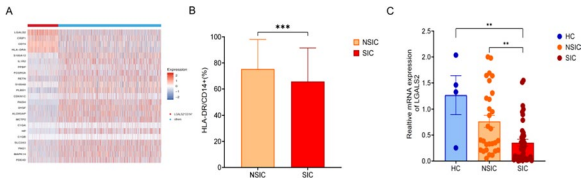


Fig 3 (abstract 000698) Identification of LGALS2 + CD14 + monocytes in the septic heart. A Heat map shows the relative expression of DEGs between the LGALS2 + CD14 + subpopulation and other subpopulation. **B** Quantitative bar chart shows the comparison of HLA-DR + /CD14 + expression between NSIC group and SIC group. **C** Quantitative bar chart shows the mRNA expression level of LGALS2 in blood samples between HC group, NSIC group and SIC group. Statistics were analyzed by one-way ANOVA and unpaired two-sided Student's t test. Data are shown as means ± SD. **P < 0.01, ***P < 0.001. HC healthy controls, NSIC non-SIC, SIC sepsis-induced coagulopathy, SD standard deviation, DEGs differentially expressed genes.

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Topic: Sepsis

000701

High levels of patient–ventilator asynchrony caused by flow insufficiency is associated with poor outcomes in patients with covid-19: application of a digital mechanical ventilation monitoring platform in intensive care unit (ICU).

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Introduction. Patient-ventilator asynchrony (PVA) is common in mechanically ventilated critically ill patients, the monitoring of which is valuable and urges advanced technology. This study reported the refined monitoring platform by our group that achieved the real-time identification of eight types of PVAs, and explored the relationship between the frequency of various PVAs and the mortality of corona virus disease 2019 (COVID-19) patients.
Objectives. This study investigated the correlation between dynamic patient-ventilator asynchrony and prognosis in intensive care unit (ICU) patients with COVID-19.
Methods. This is a retrospective study based on the ventilatory monitoring data of 23 patients with COVID-19. The study ran from December 2022 to August 2023 and the research data were gathered from Peking Union Medical College Hospital (PUMCH). Gross and individual indexes of dynamic asynchrony, which included eight types of PVA (ineffective trigger, auto trigger, double trigger, reverse trigger, flow insufficiency, overshoot, premature cycle, and delayed cycle), were analyzed to find the correlation between PVA and prognosis.
Results. 23 patients were included in this study. No correlation was found between the index and ventilatory parameters, compliance, and disease severity. Patients with dynamic asynchrony index (DAI) > 10% were more likely to have fewer 28d ventilator-free days (VFD) (1.33d vs 11.4d, p = 0.027) and were demonstrated to have a higher ICU mortality (66.7% vs 18.2%, p = 0.036). Among eight types of PVA, flow insufficiency was found to be associated with prognosis (p = 0.012).
Conclusions. DAI correlated with the prognosis of COVID-19 patients. Patients with a DAI ≥ 10% were more likely to have fewer 28d VFDs and higher ICU mortality. The index of flow insufficiency was associated with prognosis, as those with a higher prevalence of flow insufficiency were prone to ICU death.

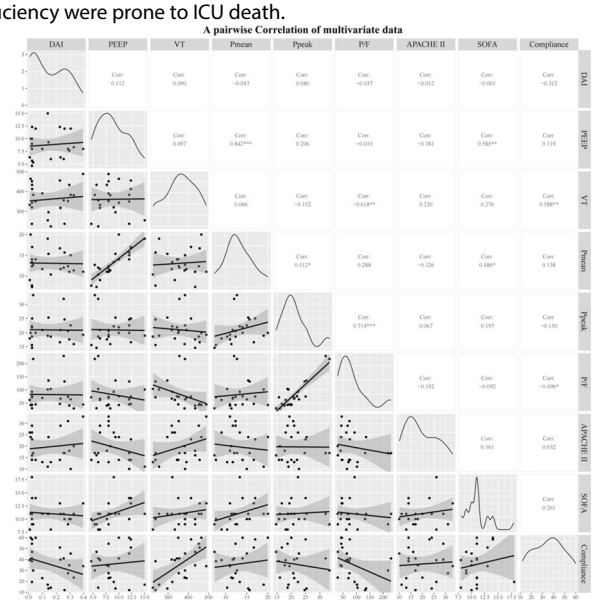


Fig 1 (abstract 000701) Pairwise correlations among DAI, ventilatory parameters, respiratory compliance, and disease severity. Each cell in the matrix displays a scatterplot and correlation coefficient (Corr), ranging from -1 to 1, indicating the strength and direction of the relationship between two variables. The diagonal of the matrix shows the distribution of each variable, including density curves and central tendency. Pmean correlated positively with PEEP (r = 0.842, p < 0.001), Ppeak (r = 0.512, p < 0.05), and SOFA (r = 0.0.486, p < 0.05). P/F correlated positively with Ppeak (r = 0.714, p < 0.001), and negatively with VT (r = -0.618, p < 0.01) and compliance (r = -0.496, p < 0.05). DAI did not correlate with other parameters. *: p < 0.05; **: p < 0.01; ***: p < 0.001.

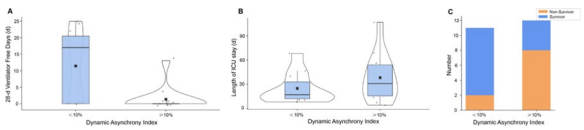


Fig 2 (abstract 000701) A. Boxplot-violin plot of 28-d ventilator-free days in two groups of patients grouped by a DAI ≥ 10% or < 10%. B. Boxplot-violin plot of length of ICU stay for two groups of patients grouped by a DAI ≥ 10% or < 10%. C. Stacked bar demonstrating the correlation between DAI and outcomes

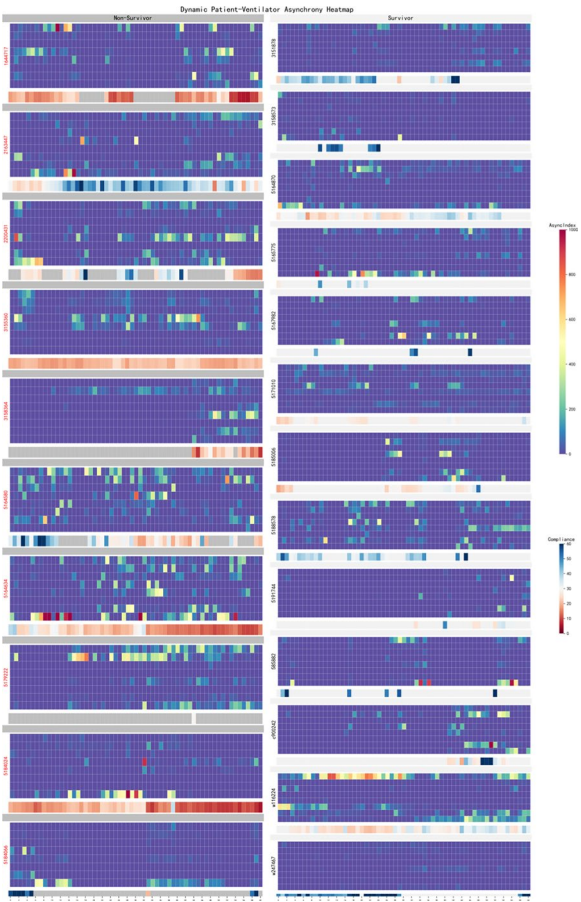


Fig 3 (abstract 000701) Heatmap of DPVA and dynamic compliance in respiratory cycles resampled by monitoring duration. The shortest time of 61 h was used as the sample size uniformly for all patients. The horizontal axis is labelled as the relative time (0–60 h), while the vertical axis in the heatmap denotes different asynchrony types: ineffective trigger, double trigger, auto trigger, reverse trigger, flow insufficiency, overshoot, premature cycle, and delayed cycle (from top to bottom). Each cell's color intensity corresponds to the total number of asynchrony events per resampled hour, with warmer hues indicating higher asynchrony frequency. Below the DPVA heatmap, a single-row heatmap represents dynamic compliance per hour, where warmer colors denote lower compliance values. Non-survivors (shown on the left) presented higher levels of asynchrony than survivors (shown on the right).

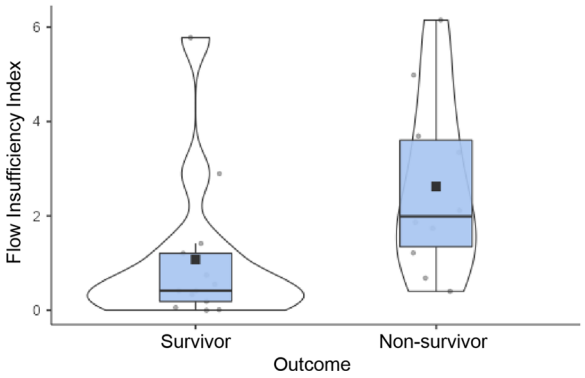


Fig 4 (abstract 000701) Boxplot-violin plot of flow insufficiency index in patients with different outcomes.

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38 We sincerely appreciate the Shanghai Shumu Medical Technology Co., Ltd. for the technological support

Topic: Acute respiratory failure and mechanical ventilation

000702

Impact of tracheostomy on ICU stay in adult patients with ARDS: a systematic review

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Introduction. Acute respiratory distress syndrome (ARDS) frequently necessitates prolonged mechanical ventilation (1); despite the widespread use of tracheostomy, evidence regarding its optimal timing and impact on clinical outcomes remains inconclusive (2).
Objectives. To investigate the impact of tracheostomy on clinical outcomes in adults with ARDS who require MV.
Methods. This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Three electronic databases including PubMed, The Cochrane Library, and EMBASE to identify relevant studies on ARDS patients receiving MV were searched from inception to July 31, 2024. The reviewers assessed the risk of bias of included studies according to the Cochrane Risk of Bias 1 tool or JBI checklists, as appropriate. Two reviewers independently screened the literature and extracted the data. Outcomes among patients who underwent tracheostomy were compared and analyzed.

Results.
Twenty studies involving 4,022 patients with ARDS who required tracheostomy were included, comprising 2 randomized controlled trials, 5 prospective studies, 12 retrospective studies, and 1 case series. On average, tracheostomized patients spent 30.2 days in the ICU and 44.8 days in the hospital, with an overall mean duration of MV of 27 days. Tracheostomy-related adverse events were reported in 15 studies and local bleeding was the most common complication. Of the 1,074 patients with tracheostomy, 626 (58.3%) were successfully weaned from the ventilator. Mortality outcomes were documented in 18 studies, indicating that 883 out of 2,302 (38.4%) of these patients died during hospitalization. Twenty studies involving 4,022 patients with ARDS who required tracheostomy were included, comprising 2 randomized controlled trials, 5 prospective studies, 12 retrospective studies, and 1 case series. On average, tracheostomized patients spent 30.2 days in the ICU and 44.8 days in the hospital, with an overall mean duration of MV of 27 days. Tracheostomy-related adverse events were reported in 15 studies and local bleeding was the most common complication. Of the 1,074 patients with tracheostomy, 626 (58.3%) were successfully weaned from the ventilator. Mortality outcomes were documented in 18 studies, indicating that 883 out of 2,302 (38.4%) of these patients died during hospitalization.

Conclusions. Tracheostomy in MV patients with ARDS does not have a clearly defined impact on ICU length of stay due to variability in study findings. However, it remains a safe intervention with generally minor complications. Future research should focus on standardized weaning protocols and multidisciplinary rehabilitation strategies to potentially improve patient outcomes.

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Topic: Nursing care and physiotherapy

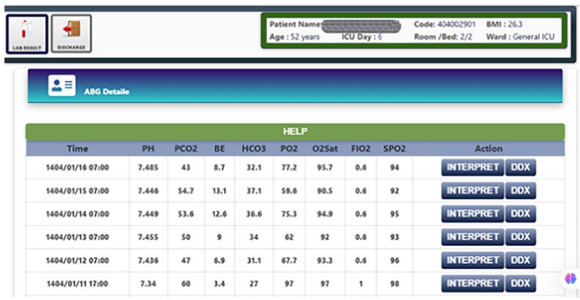
000703

Development and validation of a clinical decision support system (CDSS) for automatic interpretation of arterial blood gas (ABG) analysis: a mixed method study

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Introduction. The arterial blood gas (ABG) test is the gold standard for acquiring patients' acid–base status. However, interpreting the ABG test sometimes is challenging for physicians due to facing physicians with six different values and time limits for the associated calculations.
Objectives. Clinical decision support systems (CDSS), developed and validated by clinical experts sound suitable for assisting physicians in such a time-consuming task.
Methods. The CDSS was developed through four stages. Firstly, the previous literature was reviewed to detect any previously developed algorithms, protocols, or guidelines. Secondly, an expert panel was formed that developed an algorithm for interpreting the ABG test as the knowledge base of the CDSS. Thirdly, the CDSS was developed through the agile methodology, and its usability was assessed after running in two Intensive Care Units (ICU). At last, the CDSS was validated by comparing the interpretations of the ABG tests presented by the CDSS with the interpretations by two attending physicians.
Results. The expert panel developed an algorithm for determining oxygenation status and an algorithm for simple analysis of ABG. The kappa coefficient for concordance rates between the interpretations of the CDSS and the expert 1 and expert 2 were 0.95 and 0.97, respectively. Out of the total 100 ABG test results analyzed by the CDSS, 96 (96%) coincided (concordance), one (1%) partially coincided (partial concordance), and three (3%) did not coincide (discordance) with the interpretations by the physicians. The ABG interpretation algorithm was modified based on the discordance and partial concordance cases.
Conclusions. The CDSS showed a high agreement with the experienced anesthesiologists. The CDSS could sensitively detect oxygenation and acid–base disorders and have also the potential to reduce errors in the associated calculations. Therefore, we expect that this CDSS, as a physician aid, will prove useful in ICU or emergency

departments by representing rapid and definite interpretations of the test results.



A screenshot of the CDSS interface

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7 The study is approved by the ethics review board of the Vice-chancellor for Research Affairs of Kashan University of Medical Science (Ethical code: IR.SUMS.NUHEPM.REC.1399.045). The thesis was financially supported by the Vice-chancellor for Research Affairs of Kashan University of Medical Sciences and [Grant No. 99102] and Shiraz Anesthesiology and Critical Care Research Center, Shiraz University of Medical Sciences

Topic: Information systems and Data Science

000704

Recovery beyond survival: a review of the quality of rehabilitation care provided to patients following an admission to an intensive care unit

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Introduction. Critical care survivors are often left with significant physical and non-physical morbidity, commonly termed post-intensive care syndrome [1]. National guidance [2] in the United Kingdom highlights the need for structured rehabilitation within ICU and throughout the recovery pathway. Despite this, actual rehabilitation delivered is varied and inconsistent. The National Confidential Enquiry into Patient Outcomes and Death (NCEPOD) undertook a national review of care quality to identify potentially remediable factors in clinical and organisational provision of rehabilitation for survivors of critical illness.
Objectives. To evaluate the rehabilitation provided to critically ill adults within intensive care units, as well as throughout the recovery pathway to encompass both ward based and community care.
Methods. Data were collected for analysis using a variety of methods, including organisational questionnaires to evaluate services provided in both acute (n = 166) and community hospitals (n = 67), online anonymous surveys to gain views of both health care professional (n = 420) and patients (n = 102), and Clinical case note reviews (n = 671).
For the case note reviews, inclusion criteria were all patients aged 18 and over, who were admitted to hospital in as an emergency between 1st October 2022 to 31st December 2022 and who survived to hospital discharge, following a stay for 4 or more days on a level 3 unit. Using this criteria, clinical records for up to eight patients were selected from each hospital in England, Wales and Northern Ireland. These were then reviewed against pre-defined criteria developed a priori by a study advisory group made up of specialist multi-professional stakeholders from critical care and rehabilitation settings.
Results. Large variations in care provision were identified from all data sources and across all stages of the recovery pathway. Specific themes identified across the pathway of recovery included a failure to recognise rehabilitation needs, poor communication and handovers of care, and a lack of access to the multi-disciplinary team.
The information was used to create key areas for improvement through a consensus exercise involving the study team and specialist advisory group.
1. To improve the co-ordination and delivery of rehabilitation following critical illness at both an organisational and at a patient level.
2. A need to develop and validate a standardised rehabilitation screening tool to be used on admission to ICU.
3. To undertake and document a comprehensive, holistic assessment of the rehabilitation needs of patients admitted to ICU.
4. Ensure multidisciplinary teams are in place to deliver the required level of rehabilitation within intensive care units and across the recovery pathway in all healthcare settings.
5. Provide patients and their family/carers with clear information about their critical care stay, impact of critical illness and likely trajectory of recovery.
6. Standardise the handover of rehabilitation needs and goals for patients as they transition from the intensive care unit to the ward and ward to community.
Conclusions. This study represents the largest evaluation of critical care rehabilitation services, including ICU, ward and community settings. A number of key areas for improvement were identified with a view to improve care delivery across the entire care pathway.

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Topic: Nursing care and physiotherapy.

000705

Perioperative course of patients with pre-existing neurological disorder undergoing anaesthesia for non-neurological surgery: a prospective observational study

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Intensive Care Medicine Experimental, ***2025***;**13(1)**: ***000705***.

Introduction. Patients with diseases affecting the central nervous system may need to undergo surgery to treat the neurological condition or surgery unrelated to neurological disorder. It is very important to have knowledge of the underlying neurological disorder, anaesthetic techniques, drugs and monitoring modalities. The neurological disorder's perioperative course is influenced by the condition itself, medication management, the anaesthetic method, comorbidities etc. The choice of medications and perioperative management of anaesthesia may be affected by a variety of neurological conditions, including stroke, epilepsy, and Parkinson disease. Knowledge about the perioperative course of patients with pre-existing neurological diseases is important to reduce morbidity and mortality.
Objectives. The study's objective was to ascertain the postoperative outcomes of adult patients with pre-existing neurological diseases scheduled for non-neurological surgery. The patient characteristics, comorbidities, medication management, intraoperative events, postoperative events up to 30 days were noted to determine the perioperative course of these patients.
Methods. Patients of either gender aged more than 18 years scheduled to undergo surgical/diagnostic procedure under general anaesthesia were included in the study. These patients' medical history were recorded in the preoperative clinic. Complete information about neurological disorders was recorded, including medical history, comorbidities like diabetes mellitus and hypertension were identified. Preoperative medication management was recorded. According to the patient's record form, both intraoperative events and postoperative problems were recorded. Any important intraoperative occurrence, such as an arrhythmia, changes in the hemodynamic parameters, or the escalation of a neurological illness, was noted. Any new development of weakness, an exacerbation of the underlying neurological condition, or any other medical complications in the postoperative period were reported as postoperative occurrences. Patients were telephonically and physically followed up for 30 days.
Results. Fifty-five patients were included in the study, of which, 39 had history of stroke, 8 had history of epilepsy, 4 had Parkinson disease, two patients had history of both stroke and epilepsy and two patients had history of both stroke and Parkinson disease. Thus, we studied the perioperative course of 59 neurological diseases. Most of the patients were elderly with an overall mean ± SD age of 57.6 ± 17.2 years. 60.5% of stroke patients and 33.3% of patients with Parkinson disease were hypertensive. 14% of the stroke patients had a history of coronary artery disease while none of the patients with epilepsy or Parkinson disease had such history. 78% cases were done under GA and 22% cases in regional anaesthesia.
We found that 34.9% of stroke patients had residual paralysis and 37.2% patients were not taking DAPT. Among stroke patients 55.8% patients had an uneventful intraoperative period while 34.9% had hypotension and 9.3% had hypertensive episodes. Among patients having hypotension, 16.3% had post-induction hypotension and 18.6% patients were on vasopressor support. Postoperative period was uneventful for 79% while delirium was present in 9.3% patients. Out of 43, 3 patients died in the postoperative hospital stay while one died at home within 30 postoperative days.
Among the 10 patients with epilepsy, 80% patients were taking antiepileptic medication and 20% patients were not taking any medications. Intraoperative period was uneventful in 80% patients and 20% had hypotension. Postoperative period was uneventful in 70% patients while one of the patients had generalised seizures within 30 postoperative days.
Among the 6 patients with Parkinson disease, all patients were taking syndopa. Intraoperative period was uneventful in 50% patients and 50% patients had hypotension. One of the patients died during the postoperative hospital stay.
Conclusions. Patients with pre-existing neurological disease undergoing anaesthesia for non-neurological surgeries are having an unpredictable perioperative course, which may be due to the brain insult itself or may be due to associated comorbidities. Preoperative neurologist consultation will be useful for modification of the medications before surgery especially in patients with Parkinson disease. Modalities which can reduce the exposure of anaesthetic drugs can also help to improve the perioperative outcome.

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000706

Clinical characteristics of severe COVID-19: a multicenter study comparing Omicron and the original strain

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Introduction: Since the onset of the COVID-19 pandemic, over 700 million people have been infected with SARS-CoV-2. The Omicron variant was first identified in Africa in November 2021 and became the dominant global strain by January 2022 [1]. Although previous studies suggested that the Omicron variant has reduced virulence, primarily causing upper respiratory tract infections, it remains highly transmissible [2]. In China, after the large-scale spread of the Omicron variant, an outbreak of the Omicron variant occurred in December 2022. The number of severe COVID-19 cases subsequently increased sharply. By late December to early January, the daily increase in severe cases had approached 10,000, placing an immense burden on health care resources in a short period [3]. A large multicenter retrospective study conducted in South Africa demonstrated that compared with previous variants, the Omicron variant was associated with significantly lower hospitalization and mortality [4]. However, the number of infected patients in China has increased rapidly. This finding indicates that the population characteristics may have changed.
Objectives: Identify the population characteristics and risk factors associated with severe coronavirus disease 2019 (COVID-19) and death since the large-scale spread of the Omicron variant.
Methods: This multicenter retrospective observational study included two cohorts: the Omicron cohort, consisting of 7000 COVID-19 patients admitted to 10 national research centers in China from December 2022 to January 2023, and the Original cohort, consisting of 733 patients from Wuhan during the early outbreak in 2020. Demographic, clinical, laboratory, and treatment data were collected and analyzed. We compared the differences in patient characteristics and outcomes between the two cohorts. Multivariate logistic regression models were employed to identify risk factors for severe COVID-19 and death.
Results: A cohort of 7,000 patients admitted to 10 centers across the country was included in the Omicron cohort, among which 1,551 (22.2%) had severe cases. The original cohort consisted of 733 patients admitted to designated COVID-19 hospitals in Wuhan, all of whom had severe cases. Compared with that of the Original cohort, the median age of the Omicron cohort was notably greater (78.00 [69.00, 85.00] vs. 65.00 [56.00, 73.00], $P < 0.001$). There was a greater proportion of male patients in the severe Omicron cohort (70.0 vs. 65.2%, $P = 0.024$). Comorbidities were more prevalent in the severe Omicron cohort, such as hypertension (53.9 vs. 42.0%, $P < 0.001$), diabetes (32.1 vs. 18.8%, $P < 0.001$), coronary heart disease (20.3 vs. 12.7%, P < 0.001). Compared with that in the original cohort, mortality was slightly greater in the severe Omicron cohort (70.0 vs. 64.8%, $P < 0.001$), with shorter hospital stays (10.8 [5.0, 19.5] vs. 16.0 [9.0, 25.0] days, $P < 0.001$). Respiratory failure was slightly less common in the severe Omicron cohort (89.0 vs. 93.0%, $P = 0.002$), whereas kidney dysfunction was significantly more prevalent (23.6% vs. 11.9%, $P < 0.001$). The Sankey diagram shows the dynamic changes in organ failure among the two cohorts of severe patients within 7 days of hospitalization. On the first day, patients presented similarly, with varying levels of organ dysfunction. However, a greater number of patients infected

with Omicron died within this 7-day period (Fig. 1). After multivariate logistic regression analysis, male sex, older age, lower BMI, lack of vaccination, the use of corticosteroids before admission, the presence of underlying comorbidities, lower oxygenation, a strong inflammatory response, myocardial injury, liver injury, renal injury, and coagulation dysfunction were associated with an increased risk for severe cases (Fig. 2). Older age, the presence of malignant tumors, lower oxygenation, decreased platelet count, and elevated troponin levels were associated with an increased risk for death in severe patients (Fig. 3).

Conclusions: After the large-scale spread, the COVID-19 population was characterized by older age, male sex, and more comorbidities. Older age, male sex, unvaccinated status, preadmission glucocorticoid use, and underlying comorbidities were independent risk factors for severe COVID-19. Among severe patients, older age, underlying comorbidities, severe respiratory failure, and extrapulmonary organ injury were risk factors for death.

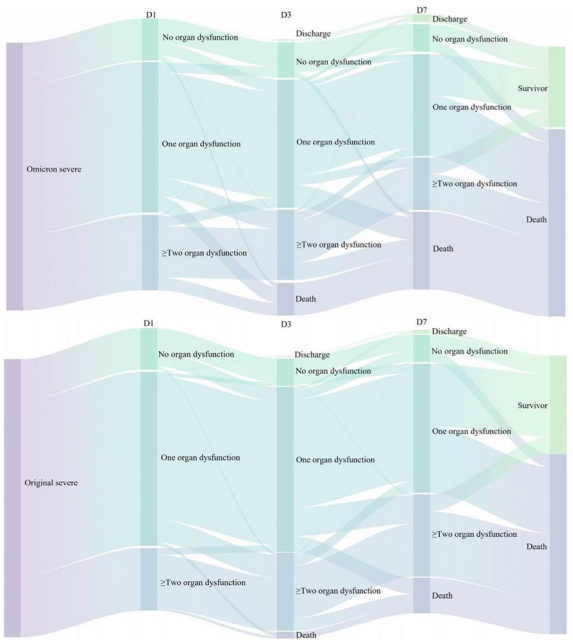


Fig. 1 (abstract 000706) Temporal changes in organ dysfunction in severe patients with different variant.

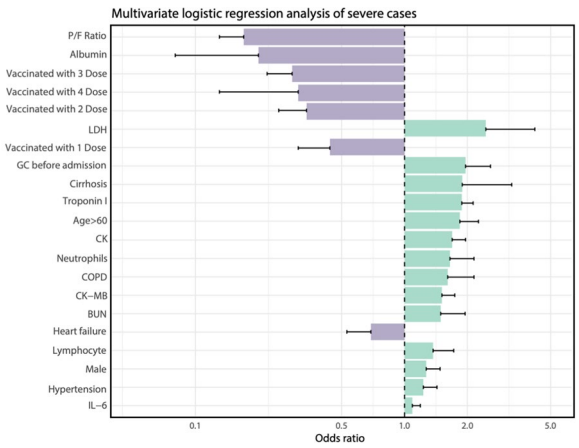


Fig. 2 (abstract 000706) Risk of severe for patients with COVID-19

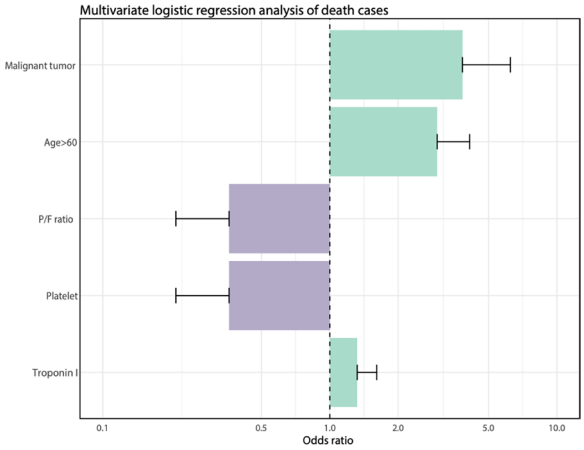


Fig. 3 (abstract 000706) Risk of death for patients with severe COVID-19

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5. This work was supported, in part, by the Noncommunicable Chronic Diseases-National Science and Technology Major Project (2023ZD0506500, 2023ZD0506506); National Natural Science Foundation of China, Grant/Award (Numbers: 81971885, 82341032, 82402565, 81930058); National Key Research and Development Program of China (2022YFC2504405); Zhongda Hospital Affiliated to Southeast University, Jiangsu Province High-Level Hospital Construction Funds (GSP- LCYIFH13); Nanjing Technology Development Program (ZKX24066).

Topic: Acute respiratory failure and mechanical ventilation

000707

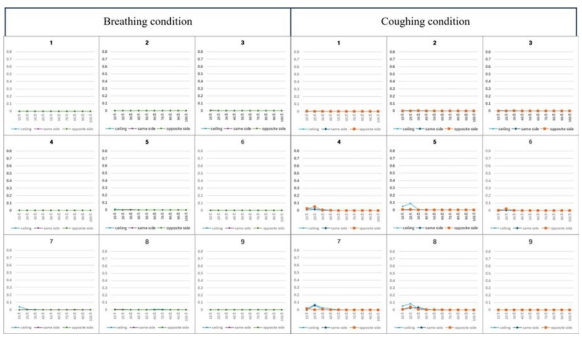
Cap-enhanced negative pressure chamber demonstrates superior aerosol containment: CFD, physical, and biological validation

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*707

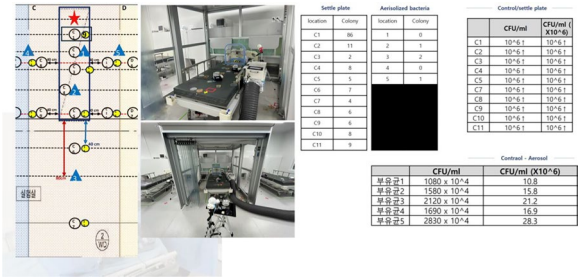
Introduction: Aerosol-generating procedures are known to carry a high risk of airborne transmission, especially in critical care settings. We've been working on a negative pressure chamber design for a while, and in this study, we tried adding a simple cap structure to improve containment. The goal was to see whether this small structural change could actually make a measurable difference.

Objectives: This study aimed to evaluate the effectiveness of a cap-enhanced negative pressure chamber in containing aerosolized particles. We validated the design through CFD simulations, physical PAO leakage testing, and biological challenge experiments using a non-pathogenic bacterial strain.

Methods: CFD simulations were conducted under three different suction configurations: directional switching (both orders) and bilateral suction. In all cases, droplet dispersion modeling showed near-zero leakage from the chamber. A physical particle leakage test was performed at Y-Medi Co., Ltd. (Incheon, Korea), using a modified HEPA filter integrity method based on ISO 14644-3.PAO particles were dispersed at 100-120 μg/L—well above standard biological concentrations—to simulate worst-case aerosol conditions. Leakage was measured using an aerosol photometer (PH-5, Tec Services Inc., USA) at nine defined positions around the hood's open side. Measurements were taken every 10 s for 90 s, at a distance of 15 cm. Three dispersion directions (toward, away from, and centered relative to the suction inlet) were tested, and each configuration was repeated five times. Simulated coughing was modeled using six bursts over 90 s. The biological test was performed in a full-scale emergency department simulation center (Paju, Korea), modeled after Seoul National University Hospital's ED.*Aerosolized Bacillus subtilis* (ATCC 6051), a nonpathogenic spore-forming organism commonly used as a biological indicator, was dispersed using a Collison nebulizer (NSF CN-311) placed at bed level. Bacteria were captured using settle plates and microbial air samplers, then quantified by serial dilution and CFU counting after incubation.
Results: CFD simulations showed complete containment with no observed particle escape in all suction configurations【1】. In the PAO leakage test, the cap-enhanced chamber showed a maximum leakage of 0.086%, with all zones dropping to 0% by 60 s【1】. In contrast, the chamber without the cap showed peak leakage of 0.567%, with ceiling leakage averaging over 0.35% at 10 s【1】. In the biological test, settle plate counts in the control group reached up to 10^6 CFU/L, although the chamber group remained below 10 CFU/L at all sites except one near the cap base (86 CFU/L). Airborne bacteria levels decreased dramatically—from 10.8 to 28.3 × 10^6 CFU/m3 in the control group to just 2 CFU/m3 with the chamber in place.
Conclusions: Adding a cap to the negative pressure chamber significantly improved containment performance across simulation, physical, and biological testing【1-2】.The improvement was especially notable during the early phase of simulated coughing, where leakage reduction was most critical.This design, which remains simple and compatible with existing suction systems, could be a realistic and scalable solution in emergency settings where full negative pressure isolation is not available【3-4,6】.The combined validation approach strengthens the reliability of this intervention for protecting healthcare workers during high-risk procedures【1-2,6】



PAO leakage during 60 s



Biological confirmation of aerosol contrainment

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6. This research was supported by a grant from the project for Infectious Disease Medical Safety, funded by the Ministry of Health & Welfare, Republic of Korea (grant number RS-2022- KH124483 (HG22C0001)).

Topic: Infections and prevention

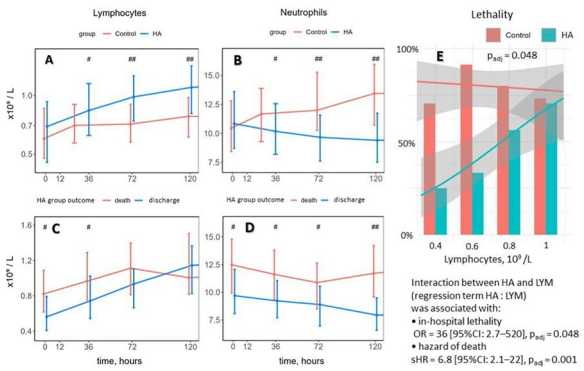
000708

Emergency ImmunoReanimation (EIR) with Efferon hemoadsorption cartridges to restore adaptive immunity and improve survival of COVID-19 patients with lymphopenia

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***708***

Introduction: In COVID-19, overstimulated innate immunity induces adaptive immunity cells exhaustion that causes increases in viral/bacterial load and severity of the disease course. Limited number of studies have demonstrated the potential of hemoadsorption (HA) to modulate immune responses in patients with bacterial sepsis (1-3). Although several studies showed therapeutic efficacy of various HA technique in COVID-19 patients, no studies reported on post-treatment changes in adaptive immune system parameters so far (4-6). In our recent study, HA resulted in a statistically significant reduction

in proinflammatory markers and neutrophil/lymphocyte ratio, with significant benefit in 60-day survival vs. control group (7). However, no thorough analysis of immune consequences of HA for subgroups of patients has been performed. The goals of the current study are to examine whether the HA with Efferon cartridges may reverse altered immune system parameters in subgroups of severe COVID-19 patients and if the pre-treatment lymphocyte or neutrophil counts are significant for a post-treatment survival of severe COVID-19 patients.
Methods: A single-center cohort study (NCT06402279) enrolled 130 patients from October 2020 to February 2022. The main group (severe COVID-19 patients,18-75 years old, not responded to anti-cytokine/cytokine receptor antibody therapy, failed noninvasive ventilation and required invasive mechanical lung ventilation, IMLV) were treated with Efferon CT cartridges as an adjuvant to standard treatment. Control group included retrospectively acquired propensity-matched patients received no hemadsorption, standard treatment only, $n = 65$).
Results: Clinical improvements in vital parameters (increasing oxygenation index, decreasing the development of multiple organ failure and halting the septic shock) following the use of Efferon CT cartridge were accompanied with significant increase in lymphocyte count and decrease in neutrophil concentration in venous blood vs control group (Fig. 1A, B). Interestingly, that patients who not survived post-treatment exhibited significantly increased both lymphocyte and neutrophil count at day 0 and in 36 h after initiation of treatment in the main group vs control (Fig. 1C, D). Regression analysis revealed that only lymphocyte numbers not neutrophils, basophils, or eosinophils, were statistically significant for establishing link between pretreatment low lymphocyte count (< 0.71 × 109) and improved survival. Pearson correlation confirmed low lymphocyte count as an independent predicting biomarker for the life-saving effect of HA in severe COVID-19 patients.
Conclusions: Data conceptually prove an EIR with HA as a method to improve both adaptive immunity and survival in severe COVID-19 patients experiencing lymphopenia.



A, **C**—lymphocytes; **B**, **D**—neutrophils (absolute numbers, × 10^9/L). **E-X**—lymphocytes, abs., × 10^9/L; Y—lethality, %% (regression analysis)

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8. In part, the study was supported by Ministry of Science and Higher Education of the Russian Federation to Federal Research and Clinical Center of Intensive Care Medicine and Rehabilitology (FGWS-2025-0014 to VP)

Topic: Sepsis

000709

Electrical impedance tomography-based evaluation of regional lung ventilation according to ventilation strategy during cardiopulmonary bypass in minimally invasive cardiac surgery: a prospective randomized controlled trial

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***709***

Introduction: Despite the potential benefits of minimally invasive cardiac surgery (MICS), cardiopulmonary bypass (CPB) during MICS can cause pulmonary complications. However, the optimal ventilation strategy for the left lung under CPB during MICS remains unclear.
Objectives: Thus, this study aimed to evaluate differences in postoperative pulmonary ventilation and complications according to ventilation strategy during MICS.
Methods: This prospective, randomized controlled trial included 60 patients who underwent MICS with one-lung ventilation. They were randomly assigned to either the nonventilation (NV) group, in which ventilation was halted during CPB, or the ventilation (V) group, in which ventilation at a tidal volume of 5 ml/kg was maintained during CPB. Electrical impedance tomography (EIT) monitoring was performed immediately after surgery to evaluate differences in regional ventilation and ventilation heterogeneity.
Results: The V group exhibited better ventilation homogeneity across the entire lung (0.5 ± 0.1 vs. 0.6 ± 0.2, $P = 0.020$) and increased ventilation in the left posterior region (1.3 ± 0.4 vs. 1.0 ± 0.3, $P = 0.003$). However, no differences were found in the clinical outcomes, including arterial blood gas analysis and postoperative respiratory complications.
Conclusions: Ventilation of the left lung during CPB in MICS showed better ventilation homogeneity and ventilation of the left posterior lung area, but did not result in differences in early complications,

including respiratory issues. Therefore, in MICS with a CPB duration of < 90 min, ventilating the left lung during CPB may not be required.

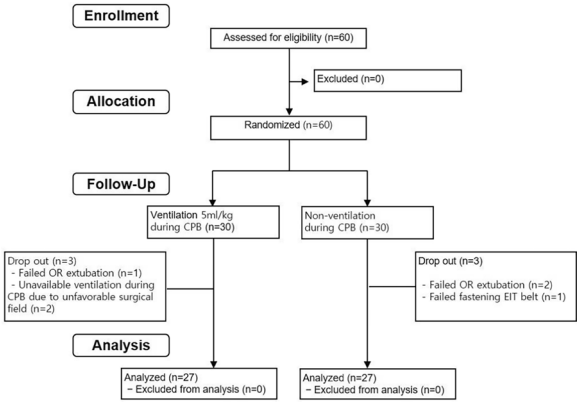


Fig. 1 (abstract 000709) Consort flow diagram. *CPB* cardiopulmonary bypass, *EIT* electrical impedance tomography, *NV* nonventilation, *OR*, operating room, *V* ventilation

Sixty patients who underwent MICS surgery requiring OLV were enrolled in this study, and 30 patients were assigned to the V or NV group using a randomization program. Finally, 54 patients in the V and NV groups were analyzed.

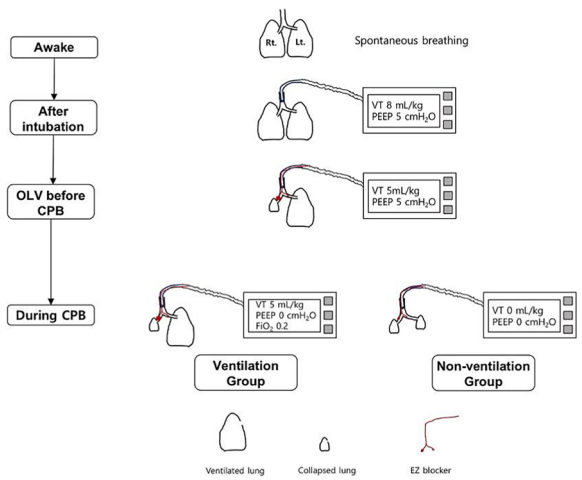


Fig. 2 (abstract 000709) Ventilation strategy. *CPB* cardiopulmonary bypass, *FiO2* fraction of inspired oxygen, *NV* nonventilation; *OLV* one-lung ventilation, *PEEP* positive end expiratory pressure, *V* ventilation

Table 1 (abstract 000709) Regional ventilation ratio, and GI index

	V group (N=27)	NV group (N=27)	P-value
Global ventilation	2471.4 ± 941.3	2479.7 ± 1403.3	0.980
Region of interest (%)			
RAA	26.3 ± 6.7	27.0 ± 6.8	0.718
LAA	28.5 ± 7.7	26.7 ± 9.3	0.456
RPA	18.8 ± 4.2	22.3 ± 7.3	0.033*
LPA	22.7 ± 5.2	20.1 ± 4.7	0.054
Index value			
LAA index = LAA / RAA ROI value	1.1 ± 0.6	1.2 ± 0.6	0.387
LPA index = LPA / RPA ROI value	1.3 ± 0.4	1.0 ± 0.3	0.003*
GI index	0.5 ± 0.1	0.6 ± 0.2	0.020*

Values are presented asmean ± standard deviation, median (interquartile range) [range], or number (proportion). GI, global inhomogeneity; LAA, left anterior area of the lung;LPA, left posterior area of the lung; NV, nonventilation; RAA, right anteriorarea of the lung; RPA, right posterior area of the lung; ROI, region ofinterest; V, ventilation. * Statistically significant

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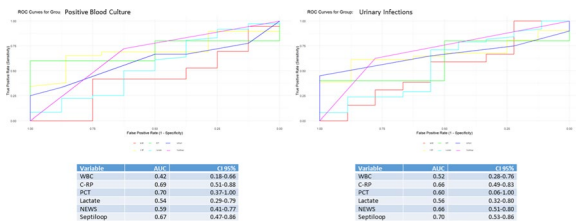
Topic: Imaging in intensive care

00710

Early diagnosis of sepsis

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Introduction: Early detection of sepsis in patients presenting to the emergency department (ED) is challenging. Organ dysfunction usually becomes apparent after the damage has been done. Therefore, tools that allow early prediction of organ dysfunction and poor outcomes are needed to improve management. Sepsis can cause immunoparalysis, Septiloop is an ex vivo test developed to diagnose sepsis and monitor the immune response during periods of immunosuppression, through a challenge test of whole blood exposed to toxins and evaluation of TNF-a release.
Objectives: To evaluate the characteristics of patients presenting to the ED with suspected infection and high risk of developing sepsis (NEWS scale $\geq$ 3) and to assess the performance of biomarkers and Septiloop in diagnosing sepsis.
Methods: We conducted a prospective observational cohort study of patients with suspected infections at high risk of developing sepsis (measured by a NEWS scale $\geq$ 3). Sepsis was defined according to the Sepsis 3 definition by two blinded investigators. Samples were collected between 0 and 4 h after admission to the emergency department. WBC, C-RP, PCT, Lactate and septiloop test was evaluated through ROC curves.
Results: We included 176 patients, of whom 139 (78%) developed sepsis within the first 24 h. Of these, 76 (43%) had respiratory infections, of which 55 had sepsis, 49 had urinary tract infections, and 51 had other sources of infection. Forty-four patients had a positive blood culture within the first 24 h. Septiloop performed at baseline and/or after 4 h showed variable accuracy depending on the focus of infection and in bacteremic disease. The best ROC AUC was for urinary tract infections (0.70 CI 95% 0.53 to 0.86) with a sensitivity of 62% and specificity of 77%. Septiloop outperformed other common markers usually used in clinical practice. The lower AUC was observed for respiratory infections. For patients with a positive blood culture, the AUC ROC was 0.67, CI 95% 0.47 to 0.86.
Conclusions: Septiloop, a new tool for sepsis diagnosis, has moderate accuracy in predicting urinary source sepsis and bacteremic sepsis.



Variable	AUC	CI 95%
WBC	0.42	0.18-0.66
C-RP	0.69	0.51-0.88
PCT	0.70	0.37-1.00
Lactate	0.54	0.29-0.79
NEWS	0.59	0.41-0.77
Septiloop	0.67	0.47-0.86

Variable	AUC	CI 95%
WBC	0.52	0.28-0.76
C-RP	0.66	0.49-0.83
PCT	0.60	0.06-1.00
Lactate	0.56	0.32-0.80
NEWS	0.66	0.51-0.80
Septiloop	0.70	0.53-0.86

ROC curves for sepsis diagnosis in patients with positive blood culture and urinary infections

Reference
1. CPP2021-008394

Topic: Sepsis

000711
The results of an audit and feedback to improve clinical documentation of residents at an intensive residency program in Saudi Arabia

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***711***

Introduction: Clinical documentation by trainees is often suboptimal. Our objective was to evaluate and enhance the quality of clinical documentation of residents of an Intensive Care Residency program using audit-based assessment and feedback.
Methods: This quality improvement project aimed to enhance trainee clinical documentation and was conducted at the Intensive Care Department of a tertiary-care hospital in Riyadh, Saudi Arabia, from October 2023 to February 2025. The Department has a five-year Adult Intensive Care Residency program. Daily progress notes are written using a standardized template in the electronic medical record (BEST-Care). One ICU consultant evaluated the quality of the written daily progress notes using a validated checklist (Northwestern University Feinberg School of Medicine responsible electronic documentation checklist). The checklist had 18 items that included critical reasoning in the Assessment/Plan section of the note and the use of copy and paste from previous notes. Each item had a two- or three-level rating scale. The score was 0 or 1 for the two-level scale items and 0, 0.5 points, or 1 for the three-level scale items. We calculated a total score as the percentage correct, ranging from 0 to 100, with the numerator being the sum of all individual item scores and the denominator the number of items, excluding those rated as not applicable. The same ICU consultant provided feedback to residents through in-person meetings, phone calls, and text messages. We performed independent and paired sample t-test analyses to compare changes in the total score.
Results: 152 progress notes were evaluated for 35 residents, with a median of 3 notes per resident (range: 2 to 8). Of these, 63 notes (41.4%) were written by PGY1 residents, 41 (27.0%) by PGY2 residents and 48 (31.6%) by PGY3 residents. The mean total score was 83 $\pm$ 13% for all residents (79 $\pm$ 17% for PGY1 residents, 85 $\pm$ 8% for PGY2 residents and 86 $\pm$ 9% for PGY3 residents; p = 0.02 for between-group difference). The mean score of the second progress notes for the 35 residents was higher than that of the first notes (83 $\pm$ 13% and 76 $\pm$ 18%, respectively; mean difference: + 7%; independent analysis p = 0.07; paired analysis p = 0.03). The mean score of the third progress notes for 30 residents was 82 $\pm$ 13 (mean difference from the first notes: + 8%; independent analysis p = 0.12; paired analysis p = 0.07). "Problems are written as diagnoses or accompanied by differentials" had a mean score of 62%. "Active problems are accompanied by clinical reasoning" had a mean score of 60%. "Problems are associated with brief, clear plans" had a mean score of 62%. "Assessment and plan are different from the previous day" had a mean score of 79%. For these items, PGY1 residents had the lowest scores (between-group differences p were 0.01, < 0.0001, < 0.0001 and 0.17, respectively). In addition, the scores of the second and third notes were higher than those of the first (between-group differences p were 0.001, 0.004, < 0.0001 and 0.002, respectively).
Conclusions: Providing feedback to ICU residents using a validated checklist significantly enhanced their clinical documentation and provided clear guidelines to facilitate medical note writing.

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Topic: Health services research and outcome

000712
Risk of readmission and infection in sepsis survivors

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***712***

Introduction: Approximately 40-70% of sepsis survivors are readmitted to the hospital within one year of discharge. Of these readmissions, 18-28% are related to infection. Considering the several therapies in the pipeline and growing number of sepsis survivors, there is large potential for the implementation of preventative interventions. For effective implementation, it is essential to understand risk factors for readmissions and infections in sepsis survivors.

Objectives: To identify risk factors for hospital readmission due to infection in sepsis survivors, compared to ICU survivors without sepsis.
Methods: Our project includes record linkage between a prospective research database of adjudicated infections among ICU patients in an academic hospital and national databases of mortality, hospital admission, and bacterial culture data. Uniquely, this involved full cross-linking of datasets, creating a comprehensive research infrastructure beyond mere variable exchange. This allowed us to identify all readmissions, even if they occurred in another hospital. Patients were included if they had an index ICU stay of at least 24 h and were discharged from the hospital alive. The primary outcome of interest was unplanned readmission to any hospital, stratified by readmission due to an infection vs. other reasons for readmission. In the current analysis, infection was defined using ICD-10 codes. Risk factors for unplanned readmission identifiable at index ICU discharge were evaluated using Weibull survival regression models.
Results: After linkage, 6300 ICU patients were included. One-year mortality was 13%. Cumulative incidence of unplanned readmission in the first year was 30%. Of the 2,781 patients (44%) with an infection during index ICU admission, 33% had an unplanned readmission within one year, of which 25% of those admissions were due to infection. Of the patients who never had an infection during index ICU admission, 27% had an unplanned readmission within one year, of which 18% were due to infection (Fig. 1). The most common infection codes were pneumonia, urinary tract infections, and sepsis. The adjusted hazard ratios for unplanned readmission are shown in Fig. 2. Although patients with infection during ICU stay have increased hazard for readmission, especially readmission for infection, previous hospital admission within 2 years of the index ICU admission stands out with a hazard ratio of 4.2 for readmission for infection.
Conclusions: The multivariable analysis indicates that sepsis survivors face increased risk for readmission and infection after hospital discharge. However, other characteristics, such as previous hospital admission, may be more important factors contributing to unplanned readmissions. The next steps in this ongoing work are to better identify readmission due to infection using bacterial culture data and to further stratify patients into risk groups for readmission due to infection, to ultimately identify patients at highest need for post-ICU preventative interventions.

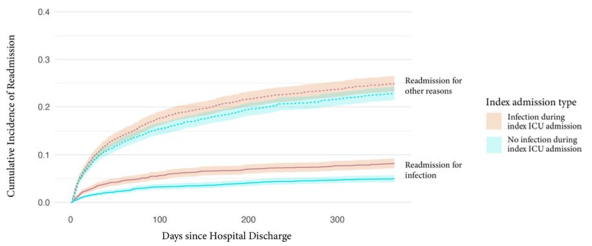


Fig. 1 (abstract 000712) Survival curves, accounting for death as a competing event, for unplanned readmission due to infection and other causes, stratified by infection status during index ICU admission

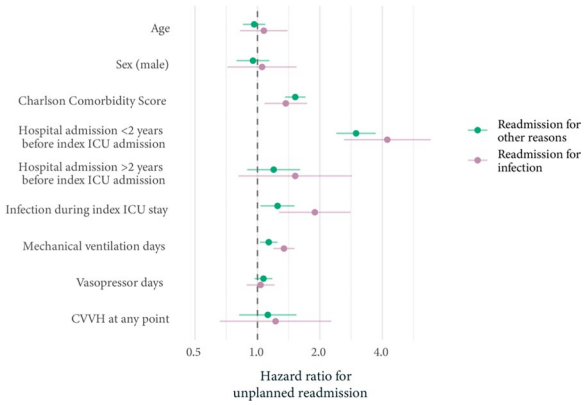


Fig. 2 (abstract 000712) Standardized coefficients from multivariable regression

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5. Funded by ZonMw project 10150022310012

Topic: Infections and prevention

000713

Core outcome measure use by physiotherapists in Irish ICUs

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*713

Introduction: Much work has been completed on developing core outcome set for use in a heterogenous ICU population (Dinglus et al., 2022). There is an identified need to include measures of physical function as part of the evaluation of ICU care (Kjaer et al., 2025). Early mobility is an intervention that is known to impact ICU length of stay, improve physical function after ICU and at hospital discharge. Adverse events are known to occur during ICU early mobility and have potential to impact on the patient experience, outcome and quality of care. Monitoring of early mobility including changes in physical function and the extent and impact of any adverse incidents would give information on the true costs and benefits of early mobility in this population.
Objectives: The aim of this study was to determine which outcome measures physiotherapy staff perform in Irish ICUs and determine how different ICU services gather information on adverse events during early mobility.
Methods: An e-survey was developed exploring the use and processes associated with physiotherapy related outcome measures in ICUs in the Republic of Ireland. The survey consisted of multiple choice

and open questions. E-surveys were distributed using national physiotherapy networks, respondents were asked to provide 1 response on behalf of the unit they worked. A second reminder was sent a month after initial distribution.
Results: There was a 60.7% response rate (17 replies; 28 ICU total listed in National Office of Clinical Audit dataset) representing hospitals across all healthcare regions in the Republic of Ireland. The most common outcome measure used in Irish ICUs was CPAx- Chelsea Critical Care Physical Assessment tool -a multi component functional score ($n = 13$). Other outcome measures sited examined impairment (peak cough flow [$n = 2$] and MRC muscle power score [$n = 2$]); mobility milestones (Manchester mobility score [$n = 4$], John Hopkins ICU highest mobility score [$n = 2$] and ICU mobility score [$n = 2$]) and baseline frailty (Clinical Frailty Score [$n = 2$]. 11 other outcome measures were mentioned by respondents, no patient reported outcome mearsures were mentioned. Although all respondents report documenting adverse events during early mobility, only one respondent graded the severity of adverse event.
Conclusions: There is a wide number and variety of outcome measures used by physiotherapists in Irish ICUs. Although all respondents recorded adverse incidents, there was very limited grading of severity, indicating a need for consensus forming for accurate recording, which would allow assessment of their impact. Measuring physical function as part of standards of critical care would ensure quality and equity of services nationally. Implementing standardised measures and recording of physical function and adverse incidents would require a national quality improvement process.

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Topic: Nursing care and physiotherapy

00714

The impact of timely antibiotic administration on mortality in septic patients admitted to ICU: a re-audit

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Intensive Care Medicine Experimental 2025 13(**Suppl 1**):***714***.

Introduction: Septic shock is a life-threatening condition that requires timely management to reduce mortality. NICE guidelines recommend administering intravenous antibiotics within 1 h for high risk patients [1]. It has been shown that delayed antibiotic administration has been linked to increased mortality [2, 3].
Objectives: This study re-audits the relationship between antibiotic administration within 1 h from sepsis recognition and sepsis related mortality as well as other outcomes. The findings were compared to a previous audit conducted between August 2021 and March 2022.
Methods: This is a prospective re-audit of septic patients admitted to the Royal Surrey Foundation Trust Intensive Care Unit (ICU) between September 2024 and February 2025 as per sepsis 3 definition [4]. The following parameters were compared with previous audit (August 2021–March 2022): Administration of antibiotics within 1 h of sepsis recognition, vasopressor support, need for renal replacement therapy and ICU and hospital length of stay and mortality.
Following a Shapiro–Wilks test for normality, variables were described as mean and standard deviation (SD) or median and interquartile range [IQR]. Wilcoxon rank sum test was used nonparametric numerical variables and chi-squared test (or Fisher's exact) for categorical variables. Analysis was conducted on R.
Results: Comparative analysis of both audits are in Table 1.

Table 1 (abstract 000714) Further comparison of results between 2024 and 2021 audits respectively were as follows: The number of male to female patients were 28 (56%) to 41 (64%)

	Sep 2024-Feb 2025	Aug 2021-Mar 2022	*P* value
No of patients:	50	64	
Age (Years):	70 [60-80]	68 [59-75]	0.3
Antibiotics within 1 h:	38 (76%)	62 (94%)	0.002
Sepsis 6 delivered within 1 h:	27 (54%)	26 (41%)	0.25
Length of stay in ICU (Days, median [IQR])	5 [3-7]	3 [2-6]	0.007
Length of stay in hospital (Days, median [IQR])	12 [7-20]	11 [6-19]	0.57
Hospital Mortality:	13 (26%)	12 (18.75%)	0.51

Vasopressors were administered in 36 (72%) versus 48 (75%) of patients, $p = 0.48$ and renal replacement therapy was delivered to 8 (16%) versus 7 (11%) of patients, $p = 0.63$**

Conclusions: In the re-audit, only 76% of patients received antibiotics within one hour of sepsis recognition, a significant decrease from 96% in the 2021 audit ($p = 0.002$). This delay was associated with a significantly longer ICU length of stay ($p = 0.007$) and an increase in overall mortality from 18.75% to 26%, though the latter was not statistically significant—possibly due to the small sample size. The observed delay in antibiotic administration may reflect increased patient load and resource limitations during the study period, underscoring the need to prioritise timely antibiotic administration. To improve outcomes, we believe enhancing staff awareness through continued education on the urgency of timely antibiotic administration. In addition, streamlining hospital protocols to ensure faster identification and treatment initiation could be pivotal.

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Topic: Sepsis

000717

Combined online and in-person critical care outreach led simulation teaching scheme of noninvasive ventilation: Could ICU admissions be reduced?

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Intensive Care Medicine Experimental 2025 13(**Suppl 1**):***717***

Introduction: Early use of Noninvasive Ventilation (NIV) is positively correlated to a reduction in patient mortality [1]. A key barrier to the early use of NIV is a lack of availability from confident, trained staff members to manage these patients [2].
Objectives: This paper sets out to increase the confidence levels of medical staff by 25%, and decrease their anxiety levels by 25%, within the context of approaching, managing, and troubleshooting patients on NIV.
Methods: A two-part teaching programme was created, aligned with British Thoracic Society and Intensive Care Society guidelines on Ventilatory Management in Acute Respiratory Failure [3]. The two-part programme was to be run in multiple sessions throughout January to April 2025, and participants included medical doctors working within the trust from the grades of Foundation Year 1 (FY1) to Senior Registrar. The first part of the programme was an online theory and physiology-based CPD session. The second part was a simulation-based workshop with the Critical Care Outreach Team (CCOT), which involved practical familiarisation with NIV machines. Data was collected using an eight-point Likert Scale and Six Point State Anxiety Scale (SAS) [4]. Participants completed the data collection before the teaching programme, after the first session, and then again two weeks after the final session to assess sustained knowledge retention and confidence.
Results: It was ascertained that 91.7% of participants had never had any formal teaching or training on NIV before. The average confidence score, out of five, before the teaching programme was 2.7. A score of five indicates the highest level of confidence. The average score then rose to 4.1 after session one, and again to 4.2 two weeks after the final session. The average level of anxiety, using the SAS, when approaching NIV in patients prior to the programme was 16, with a maximum score of twenty-four indicating the highest level of anxiety. This anxiety level then dropped to 13.6 after the first session, and again to 11.7 after the second session.
Conclusions: These results exceeded our target of reducing anxiety and improving confidence in medical staff approaching NIV. There was an increase in overall confidence by 56%, and a decreased anxiety score of 27%. It can be inferred that there is a substantial gap in medical training of doctors with regards to the use of NIV. This gap has the potential to cause harm to patients as it has already been discussed that staff members without proper training are less likely to be able to recognise the indications for NIV, and subsequently cause a delay in patients receiving the definitive care they require for respiratory failure. The introduction of a two-part teaching programme on NIV has proved to be a viable solution to this issue. The next steps involve the initiation of mandatory NIV teaching amongst foundation year doctors, increasing confidence from the early stages of their career, with the long-term aim of improved patient outcomes. Further research is to be conducted as to whether such schemes have any direct affect on number of ICU admissions due to respiratory failure.

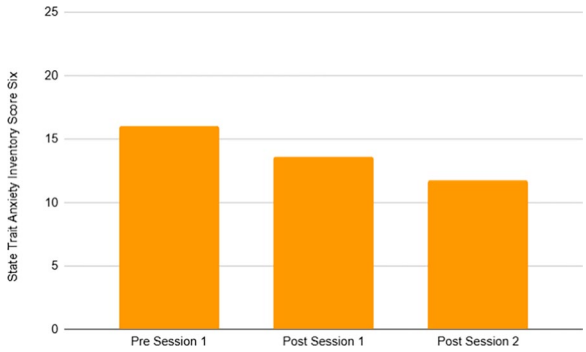


Fig. 1 (abstract 000717) Reduction in anxiety levels across two teaching sessions, as measured by the State Trait Anxiety Inventory (STAI-6)

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5. This project was conducted as a quality improvement initiative focused on delivering and evaluating a teaching programme on non-invasive ventilation (NIV). As it did not involve research on patients, the collection of identifiable personal data, or deviation from standard care, formal ethical approval was not required in accordance with institutional and national guidelines.

Topic: Acute respiratory failure and mechanical ventilation

000718

Improved efficiency of the new mirusTM system challenged by ventilatory settings—a bench study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***718***

Introduction: The Mirus™ system [1] enables target-controlled delivery of volatile anesthetics (VA) with open-system ventilators. The interface, positioned between the Y-piece and the patient, administers anesthetic vapor during inspiration as needed although capturing and releasing VA during subsequent inspiratory phases. The system autonomously calculates the required VA amount based on self-measured parameters. The recently introduced interface Lisa-44 [2], claims improved reflection efficiency, reduced VA consumption and thereby lowered environmental impact and costs.
Objectives: This study evaluates the performance of the newly introduced Lisa-44 interface under body temperature pressure saturated (BTPS) and normocapnic conditions using a test lung.
Methods: Mirus™ and Lisa-44 were tested with isoflurane and sevoflurane. Volume-controlled ventilation was set to a tidal volume of 0.5 L, a respiratory rate of 10 bpm, and an inspiratory flow time (IF) of 2.5 s. The VA target concentration was gradually increased to 1.5 MAC

and then decreased. Real-time VA concentrations were recorded every 100 ms using an external gas monitor. End-tidal concentrations (EC), injection time and area under the curve (AUC) during injections were analyzed (Fig. 1C). VA consumption was calculated and compared to historical data [3]. Experiments were repeated with a short IF of 0.5 s to simulate spontaneous breathing conditions.

Results: There was good agreement between Mirus™ and external gas monitor readings (Fig. 1A). During vapor injections, ECs increased above the target and then decreased, with average ECs slightly exceeding the target (Fig. 1B). Each injection was analyzed individually. Based on the injection time (T.-inj) and the real-time concentration of VA, with the subsequent EC subtracted as the baseline, the AUC was calculated for each injection (Fig. 1C). Higher target concentrations required more frequent and longer injections, increasing the AUC. Compared with a historical control [3], hourly consumption was markedly decreased: To achieve 0.3 to 0.5 MAC, 1.0 to 1.7 mL isoflurane (historical control: 1.6 to 2.4 mL) or 3.8 to 6.1 mL sevoflurane (7.0 to 10.0 mL) are needed (Fig. 2). However, with short IF, VA consumption increased significantly, reaching up to 43 ml of sevoflurane due to prolonged injections extending into expiration.

Conclusions: The new device demonstrates high accuracy in EC measurements and enables demand-based administration of volatile anesthetics. Although promising for reducing anesthetic consumption in clinical practice, high target concentrations and short IF may lead to increased consumption, highlighting potential limitations.

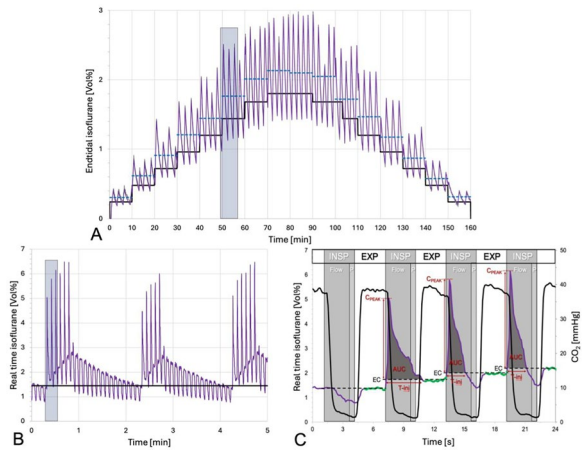


Fig. 1 (abstract 000718) **A** Overview of measurement procedure. EC measured by Mirus (purple line) and external gas monitor (grey line) compared to the target concentration (black line) and the average achieved EC (blue dashed line). **B** Zoom-in of **A**: Injection series cause the EC to rise above the target, followed by a drop below the target before a new injection series begins. **C** Zoom-in of **B** Three breath cycles with injections during inspiration (INSP), where the first injection extends into expiration (EXP), increasing the AUC. EC (green line) rises after each injection

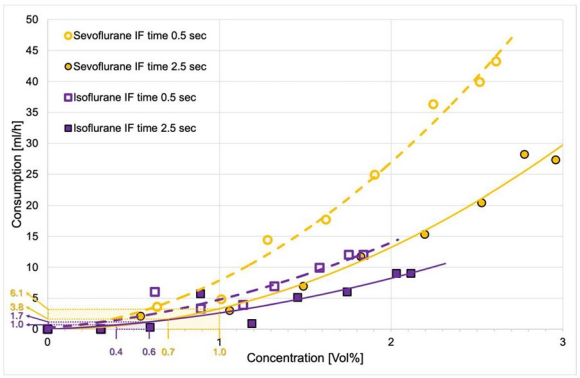


Fig. 2 (abstract 000718) Isoflurane and sevoflurane consumption plotted against the mean endtidal concentration achieved for each target across the four experiments

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4. Technologie Institut Medizin GmbH (Koblenz, Germany) provided the LISA 44 and a Mirus™ Controller for study purposes. The remaining materials and equipment were provided through institutional and departmental funds.

Topic: Sedation, analgesia and delirium

000719

Ventilator-associated pneumonia in trauma patients: a comparison between patients with and without traumatic brain injury

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***719***

Introduction: Trauma is a leading global cause of morbidity and mortality, with traumatic brain injury (TBI) being the main cause of death and disability among trauma patients. (1,2) Ventilator-associated pneumonia (VAP), defined as pneumonia occurring more than 48 h after intubation, results from the colonization of the upper airway and the subsequent replication of bacteria in the lower respiratory tract. (1-4) It is a common complication, particularly in TBI patients who have a unique susceptibility to VAP due to impaired airway protection, prolonged ventilatory support and possible immune dysregulation. (1,4-7) Reported VAP incidence in TBI varies widely and may impact morbidity and healthcare costs. (1-4) Understanding the incidence and risk factors of VAP in TBI and other trauma populations is crucial to improve outcomes, yet remains insufficiently explored in the literature.
Objectives: This study aimed to compare VAP incidence between TBI and non-TBI trauma patients, accounting for competing outcomes.
Methods: This retrospective cohort study included adult trauma patients who received mechanical ventilation for more than 48 h in the intensive care unit (ICU) of Ghent University Hospital in Belgium between January 2013 and December 2022. VAP incidence was compared between TBI and non-TBI patients using an incidence rate ratio

(IRR). A competing risk analysis was conducted to account for extubation and death.

Results: A total of 335 ventilated trauma patients were included in our study (Fig. 1). Median patient age was 50 years (IQR 31-63), 77.3% were male. TBI was present in 209 patients (62.4%), of whom 16.7% had an isolated TBI. VAP occurred in 67 of 209 (32.1%) TBI patients vs. 25 of 126 (19.8%) non-TBI patients ($p = 0.021$). VAP incidence rates were 33.2 and 23.3 per 1000 ventilator days in TBI and non-TBI patients, respectively (Fig. 2). IRR was 1.42 (95% CI 0.90-2.25).

Competing risk analysis showed a trend toward an increased risk of VAP in TBI patients (Subhazard Ratio (SHR) 1.82; 95% CI 0.94–3.53; $p = 0.077$). Male sex (SHR 2.65; 95% CI 1.05–6.69; $p = 0.039$) and spinal cord injury (SHR 2.01; 95% CI 1.04–3.90; p = 0.038) were significantly associated with an increased risk of VAP. No significant associations were observed for age, SOFA score at ICU admission, thoracic trauma, underlying pulmonary risk, immunocompromised status or antibiotic prophylaxis (Fig. 3).

Conclusions: TBI was associated with a trend toward increased VAP risk during ICU stay compared to non-TBI trauma patients, suggesting a potentially clinically relevant association despite lacking statistical significance. Further research is needed to confirm these findings and to clarify risk factors for VAP in both TBI and non-TBI patients. This may support earlier identification of high-risk patients and guide targeted preventive strategies.

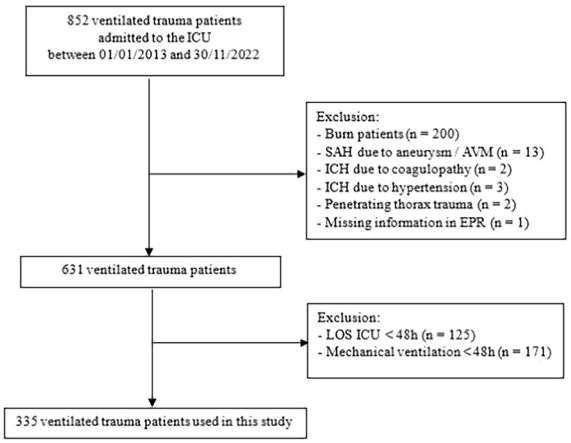


Fig. 1 (abstract 000719) Study flowchart of trauma patients. *ICU* Intensive Care Unit, *SAH* Subarachnoid haemorrhage, *AVM* Arteriovenous malformation, *ICH* Intracranial haemorrhage, *EPR* Electronic patient record; LOS: Length of stay

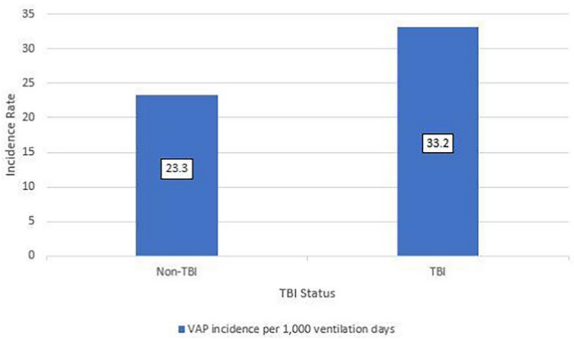


Fig. 2 (abstract 000719) VAP incidence per 1000 ventilation days. *TBI* Traumatic brain injury

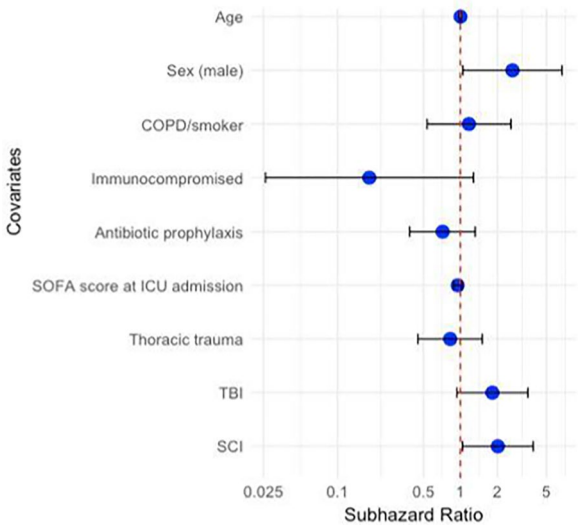


Fig. 3 (abstract 000719) Forest plot of covariates for VAP in competing risks model. *COPD* Chronic Obstructive Pulmonary Disease, *SOFA* Sequential Organ Failure Assessment, *ICU* Intensive Care Unit, *TBI* Traumatic Brain Injury; *SCI* Spinal Cord Injury

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Topic: Trauma

000721

Respiratory effects of angiotensin II and vasopressin as secondary vasopressors in ARDS patients with refractory shock

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***721***

Introduction: Acute respiratory distress syndrome (ARDS) is frequently associated with refractory shock, requiring the introduction of a second vasopressor. The Surviving Sepsis Campaign recommends the addition of Vasopressin (AVP) [4, 5]. In the recent years, Angiotensin II (Ang-II) has been emerging as a potential alternative. Two studies suggested that Ang-II [1-3] may improve oxygenation in patients with ARDS. Nevertheless, the effects of the second vasopressor remain controversial in this population.
Objectives: To evaluate the effect of AVP and Ang-II on oxygenation and ventilatory parameters in patients with refractory shock and ARDS.
Methods: Patients aged > 18 years, admitted to the ICU between May 2024 and April 2025 with a diagnosis of ARDS and refractory shock, and enrolled in a prospective ongoing registry study, were included in the analysis. Clinical, hemodynamic, and respiratory data were recorded before the initiation of the second vasopressor infusion, and at 3, 6, and 24 h after its administration.
Results: A total of 19 ARDS patients were included: 12 received AVP and 7 Ang-II. The median age was 64 (57-72) years, 63.2% were male, with an APACHE II score of 29 (26-32). Baseline characteristics were comparable between groups (Table 1), except for a higher administration of ACE inhibitors in the Ang-II group (p = 0.04). In the 3 h before the starting of the second vasopressor, the P/F ratio declined from a median of 119 (90-189) to 103 (86-160) in the whole population. A greater improvement in the P/F ratio was observed over time in the group treated with Ang II ($p = 0.03$–Fig. 1A). In a post hoc analysis, this improvement was particularly significant at 24 h ($p = 0.01$–Fig. 1B). No significant changes in ventilatory parameters and fluid balance over the study period were observed between the two groups (Fig. 2). A significant reduction in the norepinephrine (NE) dose at 6 h was also observed in the Ang-II group ($p = 0.03$—Fig. 1D).
Conclusions: In patients with ARDS and refractory shock, the addition of Ang-II as a second vasopressor led to a significant improvement in oxygenation, compared to the AVP-treated group. This effect was observed despite unchanged ventilatory settings and fluid management strategies.

Table 1 (abstract 000721) Demographics and clinical characteristics of study population

CHARACTERISTICS	All patients (n 19)	Vasopressin (n 12)	Angiotensin II (n 7)	*p*
Age, median (IQR)	64 (56.5-71.5)	64.5 (56.8-71)	64 (48-69)	0.64
Male, N. (%)	12 (63.2%)	8 (66.7%)	4 (57.1%)	1.00
BMI, median (IQR)	27.8 (24.6-32.4)	28.6 (25.5-34.5)	26.4 (23.9-30.3)	0.34
Score at admission				
APACHE, median (IQR)	29 (25.5-32)	29 (22-33.3)	30 (27-30)	0.87
SOFA, median (IQR)	13 (12-16)	13 (12-16.3)	14 (11-16)	0.83
Comorbidities, N. (%)				
Hypertension	13 (68.4%)	9 (75%)	4 (57.1%)	0.62
Chronic heart failure	6 (31.6%)	5 (41.7%)	1 (14.3%)	0.33
HFrEF	1 (5.3%)	1 (5.0%)	0 (0%)	1.00
Atrial fibrillation	4 (21.1%)	3 (25%)	1 (14.3%)	1.00
COPD	1 (5.3%)	0 (0%)	1 (14.3%)	0.37
OSAS	1 (5.3%)	1 (8.3%)	0 (0%)	1.00
Recent pulmonary embolism (< 1 year)	2 (10.5%)	1 (8.3%)	1 (14.3%)	1.00
Chronic kidney disease	6 (31.6%)	4 (33.3%)	2 (28.6%)	1.00
Drug history, N. (%)				
ACEi	3 (15.8%)	0 (0%)	3 (42.9%)	**0.04**
ARB	2 (10.5%)	2 (16.7%)	0 (0%)	0.51
Type of shock, N. (%)				0.08
Septic	9 (47.4%)	4 (33.3%)	5 (71.4%)	
Cardiogenic	4 (21.1%)	2 (16.7%)	2 (28.6%)	
Mixed	6 (31.6%)	6 (50.0%)	0 (0%)	
Septic cardiomyopathy	6 (31.6%)	3 (25.0%)	3 (42.9%)	0.62
Cardiogenic pulmonary edema	4 (21.1%)	4 (33.3%)	0 (0%)	0.25
Shock management				
NE dose before starting 2nd vasopressor (mcg/Kg/min), median (IQR)	0.85 (0.75-2.10)	1.02 (0.75-2.70)	0.78 (0.76-1.18)	0.53
Vis Score baseline, median (IQR)	85 (77-210)	107 (75-271)	79 (78-118)	0.58
Baseline respiratory status				
Steroids, N (%)	19 (100%)	12 (100%)	7 (100%)	
Invasive mechanical ventilation, N (%)	18 (94.7%)	12 (100%)	6 (85.7%)	0.37
TV (ml/Kg PBW), median (IQR)	6.23 (5.66-6.69)	6.28 (6.10-7.04)	5.86 (4.81-6.55)	0.44
PEEP (cmH_2O), median (IQR)	8.5 (6.25-10)	8 (5.75-10)	11 (8.5-12.8)	0.12
PaO_2/FiO_2 ratio 3 hrs before 2nd vasopressor, median (IQR)	119 (89.8-189)	147 (91-188)	113 (96-193)	1.00
PaO_2/FiO_2 ratio at starting 2nd vasopressor, median (IQR)	103 (85.8-160)	130 (94.7-153)	92 (83.5-177)	0.58
$PaCO_2$ (mmHg), median (IQR)	39 (36-43.5)	43 (36-51.3)	38 (36-40.5)	0.25
Pronation, N (%)	9 (47.4%)	5 (41.7%)	4 (57.1%)	0.65
iNO, N (%)	2 (10.5%)	2 (16.7%)	0 (0%)	0.51
ECMO				0.68
VV	2 (10.5%)	2 (16.7%)	0 (0%)	
VA	1 (5.3%)	1 (8.3%)	0 (0%)	
Adverse events, N. (%)				
De novo AF	3 (15.8%)	2 (16.7%)	1 (14.3%)	1.00
AKI	15 (78.9%)	9 (75.0%)	6 (85.7%)	1.00
Need for RRT	7 (36.8%) [N 15/19]	4 (44.4%) [N 9/12]	3 (50.0%) [N 6/7]	1.00
Mesenteric ischemia	5 (26.3%)	5 (41.7%)	0 (0%)	0.11
Peripheral ischemia	0 (0%)	0 (0%)	0 (0%)	
Thrombosis	1 (5.3%)	0 (0%)	1 (14.3%)	0.37
Outcomes				
ICU death, N. (%)	15 (83.3%) [N 18/19]	10 (90.9%) [N 11/12]	5 (71.4%) [N 7/7]	0.53
WLST, N. (%)	10 (55.6%) [N 18/19]	5 (45.5%) [N 11/12]	5 (71.4%) [N 7/7]	0.38

BMI: body mass index; HFrEF: Heart failure with reduced ejection fraction; COPD: chronic obstructive pulmonary disease; OSAS: obstructive sleep apnea syndrome; ACEi: ACE inhibitors; ARBs: angiotensin receptor blockers; TV: tidal volume; PBW: predicted body weight; PEEP: positive end-expiratory pressure; iNO: inhaled nitric oxide; AF: atrial fibrillation; AKI: acute kidney injury; RRT: renal replacement therapy; ICU: intensive care unit; WLST: withdrawal of life support

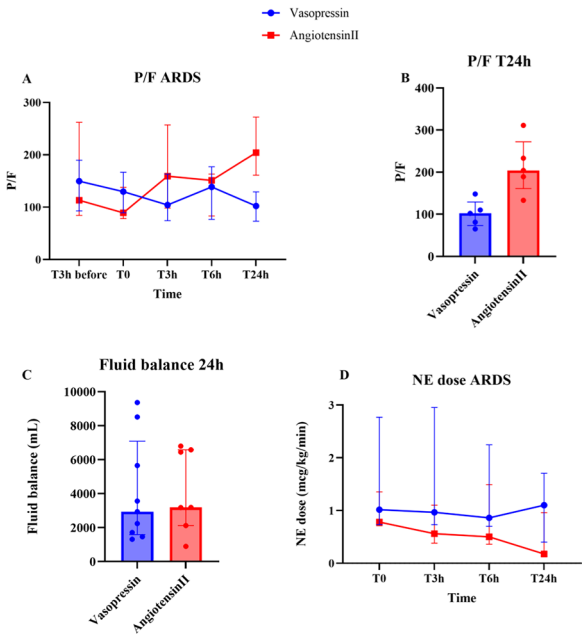


Fig. 1 (abstract 000721) Time evolution of P/F ratio (**A**); median P/F and fluid balance at 24 h between the groups (**B**, **C**); time evolution of norepinephrine dose (**D**)

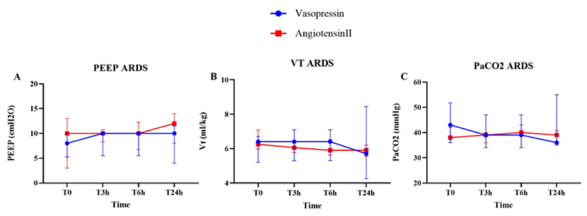


Fig. 2 (abstract 000721) Time evolution of PEEP (**A**), tidal volume (**B**) and PaCO2 (**C**) between the two groups

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Topic: Acute respiratory failure and mechanical ventilation

000722

Target temperature management in neurosurgery: who survives and why?

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*722

Introduction: Targeted temperature management (TTM) is increasingly applied in neurocritical care, yet its indications, outcomes, and risk profiles in neurosurgical patients remain unclear. Although TTM has been studied in specific brain injury types such as TBI or stroke, few studies have directly compared outcomes across multiple etiologies. Moreover, limited evidence exists regarding how TTM-related complications may influence prognosis in different injury types.
Objectives: This study aimed to identify clinical factors associated with mortality and complications among patients treated with TTM in our high-volume neurosurgical center.
Methods: We retrospectively analyzed 185 patients who received TTM who admitted in department of Neurosurgery at our institution from January 2011 to December 2024. Included patients were diagnosed with aneurysmal subarachnoid hemorrhage (SAH), intracerebral hemorrhage (ICH), traumatic brain injury (TBI), or acute cerebral infarction. Demographic and clinical factors were collected, including injury type, post-cardiopulmonary resuscitation (post-CPR) status, decompressive surgery, TTM depth and duration, and complications such as coagulopathy and pneumonia. Multivariate logistic regression was performed to identify independent predictors of mortality and coagulopathy.
Results: Among the 185 patients analyzed, the mean age was 50.6 ± 13.7 years, and 56.2% were male. The most common diagnosis was subarachnoid hemorrhage (45.4%), followed by traumatic brain injury (26.2%), infarction (15.7%), and intracerebral hemorrhage (12.4%). Decompressive surgery was performed in 73.5% of patients, and 20.5% were in a post-cardiac arrest state prior to TTM. ArcticSun was the primary cooling modality (80.5%), and long-term hypothermia (≥ 6 days) was applied in 49.2% of cases. Coagulopathy developed in 12.4%, and pneumonia in 17.3%. The overall mortality rate was 43.2%. Post-CPR state was strongly associated with increased mortality (OR = 4.079, $p = 0.003$). Long-term hypothermia (≥ 6 days) was independently associated with improved survival (OR = 0.293, $p < 0.001$). Patients who developed coagulopathy during TTM had significantly higher mortality (OR = 6.259, $p = 0.002$). Injury type showed a statistically significant association with both mortality ($p = 0.008$) and coagulopathy occurrence ($p = 0.002$), with TBI patients most frequently experiencing coagulopathy (60.9%).
Conclusions: TTM outcomes in neurosurgical patients vary significantly based on injury type, treatment duration, and complication profile. Post-CPR state and coagulopathy markedly increase mortality risk, although prolonged hypothermia may be protective. TBI patients, who had the highest coagulopathy rate, also demonstrated the highest mortality, suggesting that coagulation-related complications may play a critical role in outcome deterioration in this subgroup. Although coagulopathy in TBI has been previously acknowleged, our data uniquely suggest that coagulopathy during TTM may be a critical factor of poor outcomes in this subgroup. These findings support a tailored approach to TTM, rather than a uniform protocol, in neurocritical care settings.

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Topic: Neurointensive care

000723

Analysis of post-traumatic stress in patients from the post-ICU consultation

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***723***

Introduction: Assessment of post-traumatic stress in patients who required follow-up in the post-ICU consultation.
Methods: Descriptive, observational, and analytical retrospective study based on a prospective database. Critical patients consecutively admitted to an intensive care unit (ICU) of a tertiary university hospital between November 2020 and August 2024, for more than 72 h, requiring some type of organ support were included. Clinical, sociodemographic, and evolutionary variables were analyzed. Quantitative variables are expressed as mean ± standard deviation or median (interquartile range), and qualitative variables as absolute and relative frequency. Comparisons between qualitative variables were performed using Pearson's Chi-squared tests or Fisher's exact test. The comparison between qualitative polytomous and quantitative variables was performed by ANOVA. The comparison between quantitative variables was performed using Pearson's correlation test for variables with normal distribution and Spearman's test for those without normal distribution.
Results: The study included 21 patients, with a mean of 58.7 ± 13.7 years. Of these, 43 (60.6%) were male, with a median ICU stay of 19 days (9.30). The median PTSD score was 6.25 (3.13). 57.7% of patients did not present re-experiencing what they experienced in the ICU, 28.2% did not present avoidance behaviors of effort or activities after their stay in the ICU, being the most frequent (33.3%) the inability to remember important aspects experienced during admission. In the avoidance section, the maximum score was 30 (1.4%) and the minimum was 0 (8%), with the most frequent being the inability to fall asleep with a maximum of 3 points in 21 patients (29.6%). The presence of PTSD was not related to SAPS II ($p = 0.676$) or to the number of organic failures scored by SOFA ($p= 0.06$). We also found no relationship with regard to ICU discharge diagnosis ($p = 0.411$) although a direct relationship was observed with score attributed to sleep quality ($p = 0.017$).
Conclusions: The great part of the patients analyzed, presented low PTSD score and those who presented a higher score had worse quality in the sleep score.

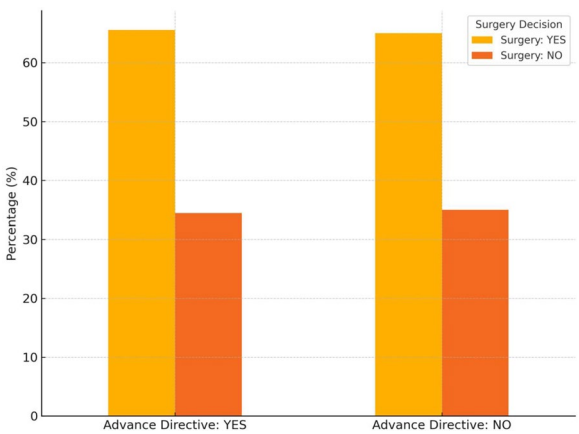
Topic: Health services research and outcome

00724

The impact of advance directives on decision making for emergency surgery in elderly patients with stage IV cancer

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***724***

Introduction: Advance directives are legal documents that allow patients to articulate their preferences for medical treatment in situations where they are unable to make decisions. They are particularly crucial in end-of-life care, ensuring that patients' wishes are respected even when they can no longer communicate. Despite their importance, the role of advance directives in the decision-making process for emergency surgeries in elderly patients with terminal cancer remains unclear. This study aims to evaluate whether the presence of an advance directive influences the decision to perform emergency surgery in patients aged 65 and older with stage IV cancer and to assess the subsequent clinical outcomes.
Methods: This retrospective study included patients aged 65 and older with stage IV cancer who were referred for surgical consultation from emergency department to general surgery department between 2019 and 2023. The primary outcome was decision to perform emergency surgery. Secondary outcomes included in-hospital mortality, complication rates, length of hospital stay, and hospitalization costs.
Results: The presence of advance directives did not significantly influence the decision to perform emergency surgery in elderly patients with stage IV cancer (34.5% vs. 35%, P = 0.962). Furthermore, there was no significant difference in mortality rates based on advance directive status (3.7% vs. 0%, P = 0.267). However, patients who undergone emergency surgery experienced longer hospital stays, higher complication rates and higher hospitalization costs, regardless of whether they had an advance directive.
Conclusions: For elderly patients with stage IV cancer, emergency surgery may provide immediate relief from pain, but it cannot stop the progression of the disease, often leading to complications, prolonged hospital stays, and excessive medical expenses. In particular, for patients who have advance directives—having made their own treatment decisions although they were mentally competent—these directives should be given significant consideration to prevent such worst-case scenarios.



Emergency surgery by advance directive status ($P = 0.962$)

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Topic: Ethics and end of life care

000725

Effect of positive end-expiratory pressure on lung ultrasound scores and patterns in critically ill patients with acute respiratory distress syndrome and acute brain injury

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Intensive Care Medicine Experimental 2025 13(**Suppl 1**):***725***

Introduction: Acute respiratory distress syndrome (ARDS) is a severe complication of critically ill patients with acute brain injury (ABI) associated with increased mortality. The application of positive end-expiratory pressure (PEEP) has been recognized as a key ventilation strategy in terms of alveolar recruitment and oxygenation. In the recent years, lung ultrasound (LUS) has been increasingly used to assess alveolar recruitment in critically ill patients with ARDS.
Objectives: To investigate the effect of PEEP on LUS scores and patterns in mechanically ventilated patients with ARDS and ABI.
Methods: We conducted a preliminary, interventional, prospective clinical study, including patients with ABI and ARDS. GCS on admission and LIS score were recorded. The intervention included a gradual increase in PEEP level from 5 to 8, 12 and 16 cmH2O. After each PEEP level change, we performed LUS in 6 regions in each lung and calculated the regional and global LUS score. Each part was scored based on the worst LUS pattern. We defined 4 LUS aeration patterns: Normal aeration pattern (A lines or fewer than 2 isolated B lines) = 0 point, moderate loss of aeration pattern (multiple, well-defined B lines) = 1 point, severe loss of aeration pattern (multiple, coalescent B-lines) = 2 points, and consolidation pattern (tissue pattern characterized by dynamic air bronchograms) = 3 points.
Results: A total of 18 patients were included in the study; 16 of them (88.9%) were males, with a median age of 60 years [49-69]. 8 patients (44.4%) were admitted for ICH, 6 (33.3%) for TBI and 4 (22.2%) for SAH. The median GCS score on ICU admission was 7 [4, 8] and the median LISS was 2 [1.75, 2.25]. There was a statistically significant difference in total LUS (LUStot) score regarding all PEEP pairs (p < 0.001) (Table 1).

Table 1 (abstract 000725) Comparison of LUS score between different PEEP levels

Variables	LUS	
PEEP pairs (cmH2O)	p value	95% CI
All	< 0.001	
PEEP 5/8	0.015	0.43, 1.68
PEEP 8/12	0.002	– 3.35, – 1.2
PEEP 12/16	< 0.001	1.31, 3.13
PEEP 5/12	< 0.001	– 4.56, – 2.1
PEEP 5/16	< 0.001	– 7.43, – 3.68
PEEP 8/16	< 0.001	– 6.22, – 2.78

A progressive reduction in LUStot score was also observed after PEEP augmentation from 5 to 16 cmH2O [from 22.39 (SD 5.49) to 16.83 (SD 4.71), $p < 0.001$] (Fig. 1). Considering regional LUS score, there was a significant improvement in LUS score if PEEP was raised from the minimum level of 5 cmH2O to the maximum level of 16 cmH2O, regarding anterior (LUSant) ($p < 0.001$, 95%CI 1.5, 5.5), lateral (LUSlat) ($p < 0.001$, 95%CI 1.12, 2.77) and posterior (LUSpost) ($p = 0.001$, 95%CI 1, 3) lung regions (Table 2). We also found that anterior regions were more recruitable (LUS from 4.22 to 1.5) than lateral (LUS from 7.16 to 5.61) and posterior (LUS from 11 to 9.28) regions. Considering LUStot, the percentages of normal aeration pattern were increased from 11.1% to 23.6%, while in consolidation pattern were reduced from 37% to 16.7% after PEEP augmentation from 5 to 16 cmH2O (Fig. 2).
Conclusions: LUS could be used to assess and guide alveolar recruitment in critically ill patients with ARDS and ABI. The LUS score improved significantly in all lung regions examined (anterior, lateral, posterior) after PEEP application, but the anterior regions appeared to be more recruitable.

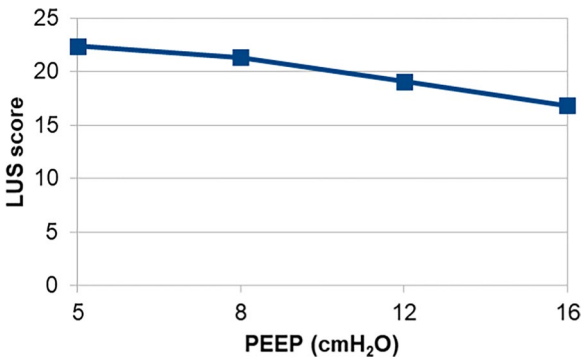


Fig. 1 (abstract 000725) LUS score according to PEEP levels

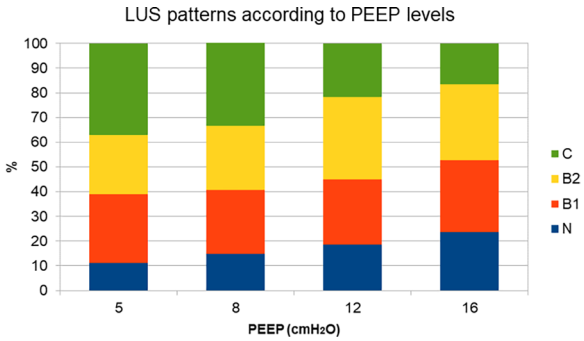


Fig. 2 (abstract 000725) LUS patterns according to PEEP levels

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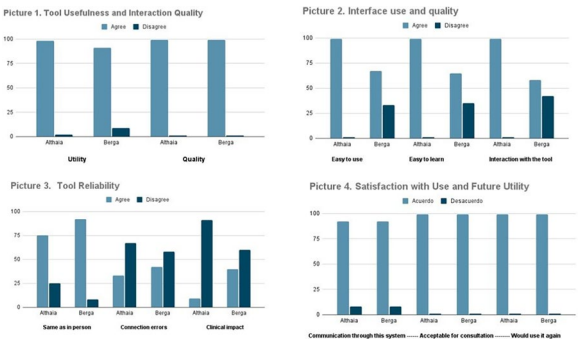
Topic: Neurointensive care

000726

Implementation of teleassistance for critical patients in a regional hospital

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***726***

Introduction: In Catalonia, not all hospitals have an intensive care unit (ICU), meaning that not all patients at vital risk can receive specialized care from the begining.Teleassistance tools can assist decision-making among specialists to ensure equitable care.
Objectives: To evaluate the effectiveness of a teleassistance strategy provided by ICU specialist from Althaia (universitary hospital) to a regional one (Hospital de Berga) through a 4 REMOTE connection reducing unnecessary hospital transfers and improving the care of critical patients. In addition, to assess professionals' perception of this teleassistance tool in terms of usefulness and interaction quality and reliability.
Methods: Nonrandomized interventional study with a historical control. Historical cohort: A retrospective cohort of patients transferred from *Hospital de Berga* to Althaia's ICU between April and December 2023. Prospective cohort: Patients consulted from *Hospital de Berga* to Althaia's ICU via teleassistance between April and December 2024. Patients at least 18 years old with severity criteria 1 or 2 and those hospitalized requiring therapeutic optimization due to critical deterioration were included. Demographic and clinical data, the need to transfer, length of ICU and hospitalary stay,interventions performed, and ICU mortality were recorded. A survey form was used to assess professionals' acceptance and satisfaction with the tool as well as its usefulness. Continuous variables were expressed as medians and standard deviation (*U* Mann–Whitney). Categorical variables were shown as percentages (Chi-square).
Results: From April to December 24th, 35 patients were enrolled, median age of 73 ± 1 years, 65% of whom, men with an active quality of life.
- Infectious diseases were the main reason for consultation (46.2%).
- Out of the 35 patients, 13 were transferred to the ICU (compared to 24 in the historical cohort), and 2 were transferred to a tertiary hospital.
- No significant differences were found between the teleassistance and historical cohorts in terms of median age (68.6 ± 16.6 vs. 69.2 ± 12.2), sex (65% men vs. 46.2%), or SAPS3 at admission (57.6 ± 13.5 vs. 62.5 ± 13.5).
- Statistically significantly, telemedicine increased the consultations of patients with infectious diseases (46.2% vs. 30%, p = 0.024).
- No significant differences were found between the teleassistance and historical cohorts in terms of length of stay or ICU mortality.
Although all professionals agreeded about patient accessibility, professional communication and therapeutic decision making, Althaia's doctors found the teleassistance tool easier to use than Berga ones (77% vs. 50%, p > 0,05) (see picture).
Conclusions: 65% of the discussed patients were men (median age 73) and an acceptablequality of life.
- Infectious diseases were the primary reason for consultation in both groups, and signficantly increased with teleassistance.
- The global number of transfers decreased to less than half after implementing teleassistance.
- Teleassistance was well accepted by professionals.



Profesionals' acceptance of the tool

Columna 1	control (%)	intervention (%)
Men	65	46
SAPS III	63	58
Clinical Frailty scale		
Very fit	16	23
Well	5	15
Managing well	37	23
Vulnerable	37	23
Mildly frail	0	15
Moderately frail	5	0
Reason for consultation		
Infectious disease	30	46
Respiratory, no COPD	25	8
Respiratory COPD	10	0
Discharge destination		
Hospitalitation	85	54
Third level hospital	5	8
Hospital de Berga	5	15
Exitus	0	23

Comparative study

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4. This research has received no external funding

Topic: Health services research and outcome

000727

Prediction of in-hospital mortality among acute coronary syndrome patients using left ventricular outflow tract–velocity time integral (LVOT–VTI)

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*727

Introduction: Acute coronary syndrome (ACS) requires precise cardiac function assessment for prognosis and management, with GRACE and TIMI scores commonly being used and other prognostic markers are needed. This study aimed to determine the accuracy of the echocardiographic LVOT-VTI to predict in-hospital mortality among ACS patients.
Methods: This was a single-center retrospective cohort conducted at a tertiary hospital in the Philippines between March 2023 to December 2023 which included ACS patients admitted to the Coronary Care Unit (CCU) through purposive sampling. The LVOT-VTI was determined through transthoracic echocardiogram done within 24 h of admission. Association of LVOT-VTI with in-hospital outcomes was determined by logistic regression. Diagnostic accuracy of LVOT-VTI was determined using accuracy measurements and area-under-the-receiver-operating-curve (AUC-ROC).
Results: A total of 148 patients were included in the study. The majority were male, hypertensive and ST-elevation myocardial infarction (STEMI) cases. Overall, the in-hospital mortality among ACS patients admitted at the CCU was 38.51% (57 out of 148). Age ($p = 0.030$), heart rate ($p = 0.040$), previous myocardial infarction (MI) ($p = 0.017$), and antiplatelet use ($p = 0.049$) were significantly different between survivors and expired patients. LVOT-VTI has sensitivity 16.48%, specificity 66.67%, LR(-) 1.25, LR(+) 0.49, PPV 44.12%, NPV 33.33%, overall accuracy 35.81%, and AUC-ROC of 0.6329 for predicting survival as shown in Table 1 and Fig. 1. LVOT-VTI has limited ability to accurately differentiate between survivors and nonsurvivors. LVOT-VTI is significantly associated with decreased risk of in-hospital mortality (OR 0.8941,95% CI 0.8238-0.9703, $p = 0.007$), but is not significantly associated with reinfarction, stroke, heart failure, cardiogenic shock, or prolonged CCU or hospital stay as seen in Table 2.
Conclusions: LVOT-VTI has limited accuracy in predicting in-hospital mortality among critical ACS patients. Further research is needed to explore additional echocardiographic parameters for better risk stratification and prognosis in ACS management.

Table 1 (abstract 000727) Diagnostic accuracy of LVOT-VTI in predicting patients' survival

		Outcome		Total
		Alive	Expired	
LVOT-VTI	< 10 cm	15	19	34
	> 10 cm	76	38	114
	Total	91	57	148
Sensitivity	16.48% (9.53 to 25.73)	Positive LR	0.49 (0.27 to 0.89)	
Specificity	66.67% (52.94 to 78.60)	Negative LR	1.25 (1.02 to 1.54)	
PPV	44.12% (30.43 to 58.76)	Prevalence	61.49% (53.14 to 69.36)	
NPV	33.33% (28.94 to 38.03)	Accuracy	35.81% (28.11 to 44.10)	

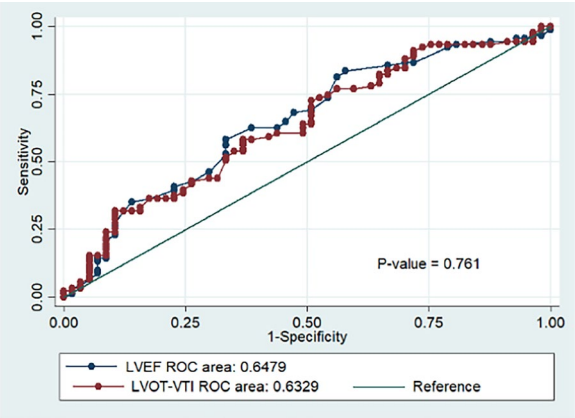


Fig. 1 (abstract 000727) Comparison of LVOT-VTI and LVEF in predicting patients' survival

Table 2 (abstract 000727) Association between outcomes and LVOT-VTI

Outcomes	Odds ratio	95% CI	P-value
Mortality	0.8941	0.8238 to 0.9703	**0.007**
Reinfarction	0.8893	0.5383 to 1.4689	0.647
Stroke	1.0331	0.8935 to 1.1945	0.660
Heart Failure	0.9581	0.8882 to 1.0336	0.269
Cardiogenic Shock	1.0038	0.9223 to 1.0926	0.930
Prolonged CCU stay, > 4 days	1.0178	0.9266 to 1.1178	0.714
Prolonged hospital stay, > 7 days	1.0005	0.9226 to 1.0851	0.990

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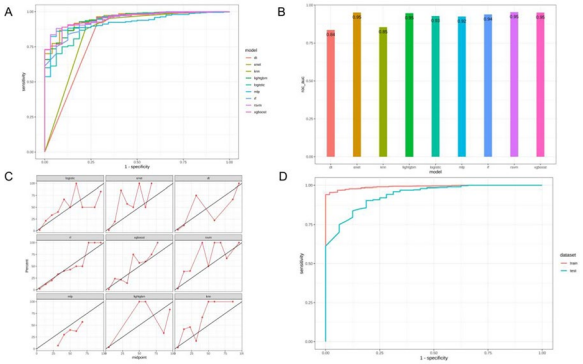
Topic: Cardiovascular issues in ICU

000728

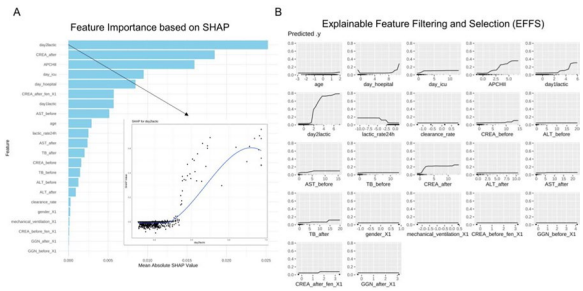
Development and validation of an interpretable machine learning model using routine laboratory tests to predict mortality risk in critically ill ICU patients

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*728.

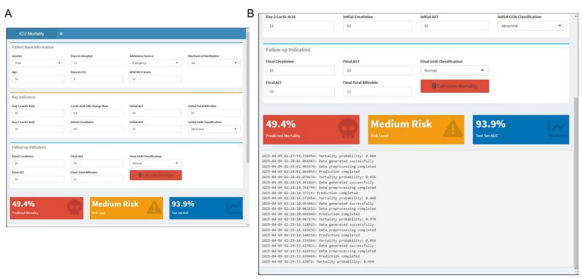
Introduction: ICU patients often present with complex and severe conditions, resulting in high mortality rates. Early use of routine laboratory tests for rapid risk stratification can support timely prognostic assessment and intervention. This study aims to develop and validate interpretable machine learning (ML) models based on early laboratory data to predict mortality risk in critically ill patients, offering clinically relevant guidance for their management.
Methods: We retrospectively analyzed clinical data from 1,465 ICU patients admitted between December 2018 and May 2019. Of these, 1,001 patients were used for model training and 465 for testing. 9 ML algorithms were employed to develop predictive models. Model performance was assessed using metrics such as the area under the receiver operating characteristic curve (AUC). SHapley Additive exPlanations (SHAP) and Explainable Feature Filtering and Selection (EFFS) were used to rank feature importance and interpret the final model.
Results: Among the 9 ML models, all except k-nearest neighbours (KNN) and decision tree (DT) demonstrated good specificity and sensitivity in the training set (Fig. 1A). Most models showed strong predictive performance, with AUC values exceeding 0.90, including ElasticNet (0.95), LightGBM (0.95), logistic regression (0.93), multilayer perceptron (MLP) (0.92), random forest (RF) (0.94), radial support vector machine (rSVM) (0.95), and XGBoost (0.95) (Fig. 1B). Further analysis indicated that the RF model had the highest stability (Fig. 1C), and its calibration curve showed strong agreement between predicted and observed mortality (Fig. 1D). SHAP analysis (Fig. 2A) and EFFS (Fig. 2B) identified key predictors, with lactate on postoperative day 2 contributing most significantly to mortality risk (Fig. 2). Based on the RF model, we developed a mortality risk calculator incorporating 22 variables, including sex, age, hospital and ICU length of stay, APACHE II score, mechanical ventilation status, lactate, creatinine, and liver enzymes. The tool enables mortality risk stratification and is available to clinicians as a plug-in, with source code accessible via GitHub (https://github.com/WenciVan/CCM/blob/main/evaluation%20death).
Conclusions: We developed and validated a visual prediction tool based on a RF model incorporating 22 readily available clinical variables to estimate mortality risk in critically ill patients. This model may assist in the early identification of high-risk individuals and support personalized treatment strategies.



Prediction of ICU patient mortality using 9 ML models. **A**, **B** AUC values of the 9 models. **C** Model stability comparison showing RF with the highest stability. **D** Calibration curves comparing RF model predictions with observed outcomes



SHAP analysis and EFFS for identifying predictive variables. **A** Feature importance ranked by SHAP values. **B** Key characters selected through EFFS



Interface of the mortality risk prediction tool based on the RF model using 22 variables. **A** User interface displaying predicted mortality probability and risk level. **B** Output of parameter calculation after running the code in R Studio

Topic: Health services research and outcome

00729

Sleep changes in patients admitted to the ICU

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):**729**

Introduction: To analyze the sleep quality of patients who have had a prolonged stay in the ICU.
Methods: A descriptive, observational and analytical retrospective study on a prospective database. We included critical patients who were admitted consecutively to an intensive care unit (ICU) of a university hospital of tertiary level between November 2020 and August 2024, for more than 72 h,requiring some type of organic support. Variables related to sleep habits, time, quality and the need for company or drugs to fall asleep were analyzed. Quantitative variables are expressed as mean ± standard deviation or median (interquartile range), and qualitative variables as absolute and relative frequency.
Results: A total of 71 patients were included in the study, with a mean age of 58.7 ± 13.7 years, of whom 43 (60.6%) were male. Mean APACHE II 17 (13.25), SOFA 8 (5.12) and median ICU stay was 19 days (9.3). 30 (45.5%) patients reported taking more than 30 min to fall asleep, 32 (48.5%) patients woke up in the early morning more than 3 or more times a week, 14 (19.7%) perceived that they did not breathe well during sleep, 28 (39.4%) snored or coughed at night and 37 (52.1%) confirmed that they suffered from nightmares at night. 30 (42.3%) patients required at least one drug to fall asleep and 38 (53.5%) reported that sleep affected their mood.
Conclusions: Most of the patients followed up by our post-ICU clinic presented sleep disturbances. The most frequent disorders were sleep onset or the use of medication to improve sleep.

Topic: Health services research and outcome

000731 Not past their prime: explorative quantification of meropenem exposure in biobank samples to retrospectively determine target attainment in critically ill pediatric patients

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Intensive Care Medicine Experimental 2025 13(**Suppl 1**):***731***

Introduction: Literature on antimicrobial exposure and optimal dosing in Pediatric ICU (PICU) patients remains scarce (1). Analysing biobank samples from earlier PICU trials could complement currently available data, even when these trials were not primarily designed as pharmacokinetic (PK) study, reducing the need for prospective observational PK trials. Unfortunately, quantifying antimicrobial PK target attainment directly from banked samples can be complicated as samples are taken at random timepoints. Pharmacokinetic exposure can be predicted by applying population PK (popPK) models using concentrations measured in biobank samples. In this pilot study, we confirmed predictive performance of a previously developed popPK model, and assessed target attainment for meropenem in PICU patients.
Methods: We performed a retrospective pilot study using 47 biobank samples from 10 participants, selected based on age range, in the PePANIC trial, covered by the original informed consent (2). Meropenem concentrations were quantified in serum using a validated LC–MS/MS method (3). Pharmacometric analysis was carried out in the Insight Rx Nova Bayesian dosing platform (Insight Rx, Inc, 2021) using the Rapp et al. popPK model (4). First, predictive performance of the popPK model was assessed by calculating the relative prediction error (PE%) (5). The model was informed with the patients' covariates, i.e. sex, length, actual body weight, age, serum creatinine, renal replacement therapy, dosing information and max. two previously observed meropenem trough concentrations (Cmin). A good fitting model was defined as a median PE% < 20%. Second, PK target attainment, defined as as 100%T > MIC, was calculated by predicting Cmin.
Results: In this pilot study, 47 biobank samples, collected 0.24-9.02 h after previous meropenem dose, from 10 patients were used. The predictive performance of the Rapp et al. pop PK model was found to be good, with a median [Q1-Q3] PE% of 14.8% [5.32-24.4]. Subsequently, Cmin were a posteriori predicted, with a median [Q1-Q3] Cmin exposure of 4.55 [2.13-9.25] mg/L (Table 2). According to the predictions, 72.3% and 31.9% of the Cmin reached the target of 2 and 8 mg/L, respectively.

Table 1 Meropenem quantification and prediction of target attainment

	Number of samples (n = 47)
Observed meropenem concentrations (mg/L)	9.85 [3.5-18.9] (n = 42) Below LLOQ: 5 (10.6%)
A posteriori Cmin prediction (mg/L)	4.55 [2.13-9.25]
Hourse since previous meropenem dose	6.16 [4.69-7.35]
Sub therapeutic	13 (27.7%)
100% T > MIC (2 mg/L)	34 (72.3%)
100% T > 4 × MIC (8 mg/L)	15 (31.9%)
Ongoing renal replacement therapy	11 (23.4%)

Continuous variables are given as Median [Q1-Q3], Categorical variables are given as n (%). Target attainment was defined as a Cmin above 1-4 time the MIC over a whole dosing interval (100% fT > 1-4 × MIC) considering a MIC of 2 mg/L (6). Samples below the LLOQ were considered to be sub-therapeutic. Cmin: trough concentration; LLOQ: lower limit of quantification- MIC minimal inhibitory concentration.
Conclusions: We successfully quantified meropenem exposure in biobank samples from the PePANIC trial. The previously published popPK model by Rapp et al. was found to describe meropenem exposure with acceptable accuracy in this patient population. The popPK model, informed with patient and treatment data, was used to retrospectively determine PK target attainment. This pilot study, while limited, suggetst that biobank samples could provide much needed PK data for antimicrobial agents. In the near future, PK target attainment will be determined for all patients in the PePANIC trial who had been treated with meropenem, followed by simulation of optimized dosing.

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Topic: Pharmacology and toxicology/poisoning

000732

One year of new life: reflections and lessons learned from lung transplantation in a tertiary hospital in Gran Canaria

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***732***.

Introduction: Lung transplantation offers a well-established therapeutic option for patients with advanced lung diseases who have exhausted other treatment alternatives. Its complexity requires careful candidate selection, highly specialized surgery, and intensive immediate postoperative monitoring. Over the years, advances in surgical techniques, immunosuppression, and complication management have significantly improved outcomes, although relevant clinical challenges still persist, particularly in intensive care units where these patients require multidisciplinary care. In this context, the University Hospital of Gran Canaria Dr. Negrín launched its lung transplantation program in July 2023, marking a milestone in the island's specialized care. This work provides a detailed description of the clinical characteristics, most frequent complications, and outcomes of the first bilateral lung transplant patients, with the aim of reflecting on the experience accumulated during the inaugural year and contributing to the continuous improvement of the care process.
Objectives: To describe the characteristics, most frequent complications, and outcomes of patients undergoing bilateral lung transplantation.
Methods: A descriptive and retrospective analysis of post-lung transplant patients admitted to the Intensive Care Unit/Recovery Unit of the University Hospital of Gran Canaria Dr. Negrín, from the start of the lung transplant program in July 2023 to December 2024. Demographic and clinical data, transplant-related values, and major complications were collected. Descriptive statistical analysis was performed using absolute frequencies for categorical variables, while continuous variables were summarized using means and standard deviations (SD).
Results: A total of 23 patients underwent bilateral lung transplantation (only one under emergency level 0), with a predominance of male patients (69.6%) and a mean age of 58.35 years (SD ± 6.80). The main underlying disease leading to transplantation was chronic obstructive pulmonary disease (56.5%), followed by diffuse interstitial lung disease (39.1%) and idiopathic pulmonary fibrosis (4.3%). Regarding the surgical procedure, the average ischemia time was 336.43 min (SD ± 104.95) for the right lung and 369.87 min (SD ± 86.39) for the left lung. Extracorporeal circulation support was required in 52.2% of patients, although only 21.7% needed it to be maintained postoperatively (VV ECMO 17.4% and VA ECMO 4.3%), with an average duration of 1.96 days (SD ± 4.87). Post-transplant, 100% of patients developed primary graft dysfunction upon admission, with a predominance of grade 0 (34.8%) and grade 3 (30.4%). The most frequent complication was renal failure (47.8%, of which 13% required continuous renal replacement therapy), followed by pneumonia/tracheobronchitis (21.7%/13%) and diaphragmatic paresis (17.4%). Only 2 patients (8.7%) required reoperation due to bleeding. The average duration of mechanical ventilation was 10.13 days (SD ± 14.18), with 6 patients (26.1%) requiring percutaneous tracheostomy. The mean ICU/Recovery Unit stay was 25.43 days (SD ± 34.95), with an overall survival rate of 78.3%.
Conclusions: In our first year of experience, 23 patients with a primary diagnosis of COPD underwent transplantation, with a survival rate of 78.3%. All patients developed some degree of PGD, with renal failure being the most common complication.

Topic: Brain death, organ donation and transplantation

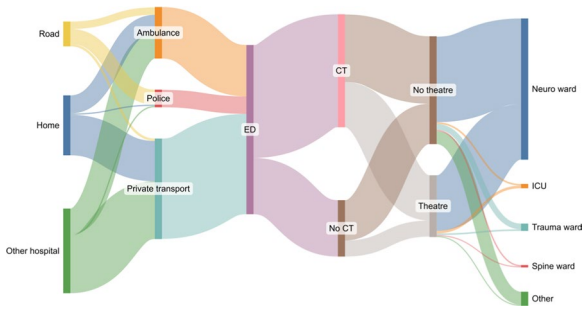
000733

A systems approach to neurotrauma pathways in Mulago Hospital, Kampala

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***733***

Introduction: Trauma is a global cause of morbidity and mortality and has been estimated to cause 9% of all deaths. (1) The global distribution of adverse health outcomes is heavily skewed towards low- and middle-income countries (LMICs), which show a rising epidemiological burden superimposed upon fragile health systems. Traumatic brain injury (TBI) is one of the top three causes of injury-related death and disability, with huge implications for neurosurgical, perioperative, and intensive care services. (2). Uganda is a low income country in East Africa which has seen intensive investment by domestic and overseas partners in the areas of both neurosurgical and intensive care provision. (3, 4) Trauma is a leading cause of mortality and morbidity, largely as a result of road traffic accidents, with the majority of the patients referred to Mulago National Referral Hospital (MNRH). Previous work has explored the epidemiology of trauma, TBI, and intensive care provision in Uganda, (5,6,7) but has not explored patient pathways in light of these development efforts.
Objectives: Our aim was to understand the clinical pathways of different patient populations that significantly contribute to the trauma burden within MNRH. Specifically, we sought to understand the different journeys undertaken by those patients with TBI as opposed to other traumatic injury, including pre- and intra-hospital pathways.
Methods: We collated information on all acutely injured adult patients that were admitted to MNRH over a 5-month period in 2024 using embedded data collectors interrogating routinely collected facility data. This included basic demographic details, along with treatment pathways and patients' physical location within the hospital. The data were analysed using R/RStudio (8) by a mixed research team consisting of clinical experts, data scientists, and health system engineers from MNRH, Makerere University, and the University of Cambridge. The research was approved by the Mulago Hospital Institutional Research Ethics Committee (MHREC 2023-103) and the Uganda National Council for Science and Technology (UNCST HS3598ES).
Results: A total of 602 patients were enrolled into the dataset of whom 52% were aged 18-35 years and 65% had suffered a road traffic accident, with assaults (20%) and falls (10%) the next most common mechanisms of injury. The majority (55%) suffered neurotrauma, followed by lower (30%) and upper (18%) limb injuries. Of patients admitted with neurotrauma, 61% arrived by ambulance and 10.3% via police transport. 42% underwent emergency surgical intervention straight from the emergency department, with 1.5% subsequently admitted to intensive care. A snapshot survey of intensive care beds being occupied by patients with TBI suggests an occupancy of 35%. Nearly 85% of patients were cared for on the specialist neurological or spinal ward after admission. Figure 1 illustrates these intra-hospital journeys as a Sankey flow diagram.
Conclusions: These results suggest that TBI remains a major disease burden in MNRH, requiring significant neurosurgical, perioperative and intensive care capacity, in line with the previous studies.(9) The small percentage of patients admitted to ICU in this data set may be reflective of functional ICU capacity, the large burden of TBI patients on dedicated neurosurgical wards and the number of inter-hospital critical care transfers. Our results indicate that there is a growing use of pre-hospital and ambulance services, which reflects a national priority

and is promising for reducing time critical delays in TBI management. Understanding the pathways patients take during admission with neurotrauma allows assessment of trauma capacity throughout the hospital. Future work is required to coordinate the acute patient pathway to ensure this increased access results in improved clinical outcomes, and to better understand how to manage the resulting burden of ICU care in the context of constrained resources.



Sankey flow diagram of patient pathways through Mulago NRH

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11. We would like to thank the team at Mulago Hospital for their support of this work

Topic: Trauma

000734

Assessment of the effect of positive end-expiratory pressure augmentation on respiratory mechanics and arterial blood gas parameters in neurocritical care patients with acute respiratory distress syndrome

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***734***

Introduction: A common complication of neurocritical care patients is acute respiratory distress syndrome (ARDS) associated with impaired oxygenation and increased mortality. The use of positive end-expiratory pressure (PEEP) plays a critical role in the management of ARDS, preventing alveolar collapse and improving gas exchange. PEEP augmentation is always challenging in brain injured patients and has been poorly studied.
Objectives: To investigate the effect of PEEP on respiratory mechanics and arterial blood gases (ABG) parameters in neurocritical care patients with ARDS.
Methods: An interventional, prospective clinical study was conducted in a Greek ICU, including 18 neurocritical care patients with ARDS. GCS on admission, APACHE II and LIS score were recorded. We performed a gradual augmentation of PEEP level from 5 to 8, 12 and 16 cmH2O. At each PEEP level, static mechanical ventilation (MV) [plateau pressure (Ppl), driving pressure (ΔP), static respiratory system compliance (Cst)] were recorded. ABG samples were obtained after 20 min and PaO2/FiO2 ratio (PFR) was calculated. During these maneuvers, we ensured normal intracranial pressure and adequate cerebral perfusion pressure in all patients, as measured via an intraparenchymal catheter.
Results: Included 18 patients (8 ICH, 6 TBI, 4 SAH) had a median age of 60 years [49-69], median ICU admission GCS 7 [4, 8], median APACHE II score 20 [17, 21.75] and median LIS score 2 [1.75, 2.25]. We were not able to detect a uniform pattern of change in ΔP as PEEP level was increased (Fig. 1). Alterations in ΔP were marginally significant between PEEP 8-PEEP 16 ($p = 0.042$, 95%CI 1, 2.5) and PEEP 12-PEEP 16 ($p = 0.047$, 95%CI – 2, – 1) pairs of PEEP levels (Table 1).

Table 1 (abstract 000734) Comparison of ventilator-derived variables, PFR and PaCO2 between different PEEP levels

Variables	ΔP		Cst		Ppl		PFR		PaCO2	
PEEP pairs	*p*	95% CI	*p*	95% CI	*p*	95% CI	*p*	95% CI	*p*	95%CI
All	< 0.001		0.019		< 0.001		0.113		0.058	
PEEP 5/8	1	− 1, 1.5	1	− 2.17, 2.1	0.001	− 3.5, 2.5	1	− 9.55, 3.88	0.487	-0.95, 0.1
PEEP 8/12	0.484	7.51e−6, 2	0.954	− 2.97, 0.52	< 0.001	4, 5	0.529	− 0.98, 12.8	1	0.66, − 0.7
PEEP 12/16	0.047	− 2, − 1	0.039	1.02, 5.38	< 0.001	− 5, 4.5	1	− 23.9, 8.3	0.185	− 1.75, − 0.05
PEEP 5/12	1	− 1, 2	1	− 4.47, 2.09	0.001	6.5, 8	0.69	− 2.36, 19.8	1	− 0.25, 1.45
PEEP 5/16	0.524	− 0.5, 3	0.198	− 8.38, 0.4	0.001	11, 13.5	0.593	− 3.44, 36.4	0.107	0.6, 3.0
PEEP 8/16	0.042	1, 2.5	0.021	− 7.19, − 1.66	0.001	8.5, 10	0.642	− 3.26, 30.6	0.158	0.3, 2.1

A fall in Cst was observed as PEEP level was increased, particularly regarding higher PEEP (> 8 cmH2O) (Fig. 1). Comparison between PEEP 12-PEEP 16 ($p = 0.039$, 95% CI 1.02, 5.38) and PEEP 8-PEEP 16 pair ($p = 0.021$, 95%CI − 7.19, − 1.66) of PEEP levels was found to be significant (Table 1). A gradual rise in Ppl was detected as PEEP level was increased (Fig. 1). All Ppl comparisons between different PEEP levels were significant ($p < 0.05$) (Table 1). A continuous rise in PFR was detected as PEEP level was increased (Fig. 1). No comparison of PFR between different PEEP levels was significant (Table 1). A gradual rise in PaCO2 was detected as PEEP level was increased (Fig. 1), but no comparison of PaCO2 between different PEEP levels was significant (Table 1).

Conclusions: PEEP augmentation from 5 to 8, 12 and 16 cmH2O altered respiratory mechanics and ABG parameters, leading to a gradual increase in Ppl, PFR and PaCO2, a decrease in Cst, and nonuniform pattern of change in ΔP. Further studies are warranted to confirm these findings in brain injured patients with ARDS.

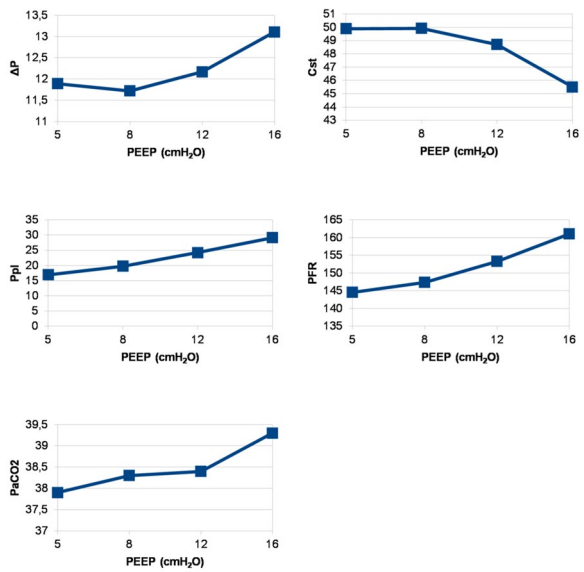


Fig. 1 ΔP, Cst, Ppl, PFR and PaCO2 according to PEEP levels

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3. None

Topic: Neurointensive care

000736

Quality of care for trauma patients in the ICU-performing bedside surgical procedures

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:736***

Introduction: From October 7th, 2023, our ICU faced a significant increase in trauma admissions, many requiring complex surgical procedures at the bedside, such as debridement, advanced wound care, negative pressure wound therapy (NPWT), and open abdomen management. While some of these are typically performed in the OR, during this period many were conducted in the ICU due to urgency or patient condition. Each procedure required coordination between multiple medical teams including general surgery, plastic surgery, and orthopedics. ICU nurses were not only responsible for critical care but also for managing procedural setup and facilitating communication between teams—all within a dynamic and unpredictable clinical setting.
Objectives: The aim of this quality improvement project was to assess the impact of the increased number and complexity of bedside procedures on ICU nursing practice and interdisciplinary collaboration. Our goal was to identify areas for improvement and develop strategies to support staff and maintain high standards of patient care.
Methods: We retrieved patient records from October 2022 to October 2024 and divided them into two periods: Period I (October 2022–October 2023) and Period II (October 2023–October 2024). We focused on the number and types of complex procedures performed at the bedside as reflected in the documentation. To gain nursing insight, we conducted a focus group with 15 ICU nurses who answered questions regarding procedural burden, team coordination, equipment access, and the nurses' sense of professional capability.
Results: The data showed an increase in both the number and complexity of bedside procedures beginning in October 2023. During period I, 530 patients admitted to the ICU; during period II, 605 patients admitted. The number of documented complex bedside procedures nearly doubled in period II compared to the previous year. This trend was also supported by the clinical impression shared by the nursing staff. Nurses described challenges in maintaining communication with interdisciplinary teams, along with managing time and equipment. While many reported a sense of empowerment, the lack

of defined protocols and logistical support created inefficiencies and stress.
Conclusions: Caring for critically injured ICU patients during high-intensity periods demands coordinated, resource-aware practices. Based on the findings, we propose implementing protocols for common bedside procedures and appointing a procedural coordinator to manage logistics and interdisciplinary collaboration. Introducing targeted simulations on complex bedside interventions could enhance preparedness.

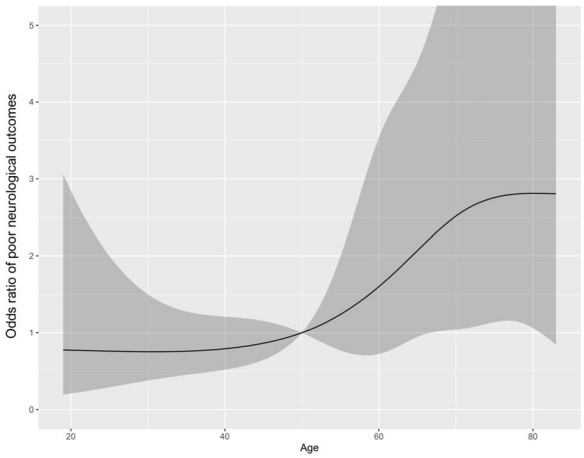
Topic: Nursing care and physiotherapy

000737

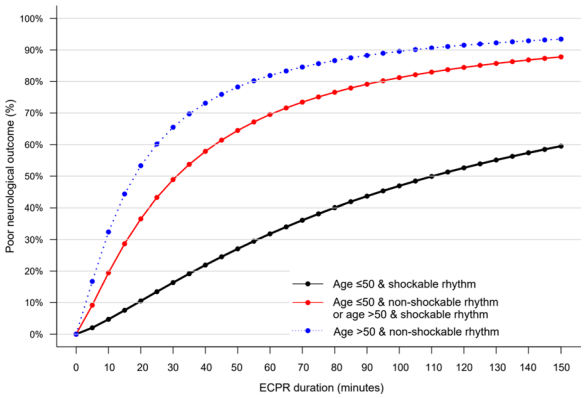
Optimal duration of extracorporeal cardiopulmonary resuscitation for favorable neurological outcomes

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Intensive Care Medicine Experimental 2025 **13(Suppl 1):*737***

Introduction: Determining the optimal duration of extracorporeal cardiopulmonary resuscitation (ECPR) remains challenging, as patient outcomes may vary significantly based on the individual characteristics. We aimed to establish critical time thresholds for achieving favorable neurological outcomes with ECPR across different risk groups, potentially providing more tailored guidance for clinical decision making.
Objectives: We aim to establish critical time thresholds for achieving favorable neurological outcomes with ECPR across different risk groups, potentially providing more tailored guidance for clinical decision-making in ECPR duration.
Methods: This single-center retrospective study analyzed 283 adult patients who received ECPR between 2013 and 2020. Through multivariate analysis of various clinical parameters, we developed a risk stratification model to identify groups with different prognostic profiles. The primary outcome was neurological status at discharge assessed by the Cerebral Performance Categories scale.
Results: In multivariate analysis, age greater than 50 years with asystole (adjusted odds ratio [OR]: 4.89, 95% confidence interval [CI]: 1.41–17.00) or pulseless electrical activity (adjusted OR: 9.70, 95% CI: 2.80–33.60), aspartate transaminase (adjusted OR: 1.52, 95% CI: 1.15–1.99), creatinine (adjusted OR: 2.08, 95% CI: 1.30–3.34), initial lactate (adjusted OR: 1.88, 95% CI: 1.27–3.45), and ECPR duration (adjusted OR: 3.50, 95% CI: 2.02–6.06) were associated with poor neurological outcomes. Based on these findings, we identified three distinct risk groups showing different acceptable ECPR duration thresholds: low-risk (38 min), moderate-risk (27 min), and high-risk (20 min). Notably, no favorable neurological outcomes were observed beyond 70 min in the low-risk group and 90 min in moderate/high-risk groups. Risk group stratification effectively predicted neurological outcomes across different ECPR durations.
Conclusions: Risk-stratified evaluation of ECPR duration provides clinically relevant thresholds for different patient groups, suggesting that continuation of ECPR may be warranted in low-risk patients even with prolonged resuscitation efforts. This approach may enable more personalized decision-making in ECPR implementation.



Age-dependent probability of poor neurological outcomes after extracorporeal cardiopulmonary resuscitation. The solid line represents the predicted probability of poor neurological outcomes based on the patient age, with the shaded area indicating the 95% confidence interval. A marked increase in the probability of poor outcomes is observed around age 50 years, which was subsequently used as a cutoff point for risk stratification. The predicted probabilities were derived from a multivariate logistic regression model adjusted for extracorporeal cardiopulmonary resuscitation duration, aspartate transaminase, initial lactate levels, and first monitored rhythm. The vertical dotted line at age 50 represents the identified threshold for risk stratification.



Relationship between the ECPR duration and probability of poor neurological outcomes stratified by risk group. Risk categories are defined as follows: Low-risk—patients with shockable rhythms and age under 50 years; Moderate risk—patients with shockable rhythms and age 50 years or older, or patients with nonshockable rhythms and age under 50 years; High risk—patients with nonshockable rhythms and age 50 years or older.

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7. Not applicable

Topic: Cardiac arrest

000739

Modalities in clinical practice for the first spontaneous breathing trial? Data from the "WEAN SAFE" study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***739***

Introduction: Weaning from invasive mechanical ventilation (MV) remains a challenge for the clinician. The best technique of spontaneous breathing trial (SBT) to fulfil safe weaning success (pressure support ventilation (PSV) or T-piece), remains debated. Our aim is to describe characteristics and outcome of patients according to type of SBT chosen by clinicians in daily practice, outside the scope of any controlled study.
Methods: We used data from the observational "WEAN SAFE" study (1), which included 5869 patients receiving MV for more than 2 days in 481 intensive care units in 50 countries between 2017 and 2018. We included patients with at least one documented SBT and evaluated the results of the first SBT by comparing PSV and T-piece. Primary endpoint was the rate of weaning success following the first SBT (extubation within 24 h of the first SBT without reintubation or death within 7 days). Secondary endpoints were extubation rate within 24 h, reintubation rate within 7 days, total duration of MV, in-hospital and intensive care length of stay and mortality.
Results: Among the 5869 patients included in "WEAN SAFE", 4523 had at least one attempt at MV separation. The first of which was an SBT for 2977 patients (66%): 2441 PSV (81%) and 566 T-piece (19%). Demographic characteristics, comorbidities, initial severity and reasons for admission or intubation were similar between groups, apart from a higher proportion of admissions for medical reasons (73% vs. 67%, $p = 0.009$) and intubation for sepsis (26% vs. 22%, $p = 0.038$) in the T-piece group. A comparison of the outcome of the two groups is shown in the table.
Conclusions: In the real-life "WEAN SAFE" cohort, first SBT in PSV was associated with a higher rate of extubation at 24 h and weaning success following the first SBT, with shorter MV and length of stay than with T-piece. However, overall rate of reintubation, weaning success at ICU discharge and mortality did not differ between the two groups. Multivariate analysis will therefore be required to identify explanatory factors for these results.
Weaning results and outcome of patients who underwent a first SBT on pressure support or on a T-piece.

Table 1 (abstract 000739) Diagnostic accuracy of LVOT-VTI in predicting patients' survival

Outcome parameters	Overall population 1st SBT	PSV group	T-piece group	p-value	n
	n = 2977	n = 2411	n = 566		
Extubation within 24 hours of first SBT, n (%)	2342 (86%)	1943 (88%)	399 (78%)	<0.001	2729
Successful weaning following first SBT, n (%)	1959 (77%)	1616 (78%)	343 (71%)	0.001	2555
Overall success of weaning at ICU discharge, n (%)	2555 (86%)	2071 (86%)	484 (85%)	0.865	2977
Reintubation, n (%)	352 (13%)	278 (13%)	74 (14%)	0.293	2729
Overall duration of invasive VM (days)	6.00 [4.00;11.0]	6.00 [4.00;10.0]	8.00 [5.00;13.0]	<0.001	2900
Length of stay in intensive care unit (days)	10.0 [6.00;16.0]	10.0 [6.00;15.0]	13.0 [8.00;21.0]	<0.001	2977
Length of stay in hospital	21.0 [14.0;36.0]	20.0 [13.0;34.0]	26.0 [16.0;43.0]	<0.001	2949
Mortality in ICU, n (%)	403 (13%)	315 (13%)	88 (15%)	0.137	2977
Hospital mortality, n (%)	636 (21%)	499 (21%)	137 (24%)	0.081	2971

Reference

1 WEAN SAFE study Pham Lancet Respiratory medicine 2023 doi. org/https://doi.org/10.1016/S2213-2600(22)00449-0

Topic: Acute respiratory failure and mechanical ventilation

000740

International transfusion practices and outcomes in haematology patients admitted to the Intensive Care Unit

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***740***

Introduction: The number of critically ill patients with haematological conditions is rising, and transfusion of blood products is a key component of their management (1, 2). The lack of high-quality evidence

tailored to this patient population has led to inconsistent guideline recommendations and uncertainty regarding transfusion efficacy (3-5). However, despite their significant transfusion needs, data on transfusion practices in these patients remain scarce (5-8). These patients may show differential responses to blood products, such as platelet transfusions, due to their underlying haematological condition and/or treatments. Determining transfusion rates, thresholds, efficacy and underlying reasons and physiological parameters necessitating transfusion is therefore essential.

Objectives: To compare transfusion practices in critically ill patients with and without haematological conditions, and assess the impact of RBC, platelet, and plasma transfusions on clinical outcomes.

Methods: This is a substudy of the International Point Prevalence Study of Intensive Care Unit Transfusion Practices (InPUT)—an international, multicenter, prospective, observational cohort study evaluating worldwide transfusion practices in the ICU (9). Haematological conditions included benign/malignant disease or prior stem cell transplant. The primary outcome was occurrence rates of RBC, platelet, and plasma transfusions. Secondary outcomes included transfusion indications, thresholds, and clinical outcomes.

Results: Of all the patients included in the InPUT-study (n = 3643), 131 (3.6%) had a haematological condition. These patients had higher odds of receiving RBC (odds ratio (OR) 1.58, 95% CI 1.09-2.29) and platelet transfusions (OR 8.32, 95% CI 5.09-13.6,) and lower transfusion thresholds for RBC (7 [IQR: 7-8] g/L) and platelets (median 50 × 10^9 [IQR: 30-50] vs. 55 × 10^9 [IQR: 50-100]). The most common primary reason for RBC transfusion was low haemoglobin (Hb), and in most cases, no overt physiological signs were reported necessitating transfusion at that point (Fig. 1A & B). When a physiological trigger was given, "hypotension" was most commonly reported. Critically ill haematological patients more frequently received plasma and platelet transfusions for prophylactic or procedural purposes, while active bleeding was cited less frequently (Fig. 1C & D). Haematological patients who received a transfusion had higher 28-day mortality and longer ICU stays.

Conclusions: Haematological patients are more likely to receive RBC transfusions than nonhaematological ICU patients, with low haemoglobin levels being the primary reason. Plasma, coagulation factors, and platelet transfusions are mostly given prophylactically. Given the limited evidence on optimal transfusion strategies for haematological ICU patients, our findings underscore the need for further research in this vulnerable population.Reasons and triggers for RBC transfusion, reasons for plasma and platelet transfusion, stratified by presence of a haematological condition

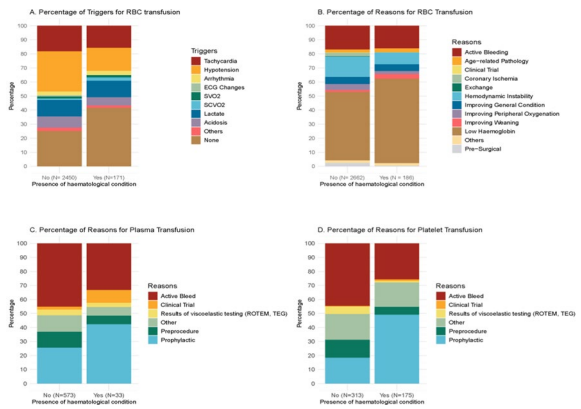


Fig. 1 (abstract 000740) Reasons and triggers for RBC transfusion, reasons for plasma and platelet transfusion, stratified by presence of a haematological condition
Triggers are defined as: Physiological parameters necessitating transfusion.
Reasons are defined as: Clinical reason provided as foundation for the decision to transfuse.

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9. Dr Cecconi reported receiving personal fees from Edwards Lifesciences, GE Healthcare, and Directed Systems outside the submitted work. Dr Feldheiser reported receiving personal fees from Baxter and Medtronic outside the submitted work. Dr Scheeren reported serving as senior medical director for Edwards Lifesciences (Garching, Germany). Dr McQuilten reported receiving grants from Australian National Blood Authority and National Health and Medical Research Council during the conduct of the study. Dr Vlaar reported receiving personal fees from a Vidi grant (ZonMW: 09150172010047). No other disclosures were reported.

Topic: Haematologic–oncologic issues in the ICU

000741

Development of BERT-based Large Language Model (LLM) for triage in the emergency department based on real-world conversation

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***741***

Introduction: In hospitals and pre-hospital settings, triaged is conducted to focus more available resources on the most urgent patients rapidly. To triage accurately, education and training is required. In the recent years, artificial intelligence (AI) has been attempted to triage patients. However, most studies trained artificial intelligence with the summarized scenarios. It has not been studied whether AI can actually triage a conversation between a healthcare provider and a patient.

Objectives: In this study, we trained large language models to triage between urgent (KTAS 3) or nonurgent (KTAS 4, 5) with real-world clinical conversation from the emergency department.

Methods: The conversations between patients and medical staff were publicly available in anonymized form through the 'AI Hub' provided by the Korea Information Society Agency. We used conversations from the triage level. An example of an extracted triage conversation is shown in Fig. 1. Triage was performed using the Korean Triage and Acuity Scale (KTAS). We trained two BERT-based models to triage between urgent (KTAS 3) or nonurgent (KTAS 4, 5). The first model tokenizes the entire conversation, and the second model is a hierarchical model that tokenizes each sentence and then reprocesses it. We defined the performance metrics as accuracy, precision, recall, and F1-score. To demonstrate its performance, we compared it to the accuracy of ChatGPT GPT-4o. In addition, we demonstrated the explainability of the model we trained using SHapley Additive exPlanations (SHAP).

Results: Out of a total of 5,244 clinical conversations, we extracted 1,057 conversations from the Triage level. Of these, 950 were used for training and validation, and 107 were assigned to the test set. The performance metrics of our models and ChatGPT GPT-4o are shown in Table 1. Our model had an overall accuracy of 69.4% and 75.9%, respectively, as compared to 35.2% for ChatGPT GPT-4o. On Urgent (KTAS 3) patients, the recall of our model was 0.8571 and 0.9610, respectively, as compared to 0.1818 for ChatGPT GPT-4o. The confusion matrix for each model is shown in Fig. 2. When we examined LLM explainability with SHAP, we found that our model actually learned the KTAS classification system. In addition, it focused on clinically meaningful situations such as revisit or referral to a high-level hospital.

Table 1 (abstract 000741) The performance metrics of BERT-based large language models and ChatGPT GPT-4o

Performance metrics		ChatGPT GPT-4o	BERT-based Model 1	BERT-based Model 2
Overall Accuracy (%)		35.2%	69.4%	75.9%
Urgent (KTAS 3)	Precision	0.6667	0.7500	0.7629
	Recall	0.1818	0.8571	0.9610
	F1-Score	0.2857	0.8000	0.8506
Not Urgent (KTAS 4/5)	Precision	0.2759	0.4500	0.7273
	Recall	0.7742	0.2903	0.2581
	F1-Score	0.4068	0.3529	0.3810

Conclusions: We developed a BERT-based LLM to triage in the emergency room based on real conversations and significantly outperformed ChatGPT. The study showed the limitations of traditional LLMs in triaging real-world conversations but also showed that training with real-world conversations can improve them.

No.	Speaker	Conversations
1	Triage nurse	This way please. Take a sit. What makes you come here today?
2	Patient	I have pain in my chest.
3	Triage nurse	When did this start?
4	Patient	It's been three days.
5	Triage nurse	Three days. I see. any other symptoms?
6	Patient	My left arm hurts as well when my left chest aches.
7	Triage nurse	Do you still have pain on your left arm?
8	Patient	Yes
9	Triage nurse	Is it radiating?
10	Triage nurse	Or is the pain more like acheing?
11	Triage nurse	Crushing?
12	Triage nurse	Or does it feel like ripping inside?
13	Triage nurse	What kind of pain is it?
14	Patient	It feels like a stab.
15	Triage nurse	Stabbing pain, is it?
16	Patient	Yes
17	Patient	Now my head hurts.
18	Triage nurse	Oh
19	Triage nurse	You have a headache now?
20	Patient	Yes, it feels like someone is poking my head.
21	Triage nurse	So, the pain doesn't extend to this area, does it?
22	Triage nurse	Like to your shoulders.
23	Patient	It passed, downwards.
24	Triage nurse	Passed downwards?
25	Triage nurse	So, the pain is no longer on your chest area?
26	Patient	No, it still hurts
27	Triage nurse	It still hurst
28	Patient	Yes.
29	Triage nurse	Which part of your arm does it hurt?
...	...	...

Fig. 1 (abstract 000741) An example of clinical conversation data used in a study. The conversation is originally in Korean, which is translated into English

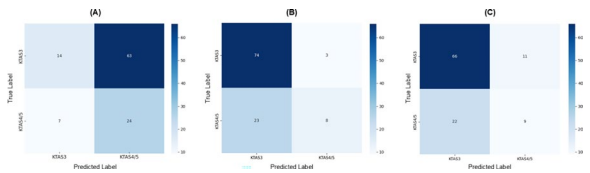


Fig. 2 (abstract 000741) The confusion matrix for each large language model (LLM). **A** ChatGPT PGT-4o, **B** BERT-based Model 1, **C** BERT-based model 2. BERT-based model 1 tokenizes the entire conversation and BERT-based model 2 tokenizes each sentence and then reprocesses it

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1. This study was supported by a grant from Korea University Ansan Hospital (No. O2411941). The funder had no role in the design of the study; the collection, analysis, and interpretation of data; or writing the manuscript.
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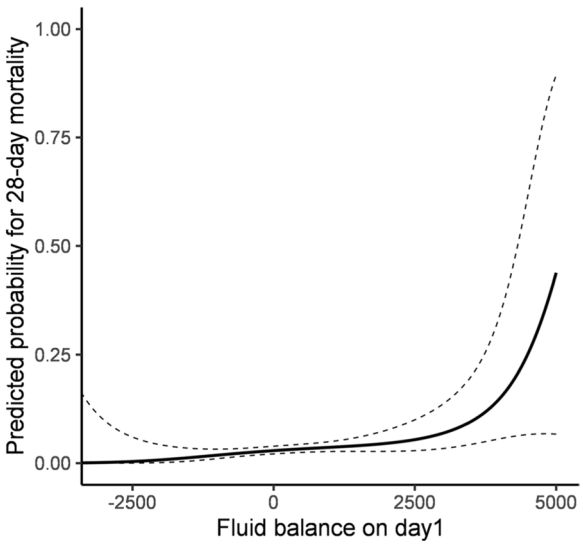
Topic: Information systems and data science

000743

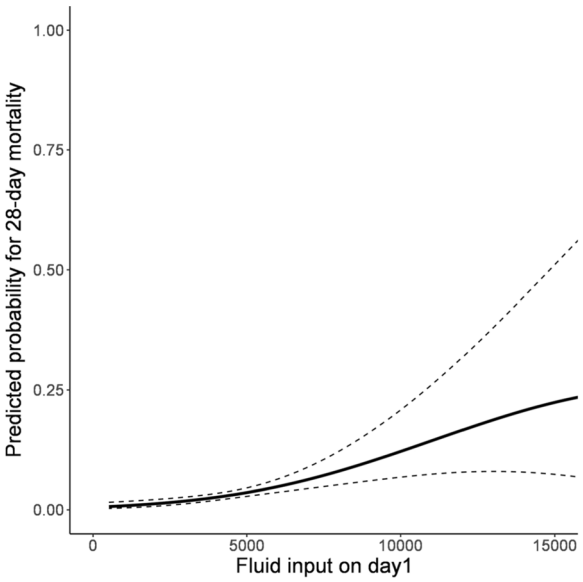
Early positive fluid balance associates with increased mortality in neurological critically ill patients: a 10-year cohort study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***743***

Introduction: Fluid management is a critical aspect of care for neurocritically ill patients, yet the optimal approach remains unclear. The relationship between fluid balance and clinical outcomes in these patients requires further investigation, particularly regarding the timing and volume of fluid administration.
Objectives: The objective of this study is to investigate whether early fluid balance patterns and management strategies are associated with clinical outcomes in neurological critically ill patients.
Methods: This retrospective observational study analyzed 2,186 adult patients admitted to the neurosurgical intensive care unit (ICU) from January 2013 to December 2022. We employed generalized additive model (GAM) with cubic spline smoothing to examine nonlinear relationships between fluid balance and mortality. The maximally selected rank statistics method was used to determine the optimal cutoff value for fluid balance. Associations between fluid balance patterns and 28-day mortality were analyzed using multivariable logistic regression model.
Results: Initial analysis identified fluid balance on day 1 as the most significant predictor of mortality, patients with positive fluid balance showed higher 28-day mortality. Nonsurvivors showed significantly higher fluid input throughout the 7-day observation period, particularly during the first 24 h (4444 mL vs 3978 mL, $p = 0.007$). Multivariable analysis confirmed that fluid balance on day 1 remained independently associated with 28-day mortality after adjusting for confounders (adjusted odd ratio 1.705, 95% confidence interval: 1.001–2.905, $p = 0.049$). In addition, the relationship between fluid input day 1 and mortality demonstrated a progressively increasing probability of 28-day mortality with higher fluid volumes.
Conclusions: Early fluid balance, particularly during the first 24 h of ICU admission, shows a significant association with mortality in neurocritically ill patients. These findings emphasize the crucial importance of careful fluid management in the early phase of neurocritical care and suggest that implementation of strict fluid monitoring protocols, especially during the initial period of care, may improve patient outcomes.



Predicted probability of 28-day mortality according to fluid balance on day1



Association between fluid input on day 1 and predictive probability for 28-day mortality.

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6. None

Topic: Neurointensive care

000744

A Decision shared? Limiting treatment in severe traumatic brain injury

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***744***.

Introduction: Decision making around treatment limitation in severe traumatic brain injury (sTBI) is highly challenging, yet integral to the provision of individualised, patient-focused care [1]. A shared decision-making approach is recommended by Critical Care Societies [2, 3] and in the UK is required by the Mental Capacity Act [3]. There is little UK data on approach to treatment-limiting decisions (TLDs) in sTBI.
Objectives: This study aims to describe TLD practice at our institution, a tertiary neurosurgical and major trauma centre in London, UK.
Methods: A retrospective study of all adult sTBI patients admitted to the ICU of a London teaching hospital was carried out. The data collection period was Jan-Dec 2022. Electronic notes were reviewed for TLDs. TLD documentation was reviewed for key aspects of decision-making processes, including shared decision-making with surrogate involvement, multidisciplinary input, consideration of patient values and preferences, conflict, and ethics committee involvement. ICU/hospital mortality data was registered.
Results: One hundred patients were admitted with sTBI during the study period. One patient was excluded due to insufficient records. Of the remaining 99, 48% (n = 48) had one or more TLD implemented. Commonest TLDs were DNACPR (n = 42) and withholding neurosurgery (n = 26). ICU clinicians were key decision-makers, contributing to TLDs in all patients: acting unilaterally in 12/48 (25%), with multidisciplinary input in 30/48 (63%), and with surrogate involvement in 25/48 (52%). Contributing specialties were Neurosurgery (30/48, 63%), Brain Injury Team (2/48, 4%), Emergency Medicine (2/48, 4%), and Oncology (1/48, 2%). Surrogates were family members in 24/25 (96%) cases and an Independent Mental Capacity Advocate in 1. No Advanced Directives were used. Clear documentation of patient value/preference consideration was evident in 9/48 (19%). Conflict was found in 3 cases (6%). All were resolved without legal escalation; one required Brain Injury Team referral. ICU and in-hospital mortality was 38/48 (79%) and 42/48 (87.5%) respectively. All patients without TLDs survived to hospital discharge.
Conclusions: A shared decision-making approach aims for clinicians and surrogates to come to decisions together, maintaining a focus on the individual patient's preferences, goals and values [4]. Our data suggests a need for increased involvement of surrogates in TLD discussions, as well as more explicit documentation, which includes patient values and preferences. Involvement of other specialty teams, such as the Brain Injury Team, may be an under-utilised resource. Significant conflict between the treating team and family is rare, but when present may be an indication for additional specialty input. The study limitations include its retrospective design and reliance on availability and quality of documentation, which may have impacted some study findings. A prospective study would be beneficial to better capture the complexities and quality of TLD processes in sTBI.

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5. No grants were received

Topic: Ethics and end of life care

000745

Comparison between conventional and artificial intelligence-based statistical models for predicting sepsis mortality in Colombia

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***745***

Introduction: Sepsis is a host response to a potentially fatal infection and recognizing predictors of severity can reduce high mortality rates (1,2). Several machine learning methods have shown promise for detecting early stage sepsis and have emerged as an alternative to classical and robust methods such as logistic regressions but prospective validation studies of diverse populations are required to validate their results (3,4).
Objectives: To evaluate the performance of several predictive models of mortality in a cohort of patients diagnosed with sepsis in a tertiary hospital in Colombia.
Methods: Study of a prospective cohort of adults who were admitted to the emergency department with suspected infection, confirmed infection and then developed sepsis after which they were admitted to the ICU between 2021 and 2022 (5). Those over 18 years of age were included and those with comorbidities such as primary immunodeficiencies, those with exposure to antibiotic therapy prior to consultation and terminal illnesses were excluded. Demographic information, comorbidities, symptoms, physical examination and laboratory findings were collected. ICU mortality was the main outcome and a multivariate logistic regression model was constructed, adjusted for confounding factors and with backward direction, in which 23 model iterations were made and the best model with the highest log likelihood Cox-Snell R2 0, 45 and Nagelkerke's R2 of 0.85, then several machine learning algorithms (Random forest (6), support vector machine, k-nearest neighbors and decision tree) were trained with 80% of the data and tested with 20%. Finally, an area under the ROC curve analysis was performed and the models were compared.
Results: The study of a prospective cohort of adults who were admitted to the emergency department with suspected infection, confirmed infection and subsequently developed sepsis after which they were admitted to the ICU between 2021 and 2022 (5). Those over 18 years of age were included and those with comorbidities such as primary immunodeficiencies, those with exposure to antibiotic therapy prior to consultation, and terminal illnesses were excluded. Demographic data, comorbidities, symptoms, physical examination and laboratory results were collected. Approval was obtained from an ethics committee of the hospital institution. ICU mortality was the primary outcome and a multivariate logistic regression model, adjusted for confounders

and backward direction, was constructed in which 23 iterations of the model were performed and the best model with the highest log Cox-Snell R2 0 probability was chosen, 45 and Nagelkerke's R2 of 0.85, then several machine learning algorithms (Random forest (6), support vector machine, k-nearest neighbors and decision tree) were trained with 80% of the data and tested with 20%. Finally, an area under the ROC curve analysis was performed and the models were compared.
Conclusions: Logistic regression was the most robust model for predicting sepsis mortality in this cohort of ICU patients and although Random Forest and decision tree models also perform well they are more difficult to implement in clinical settings, so a simple model may be a better option. It is also important to take into account the limitations of machine learning, especially when dealing with small cohorts, with high false positive rates and as in this case a low incidence of mortality and in the presence of overfitting typical of these models.

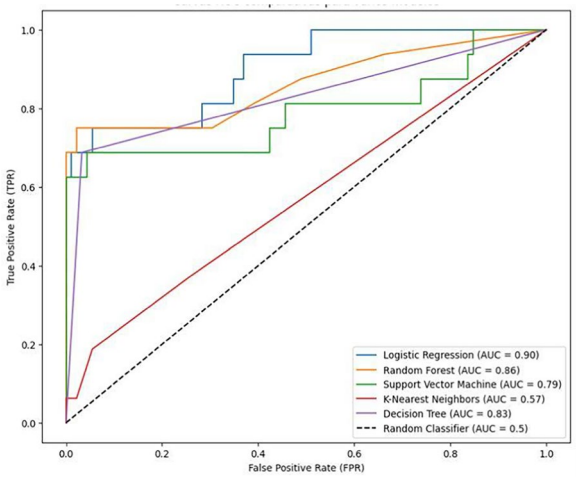


Fig. 1 (abstract 000745) Comparison of ROC curves of logistic regression, machine learning models and decision trees

Table 1 (abstract 000745) Importance of variables for thetraining and testing of machine learning models

Variable	Importance
ICU stay	0.230720
Lactate level	0.056582
SOFA score	0.045089
Glasgow Coma Scale	0.033340
Diastolic blood pressure	0.032530
Systolic blood pressure	0.027928
Hospital stay	0.026085
Heart rate	0.024409
Temperature	0.016357
Previous use of beta blockers	0.012509
Respiratory rate	0.012133
Previous use of antihypertensives	0.009185
Dyspnea	0.008008
Productive cough	0.006139
Sex	0.005982
Chronic obstructive pulmonary disease	0.005691
Altered mental status	0.005676
Respiratory focus	0.005274
Dementia	0.004974
Antibiotics	0.004390

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Topic: Sepsis

000746

The effect of prone position on bacterial translocation in sprague dawley rats undergoing injurious mechanical ventilation

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***746***

Introduction: Pulmonary infections are among the most common causes of intensive care unit admissions. The resulting hypoxia from these infections is typically managed with mechanical ventilation and antibiotherapy. However, it is known that lung injury associated with mechanical ventilation may lead to bacterial translocation from the alveoli into the bloodstream.
Objectives: In this study, we aimed to investigate whether the prone position, as one of the lung-protective ventilation strategies, could prevent bacterial translocation from the lungs to the bloodstream.
Methods: For this purpose, we designed an experiment in which 22 Sprague-Dawley rats received Escherichia coli (E.coli) inoculation via trachea under mechanical ventilation. The animals were then randomized into two groups: prone (n = 11) and supine (n = 11). Anesthesia was achieved using intraperitoneal xylazine and ketamine. A surgical tracheostomy was performed using a 16-gauge cannula, and baseline ventilation was provided with the settings: TV: 6 ml/kg, PEEP: 3 cmH_2O, RR: 68/min. Carotid arterial cannulation was performed for blood gas sampling, blood cultures, and blood pressure monitoring. After collecting baseline blood gas and culture samples, an E. coli colony was instilled into the trachea. Rats were then randomly assigned to prone or supine positions. Subsequently, injurious mechanical ventilation was initiated with settings: FiO_2: 60%, TV: 12 ml/kg, PEEP: 3 cmH_2O, RR: 68/min. At 0, 15, 30, 45, and 60 min, body temperature, heart rate, blood pressure, oxygen saturation, and peak airway pressure (Ppeak) were recorded, along with serial blood gas and blood culture sampling. At the end of the experiment, euthanasia was performed via cervical dislocation.
Results: There were no statistically significant differences in baseline blood gas parameters between the groups. E. coli growth was detected in the blood cultures of 4 animals in each group. The median time to E. coli growth in blood cultures was 15 min in the supine group and 60 min in the prone group (p = 0.114). In the prone group, 25% of animals showed bacterial growth before 15 min, whereas in the

supine group, all animals had positive cultures within the first 15 min ($p = 0.04$).

Conclusions: Our experimental protocol demonstrated that the prone position delays bacterial translocation from the lungs to the bloodstream when compared to the supine position. This suggests a potential protective role of prone positioning in the setting of ventilator-associated lung injury.

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Topic: Acute respiratory failure and mechanical ventilation

000747

Circulating RNAs to improve outcome prediction after cardiac arrest

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***747***

Introduction: Mortality after cardiac arrest (CA) is mostly consecutive to severe neurological damage. The molecular mechanisms driving brain damage are only partly understood. Predicting this damage after CA would allow tailoring healthcare to each individual. However, the current prognostication strategies are not fully accurate and could benefit from the discovery of novel biomarkers. Circulating RNA molecules appear as promising biomarkers for various diseases, including cardiovascular and neurological diseases (1-3). However, their role in brain damage after CA have not yet been fully characterized.

Objectives: This study aimed to identify and validate blood-based RNA biomarkers as outcome predictors after CA.

Methods: A total of 191 patients of the Luxembourg CA cohort were used in this study (ethical approval 200,803/05). RNA was extracted from peripheral blood samples collected in PAXgene RNA tubes 48 h after CA. RNA expression profiles were characterized using optimized direct RNA sequencing in a sub-group of 50 CA patients: 25 patients who survived without any major neurological sequelae at 6 months after CA (cerebral performance category, CPC 1) and 25 age-, body mass index-, and sex-matched patients who died within 6 months after CA (CPC 5). Sequencing results were validated by quantitative PCR (qPCR) in the remaining 141 patients (57 CPC1 and 84 CPC5). Statistical analyses were performed using R studio. Logistic regression, Kaplan–Meier curves and Cox proportional hazard models were used to evaluate their association with survival time.

Results: Direct RNA sequencing in 50 patients yielded 6.7 M reads/sample, detecting 10,490 genes. We identified 412 differentially expressed genes ($p < 0.05$, |log2 fold-change|> 0.5) between survivors and patients who died within 6 months after CA. Biological pathway analysis highlighted key roles in blood cell development, heme biosynthesis, circulation, immunity, apoptosis, and glucose transport. Two RNA candidates were selected for validation by qPCR in the remaining 141 patients. RNAs 1 and 2 were upregulated in nonsurvivors as compared to survivors (Fig. 1). In logistic regression analysis, RNAs 1 and 2 were significant univariate predictors of 6-month survival (Fig. 2A). The predictive value of RNA 1 and RNA 2 remained significant after adjustment with age, body mass index (BMI), time from CA to return of spontaneous circulation (time CA-ROSC), levels of lactate and neuron-specific enolase (NSE) measured 48 h after CA (Fig. 2B). Adding RNA 1 or RNA 2 to a baseline clinical model (BM) including age, BMI, time CA-ROSC, lactate and NSE improved the prediction of survival, as attested by decreased Akaike Information Criterion (AIC), increased area under the curve, significant net reclassification index (NRI) and integrated discrimination improvement (IDI) (Table 1). Kaplan–Meier survival analysis and log-rank test showed that patients with higher (above median value) expression of RNA1 and RNA2 had lower survival rate compared to those with lower expression ($p = 0.0015$ and $pp = 0.053$, respectively; Fig. 3A). These findings were supported by univariate Cox proportional hazards models, where both RNAs were significantly associated with survival time. However, their significance was lost after being adjusted to other clinical variables (Fig. 3B).

Table 1 (abstract 000747) Incremental value of RNA 1 and RNA 2 to predict 6-month survival after CA

	AIC	Lr_p	AUC	DeLong_p	NRI	NRI_p	IDI	IDI_p
Baseline model (BM)	96.155	-	0.940	–	–	–	–	–
BM + RNA1	89.172	0.002	0.953	0.34	0.839	1.18E−07	0.04	0.009
BM + RNA2	91.303	0.008	0.950	0.19	0.803	4.70E−07	0.034	0.029

Conclusions: Elevated blood levels of RNA 1 and RNA 2 measured 48 h after CA are associated with an increased risk of mortality within 6 months. The predictive value of these novel RNAs must be confirmed in larger patient populations.

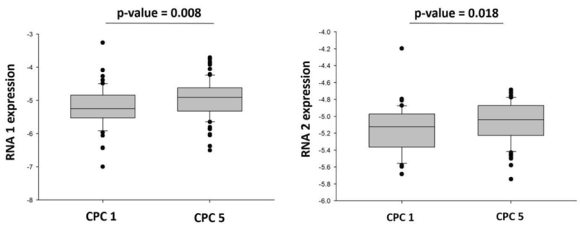


Fig. 1 (abstract 000747) Upregulation of candidate RNA biomarkers in nonsurvivors after CA. Expression levels of RNAs 1 and 2 in patients who survived without neurological sequelae (CPC 1; $n = 57$) and in patients who died within 6 months (CPC 5; $n = 84$) were assessed by qPCR normalized by 18S. *P* values are from Mann–Whitney *U* test

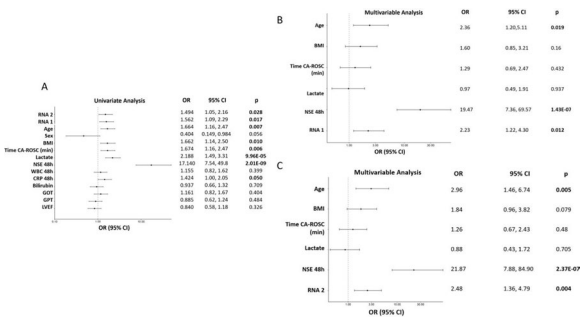


Fig. 2 (abstract 000747) Capacity of RNAs 1 and 2 to predict 6-month survival after CA. Odds ratio (OR) ± 95 confidence intervals (95% CI) and *P* value from univariate (**A**) and multivariable (**B**, **C**) logistic regression analyses conducted in 141 patients are shown in forest plots. *BMI* body mass index, *time CA-ROSC* time from CA to return of spontaneous circulation, *NSE* neuron-specific enolase; *WBC* white blood cell count;

CRP C-reactive protein; *GOT* Aspartate aminotransferase; *GPT* Alanine aminotransferase; *LVEF* Left ventricular ejection fraction

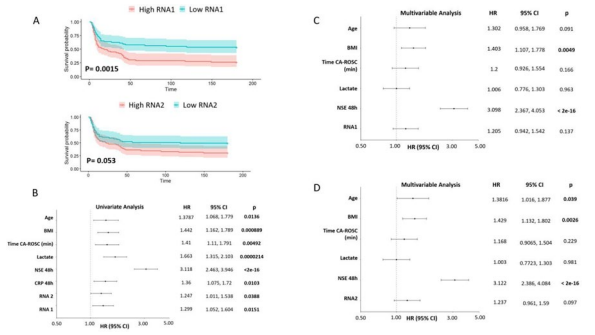


Fig. 3 (abstract 000747) Association of RNA1 and RNA2 expression with survival after CA. **A** Kaplan–Meier survival curves for RNA1 and RNA2 stratified by high and low expression levels. High RNA1 expression (above median value) was significantly associated with reduced survival ($p = 0.0015$, log-rank test), while RNA2 showed a trend toward significance ($p = 0.053$). **B** Forest plot from univariate Cox proportional hazards analysis showing that RNA1 (hazard ratio HR = 1.299, $p = 0.0151$) and RNA2 (HR = 1.247, $p = 0.0388$) were significantly associated with survival. **C, D** In multivariable Cox regression analyses adjusted for clinical covariates, RNA1 ($p = 0.137$) and RNA2 ($p = 0.097$) did not remain significantly associated with survival

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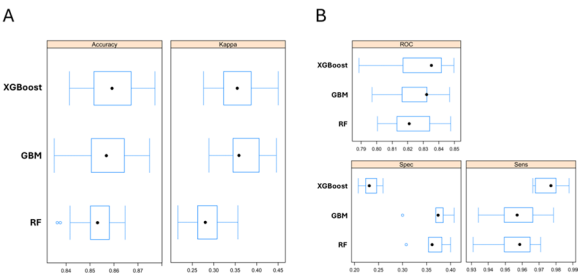
Topic: Cardiac arrest

000748

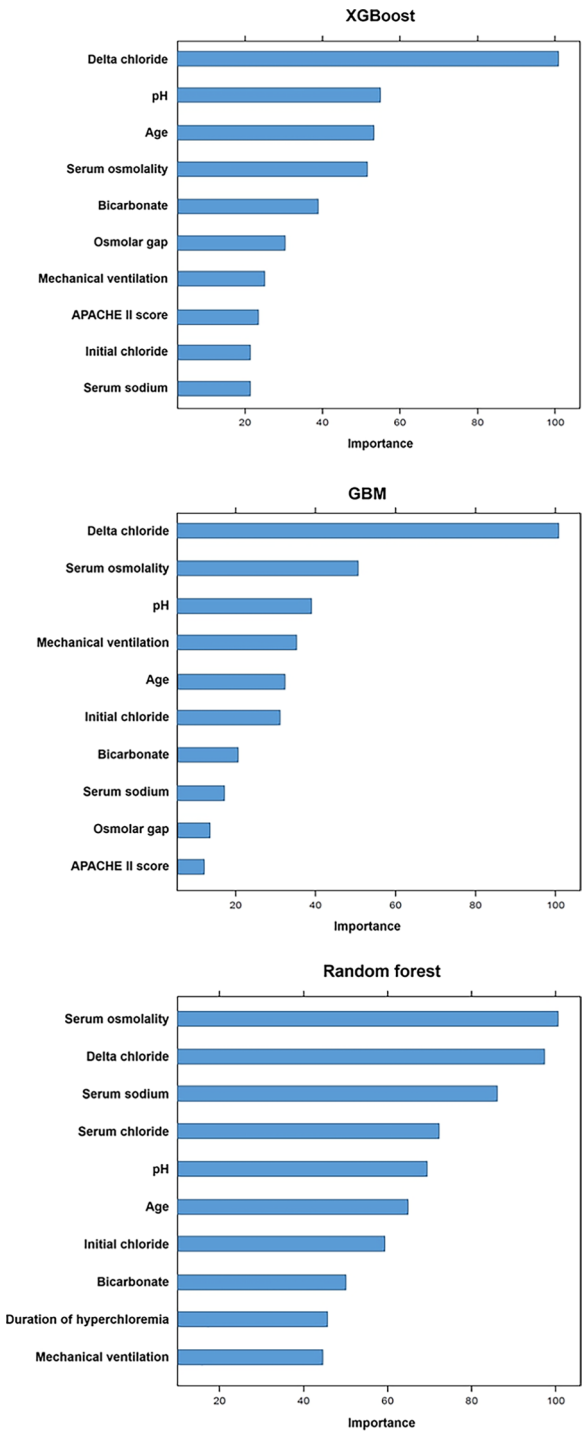
Machine learning-based prediction of acute kidney injury in neurocritically ill patients undergoing hyperosmolar therapy

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***748***

Introduction: Acute kidney injury (AKI) is a pivotal concern in neurocritical care, impacting patient survival and quality of life. This study harnesses machine learning (ML) techniques to predict the occurrence of AKI in patients receiving hyperosmolar therapy, aiming to optimize patient outcomes in neurocritical settings.
Objectives: Our study employed ML techniques to predict AKI in neurocritically ill patients undergoing hyperosmolar therapy. Utilizing historical patient data and sophisticated algorithmic models, ML can offer a novel approach to uncover complex interactions and risk factors not easily identifiable through traditional analysis. Our goal is to harness ML to offer insights that could significantly improve patient management in neurocritical care settings.
Methods: We conducted a retrospective cohort study of 4,886 patients who underwent hyperosmolar therapy in the neurosurgical intensive care unit (ICU). Comparative predictive analyses were carried out using advanced ML algorithms—eXtreme Gradient Boosting (XGBoost), Gradient Boosting Machine (GBM), Random Forest (RF)—against standard multivariate logistic regression. Predictive performance was assessed using an 8:2 training–testing data split, with model fine-tuning through cross-validation.
Results: The XGBoost algorithm notably outperformed both the GBM and RF, as well as traditional logistic regression in predicting AKI, achieving a sensitivity of 95.9% and specificity of 36.2%. When applied to an independent test set, it maintained an accuracy of 85.9%, with a *C*-statistic of 0.821 and a Kappa statistic of 0.365. The multivariate logistic regression analysis, while informative, showed less predictive strength as compared to the ML models. Delta chloride levels proved to be the most influential predictor, with additional significant variables including pH, age, serum osmolality, bicarbonate, and the osmolar gap.
Conclusions: The study affirms the value of ML in clinical diagnostics, with XGBoost providing a reliable tool for AKI prediction in neurocritical patients. The prominence of delta chloride among the predictive variables underscores its potential as a biomarker for AKI risk in this patient population.



Predictive performance of eXtreme gradient boosting (XGBoost), stochastic gradient boosting (GBM), and random forest (RF) machine learning model for poor neurologic outcome. Sens = sensitivity, Spec = specificity, ROC = receiver-operating characteristic



The top variables contributing to the predictive performance of each model. The magnitude of the model performance reduction reflects how dependent the model is on particular variable. The importance of variables is scaled so that the maximum value is 100. Delta chloride was defined as the difference between the initial chloride level and the highest chloride level observed during the patient's stay in the intensive care unit. Sodium level, serum osmolality, and chloride level were defined as the highest values recorded during the patient's ICU stay. XGBoost = eXtreme gradient boosting, GBM = Stochastic Gradient Boosting, APACHE II = Acute Physiology and Chronic Health Evaluation.

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Topic: Neurointensive care

000750

Palliative extubation at a regional Japanese hospital: a single-center experience

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Intensive Care Medicine Experimental ***2025*** **13**(**Suppl 1**):***750***

Introduction: In Japan, the withdrawal of life-sustaining treatment, particularly palliative extubation, remains limited and controversial. Our medium-sized regional hospital, which includes emergency and cardiovascular centers, has promoted goal-concordant care for over a decade, inspired by clinical practices in the U.S. When patients' goals cannot be achieved, we consider withdrawing life-sustaining treatments, including palliative extubation. We emphasize careful decision-making through advance care planning (ACP) and shared decision-making (SDM) with patients and families. However, few studies have thoroughly investigated the actual decision-making process involved in palliative extubation. Therefore, we aim to report our institution's experience, with particular focus on this process.
Objectives: To describe our experience with palliative extubation, focusing on its decision-making process at a facility where it is routinely practiced.
Methods: This was a single-center retrospective study. We reviewed ICU patients from January 2017 to December 2023. For those who underwent palliative extubation, we collected data on demographics, clinical course, medications used at extubation, time from extubation to death, and decision-making processes, including participants in ACP and SDM. We also analyzed annual trends in palliative extubation among in-hospital deaths following ICU admission.
Results: Palliative extubation was performed in 62 patients. The median age was 79 years (IQR: 68.5-85); 66.1% were male. The median hospital stay was 15 days, ICU stay 6.5 days, and mechanical ventilation duration 133.5 h. Cardiovascular disease was the most common diagnosis (48.3%), followed by respiratory disease (21.0%). The median time from extubation to death was 34.2 h. Fentanyl was used in 79.0% of cases, and midazolam in 6.5%. ACP was documented with patients in 35.5% of cases (including prior discussions), most commonly with patients' adult children (71.0%) and spouses/partners (50.0%). SDM involved patients' adult children in 72.6% and spouses/partners in 50.0%; in only one case was the patient directly involved in the final decision-making to withdraw care. Multidisciplinary conferences were held in 62.9% of cases; in three cases without family, all included team

discussions. The rate of palliative extubation among ICU deaths rose from 4.0% in 2018 to 13.9% in 2023, with an overall rate of 8.0%.
Conclusions: Palliative extubation is increasingly practiced at our institution as part of goal-concordant care. Our structured approach involving ACP, SDM, and multidisciplinary input supports ethically sound decision-making. These findings may help inform and encourage broader adoption of palliative extubation practices in Japan.

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Topic: Ethics and end of life care

000752

Complement regulation in a model of LPS-induced lung hyperinflammation in the rat

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***752***

Introduction: Complement activation has been implicated as a contributor to lung injury (1). Membrane-bound complement regulatory proteins, including decay-accelerating factor (DAF), control complement activation thus ensuring the balanced activation of the complement cascade and mitigating complement-mediated injury (2). Few reports have assessed a possible role of CRegPs in mediating acute lung injury (ALI). Most studies have reported findings primarily in mice but the variation of CRegPs expression in different rodents raises questions over their functional role across species.
Objectives: The aim of the present study was to assess the role of DAF on extent of LPS-mediated acute lung injury in the rat, using a transgenic rat model of DAF deficiency.
Methods: Male Sprague–Dawley rats, 180 g in body weight, were used in this study. Animals were reared in accordance with the European Union Directive for the care and use of laboratory animals. WT and *Daf*-/- rats were injected intraperitoneally with 8 mg/kg of LPS prepared from Escherichia coli O111:B4 under isoflurane anesthesia. Control mice received sterile saline solution. Four rats were included in each group. Rats were euthanized under anaesthesia at 16 h post injection and blood samples were obtained from the abdominal inferior vena cava. Serum, BALF and lung tissue samples were obtained. Hematoxylin/eosin staining was performed on lung tissue sections of WT and *Daf*-/- control and LPS receiving rats. IL-6 and IL-10 levels were determined in BALF samples by ELISA immunoassays. Protein levels were determined by immunohistochemistry and western blotting in lung tissue sections and protein lysates respectively.
Results: LPS administration to wild-type (WT) rats caused histopathological lesions indicative of acute lung injury and significantly increased the number of infiltrating inflammatory cell infiltrates without an increase in tissue complement (C3/C3b protein) levels. The total number of cells and Interleukin (IL)-6, but not IL-10 levels, also increased, in bronchoalveolar lavage fluid (BALF) samples in response to LPS. In DAF-deficient rats (*Daf*-/-), DAF protein levels in lung tissue were undetectable in both control and LPS-treated animals. However, DAF absence resulted in increased C3/C3b protein levels in *Daf*-/- control rats, compared to their WT controls. LPS administration to *Daf*-/- rats exacerbated lung injury without an effect on C3/C3b levels. Baseline tissue protein levels of the anaphylatoxin 5a receptor 1 (C5aR1) in *Daf*-/- rats were higher as compared to those in WT controls but this difference was not significant. LPS administration to either group had no effect of on C5aR1. DAF deficiency had no effect on baseline protein levels of the membrane-bound complement regulator, CR1-related gene/protein Y, (Crry). LPS administration increased Crry protein expression levels to a similar extent in both WT and *Daf*-/- rats.
Conclusions: DAF deficiency increases endogenous C3/C3b and C5aR1 protein levels in lung tissue. LPS-induced inflammatory response and lung injury are augmented in *Daf*-/- rats without further increase in C3/C3b and in the absence of significant changes in the expression of membrane-bound complement regulatory proteins, DAF and Crry, or the anaphylatoxin receptor, C5aR1.

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Topic: Sepsis

00753

Right ventricular injury during VV-ECMO for severe ARDS: does time matter?

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***753***

Introduction: Right ventricular injury (RVI) is prevalent in patients with severe ARDS and is associated with significant mortality [1]. Despite the theoretical RV-protective effect of VV-ECMO, RVI may persist or worsen. The timing and optimal monitoring of RVI in these patients is not well established [2].
Objectives: To characterise the incidence and temporal patterns of RVI in patients receiving VV-ECMO for severe ARDS. To compare clinical characteristics and outcomes between acute and delayed RVI.
Methods: A single-centre retrospective study of patients admitted to a tertiary centre with refractory ARDS requiring VV-ECMO between April 2022 and April 2024, who had at least one echocardiogram performed. RVI was diagnosed via presence of any of: impaired RV function on visual assessment; RV dilatation; right to left ventricular end-diastolic area greater than 0.6 with septal dyskinesia. RVI was divided into acute (if present on admission) and delayed (developed later during the ECMO run). Results were analysed using R Studio version 2024.12.1.
Results: A total of 40 patients were included (median age 39.5 years [IQR 30-49]; 45% male). RVI was observed in 63% and was associated with higher ICU mortality (48% vs 13%, p = 0.04).
72% had acute RVI, mostly diagnosed at admission [0-5 days]. The remaining had delayed RVI (46 days after admission [19-65]). Patients with acute RVI were younger (p < 0.01), were intubated for fewer days prior to ECMO cannulation ($p = 0.01$), and had a trend to present with higher troponins at admission (Table 1). No significant differences were observed on Murray Score, but a trend to lower RESP Score was observed in the delayed RVI group ($p = 0.05$).
While differences in mortality were not statistically significant, delayed RVI was linked to longer ECMO runs ($p < 0.01$) and longer ICU length of stay (p < 0.01)—Table 1.

Table 1 (abstract 000752) Characteristics of acute vs delayed RVI

Characteristic	Acute RVI (*n* = 18)	Delayed RVI (*n* = 7)	*P* value
Age (years)	31.5 (27-40)	54 (42-55)	< 0.01
Male sex	28% (*n* = 5)	57% (*n* = 4)	0.205
BMI (kg/m^2)	25.1 (20.8-40.5)	28.7 (26.9-33.0)	0.317

Characteristic	Acute RVI ($n = 18$)	Delayed RVI ($n = 7$)	*P* value
Days intubated pre-cannulation	1 (0-2)	7 (2-12)	0.012
High sensitivity troponin at admission (ng/L)	358 (166-975.5)	56 (20-300.5)	0.082
Murray score	3 (3-3.8)	3.25 (2.8-3.3)	0.610
RESP score	4 (3-5)	2 (-1-4)	0.052
Mortality	39% ($n = 7$)	71% ($n = 5$)	0.202
ECMO duration (days)	8 (4-21)	58 (22-116)	< 0.01
ICU length of stay (days)	11 (5-44)	112 (28-147)	< 0.01

Conclusions: Right ventricular injury was common among patients receiving VV-ECMO for severe ARDS being associated with higher ICU mortality. Two patterns of RVI were observed. Acute RVI, reflecting disease-driven RV strain prior to ECMO initiation, and delayed RVI which developed during the ECMO run. The latter is likely to reflect incomplete resolution of ARDS and development of lung fibrosis. Although this is likely to reflect natural disease progression, early identification of delayed RVI and therapeutic intervention might aid reversal and improve survival.

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Topic: Cardiovascular issues in ICU

000754

Effect of frailty on primary, secondary outcomes, length of stay and delirium for elderly surgical patients admitted post operatively in the ICU

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:754***

Introduction: Elder surgical patients admitted postoperatively in the Intensive Care Unit (ICU) are a distinct group of patients, more diverse and more demanding, bearing many comorbidities and a limited capacity to thrive. Frailty is a major hinderance of post operative outcomes and can change the course of ICU stay for most of the elderly surgical patients.
Objectives: The aim of this retrospective study is to determine whether frailty alters outcomes and length of ICU stay for patients older than 65 y.o admitted in the ICU after elective major surgery.
Methods: A total of 40 patients > 65 y.o that had elective major abdominal and neck surgery were included in the study. The type of surgery, their demographics, comorbidities, length of ICU stay, outcome, APACHE II score, Clinical Frailty score, SOFA score, blood tests and delirium occurrence with Confusion Assessment Method for the intensive care unit (CAM-ICU) were recorded retrospectively and were statistically analyzed.
Results: Of the 40 patients, the median age was 75.5 years (65-95), the number of female and male patients was equal. Median APACHE II score was 13.5 ± 2.8 and media SOFA score 6. Most patients had CFS score of 4 and 5 (68.4% of all patients). The median Length of ICU stay was 4 days and median days on mechanical ventilation (MV) was 2.5 days. 86.8% of the patients were discharged from the ICU and all of them were discharged later from the hospital. Comparing frailty within two groups, the nonfrail (CFS 1-4) vs the frail (CFS 5-9), no statistically significant difference regarding survival and in hospital death was observed. However, the frail group had longer LOS (median 3.2 vs 6.9 days) and needed more days on MV (median 1.5 vs 5). Most of the patients with delirium occurrence in the ICU after surgery belong to the frail group (28% vs 5.5%).
Conclusions: Frailty alone may not alter surgical outcomes in the ICU, as the severity of the surgical intervention seems to play an important role to survival. However, significant differences exist in the LOS and MV need of frail patients and more of them may develop post operative delirium in the ICU. More studies and the developement of a specific for the elderly post-op score is needed to precisely predict outcomes for this subgroup.

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Topic: Perioperative care

000755

The impact of agency nursing on patient centered outcomes: a cohort study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:755***

Introduction: Over the last few years, we have seen an exponential increase in the number of traveling nurses in the USA, especially during the pandemic. Reliance on temporary staffing weakens organizational investments in clinical nursing competencies and their influence on specialized care. There is a paucity of data on the impact of Traveling ("Agency") nurses on quality of care and outcomes in hospitalized patients.
Methods: We retrospectively analyzed hospital staffing data at our institution, a large tertiary care center, from 2019 to 2023. We investigated the relationship between nurse staffing ratios, agency nursing, hospital-acquired infections (HAIs), and patient safety indicators (PSIs). We analyzed the association between staffing indices and different PSI and HAI using Spearman's Correlation. The variable agency percent

was divided into three groups: < 5%, 5-10%, and > 10%. We then compared the total number of PSI and number of infections using a one-way ANOVA.

Results: The average total monthly Agency shifts increased in all areas between 2019 and 2023. In the Critical care areas (CCA), it went from 4 (SD = 3.1) to 70 (SD = 81) (peaked in 2022 at 186). In the medical surgical areas (MSA), it increased from 65.8 (SD = 36.5) to 796.6 (SD = 245.6), in the ED from 1.5 (SD = 0.8) to 339.8 (SD = 100.6), and overall from 70.9 (SD = 36.7) to 1,206 (SD = 353.5). As a percentage of total nursing shifts between 2019 and 2023, the Agency nursing shifts increased in the CCA from 0.2% to 2.4% (peaked in 2022 at 7%), in the MSA from 1.3% to 14.2%), in the ED from 0.1% to 31.3% and overall from 0.9% to 12.7%. PSI events varied over the years and increased from 7.1 (SD = 2.4) events per month in 2019 to 9.3 (SD = 5.2) events per month in 2023. For HAI, ventilator-associated pneumonia (VAP) increased from 0.6 (SD = 1) in 2019 to 3.5 (SD = 1.1) in 2023, clostridium difficile (C. diff) from 7.2 (SD = 1.4) in 2019 to 9.3 (SD = 2.8) in 2023, and MRSA from 1.4 (SD = 1.7) in 2019 to 3.3 (SD = 2.1) in 2023. On the other hand, central-line associated bloodstream infections (CLABSI) and catheter-associated urinary tract infection (CAUTI) rates decreased over time from 1.4 (SD = 0.7) and 2.4 (SD = 1.2) in 2019 to 0.7 (SD = 0.6) and 1.5 (SD = 0.9) in 2023, respectively. The overall number of infections increased between 2019 (15.8 [SD = 1.7]) and 2023 (20.5[SD = 3.3]). In the CCA, increased agency nursing was significantly correlated with VAP number (0.27 [0.0-0.5], $p = 0.04$), C. diff (0.4 [0.15-0.6], $p = 0.001$), and total number of infections (0.32[0.07-0.54], $p = 0.013$). For the hospital, a positive correlation was also observed between the percentage of agency and all PSI (0.37 [0.11; 0.58], $p = 0.005$).

Conclusions: From 2019 thru 2023, in our institution, we demonstrated a reduction in quality metrics measured by Patient Safety Indicators (PSIs) and nosocomial infections which correlated with the rinse in the percentage of travel, "Agency", nursing across our major adult clinical units. Travel, "Agency", nursing provides the immediate support necessary to sustain clinical services to a health care system faced with staffing shortages and/or unanticipated surges in patient volume. However, it is hard to ignore that by increasing the number of nurses unfamiliar with our health care system, unit-based protocols, and unit-based competencies our instituion saw a significant reduction in quality surrounding patient centered outcomes. This study should highlight the need to understand the nature of the relationship between travel "Agency" nurses and staffing indices with specific outcomes in order to establish preventative strategies.

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Topic: Health services research and outcome

000756

Critical care and hematologic malignancies: analyzing symptoms and understanding distress

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***756***

Introduction: Patients with hematologic malignancies (HMs) are admitted to intensive care units (ICUs) with complications of their cancer or cancer treatment(1). Prior research has improved care and decreased mortality(1), yet an understanding of their symptom experiences has not been established(2). Symptom control is crucial for HM patients in the ICU. Uncontrolled symptoms may cause increased

distress including pain, agitation, anxiety, hunger, and insomnia, and can negatively impact quality of life and survivorship(3,4).
Objectives: This study aimed to identify symptoms and distress levels of patients with HMs in the ICU. Research questions included: (1) What symptoms do HM patients experience in ICUs?; (2) How distressing are physical and psychological symptoms?; and (3) What patient and ICU characteristics are associated with distress?
Methods: A cross-sectional study was conducted in a 27-bed ICU in Toronto, Canada, from March 2023 to January 2025. Demographic data was obtained from chart review. The Memorial Symptom Assessment Scale Short Form (MSAS-SF) was completed by participants and measured symptoms and symptom distress subscales. Eligible participants were ICU patients (> 17y) diagnosed with a HM, who could complete the MSAS-SF verbally or by hand. Demographic data was analyzed using descriptive statistics. A univariate analysis evaluated relationships between variables and the MSAS-SF Global Distress Index subscale.
Results: Sixty-eight participants consented, with a mean age of 58.5y (SD ± 14.4). Common HM subtypes included acute leukemia (38%) and lymphoma (32%). Respiratory failure was the ICU admission etiology for 50% of our sample ($N = 34$) and 43 participants (63.2%) received mechanical ventilation (MV) or noninvasive ventilation in ICU, with a low level of organ failure (SOFAhem 4.81). The mean ICU stay was 9.5 days (SD ± 8.7), and mean time between ICU admission and participation was 4.7 days (SD ± 4.4). Frequently endorsed symptoms included a lack of energy (88.2%), dry mouth (83.8%), drowsiness (72.7%), and shortness of breath (70.6%). Mean MSAS-SF symptom subscale scores indicted a high level of distress among physical symptoms (1.61 ± 0.80, range 0-3.53), psychological symptom frequency (1.56 ± 1.06, range 0-3.67), and the global distress index (1.89 ± 0.88, range 0-3.72), as indicated by subscale scores > 1 (5). Trends show increased distress with continuous renal replacement therapy, MV, and a previous stem cell transplant.
Conclusions: HM patients in ICU commonly experience a lack of energy, dry mouth, drowsiness, and shortness of breath. Clinicians should focus on symptom assessment and management to support patient needs. This study highlights the importance of understanding the unique symptom profile of HM patients in ICU to provide targeted interventions. Future research with larger, multicenter samples is warranted.

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Topic: Haematologic–oncologic issues in the ICU

000758

Experiences, perspectives and expectations of professionals with family participation in the intensive care unit, focussed on diverse cultural backgrounds

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):*758*

Introduction: Family participation in the care of a patient in the intensive care unit (ICU) can have a positive impact on mental, physical, and cognitive health impairments for both patients and family members (1). In addition, it can positively influence satisfaction with care (1). However, needs in care and communication regarding family participation can be strongly affected by the cultural background of patients and family members (2,3). With knowledge of these needs, an ICU professional can better align with diverse cultural backgrounds (3).
Objectives: To gain insight into the experiences, perspectives, and expectations of ICU professionals regarding culturally sensitive family participation.
Methods: A qualitative study using semi-structured interviews was conducted between December 2024 and April 2025. A purposeful sample of ICU healthcare professionals at a teaching hospital in the Netherlands was included. Interviews were transcribed and key themes were identified using thematic analysis. All participants provided informed consent.
Results: We interviewed nineteen healthcare professionals; fourteen ICU nurses, one intensivist, one physical therapist, two spiritual caregivers, and one medical social worker. The median age of the healthcare professionals was 46 (IQR 32-52) years and 68% were female. The median time working in the ICU was 10 (IQR 5-16) years. Six healthcare professionals had an Islamic background, four a Christian background, one a humanistic background, and eight were nonreligious. Four main themes emerged: (1) opinions in participation of family; (2) culturally sensitive care; (3) communication challenges and; (4) supportive needs. All respondents value family participation in ICU care. Although the new open visiting policy enhances participation, challenges remain. Healthcare professionals primarily develop family engagement approaches through personal experience, creating inconsistent practices. Cultural backgrounds of staff, patients, and families shape expectations and communication, with professionals reporting uncertainty when addressing specific cultural or religious needs. ICU nurses and physicians should more often and earlier seek the assistance of medical social work and spiritual care for support. To address this uncertainty and ensure more effective, culturally sensitive care, this highlights the necessity for cultural diversity training for ICU staff.
Conclusions: ICU professionals are generally positive about family participation and recognize the importance of culturally sensitive care. Facilitating family participation depends on effective communication, while it can be challenging to align family expectations with the possibilities within healthcare logistics. Nurses and physicians need greater awareness and reflexivity regarding how they communicate with families, ensuring their interactions are both empathetic and clear. Family participation in the ICU requires a flexible, culturally sensitive approach.

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Topic: Nursing care and physiotherapy

000759

Improving sleep in the ICU using a real-time sleep monitoring

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Introduction: Sleep disruption is common in intensive care unit (ICU) and is associated with poor outcomes. Noise and nurse care have been reported to disrupt sleep. Night "Quiet-time" postponing and clustering nonurgent care has been tested to improve sleep but results are contrasting and no studies have used objective sleep measurement using EEG.
Objectives: We hypothesized that using a real-time automated sleep monitoring system guiding nursing rounds and nurse care would improve sleep of ICU patients.
Methods: We conducted a prospective monocenter before-after study including critically ill awake patients free of sedatives. In the usual care group, nursing rounds were performed every 4 h as daily practice. In the treatment group, nursing rounds were guided by a medical device composed by an electroencephalography recorder and sleep scoring system working in real-time connected to a tablet positioned at the doorstep of the room. When patients had a continuous sleep episode longer than 10 min, the tablet indicated to prioritize sleep, suggesting caregivers to delay nonurgent care. When patients were awake, the tablet indicated to prioritize care with no nursing rounds restrictions. All patients underwent sleep recording from 7 pm to 7 am. Room entries were counted using an entry/exit counter. Room entries were counted using an entry/exit counter. The primary outcome was total sleep time.
Results: Among the 81 patients included, 60 were analyzed (30 per group). Age, sex and severity scores at ICU admission did not differ between groups. The main reason for ICU admission was acute respiratory failure (63%). Overall, 55 patients (92%) were included while breathing spontaneously and 5 (8.3%) while intubated with no differences between groups. No patients were delirious at inclusion in both groups. In treated group, no patients had delirium. In usual care group, three patients had a delirium after the first or second night. Overall median sleep time was 203min [97-322] in treated group vs 177min [12-224] with no differences between groups. Median [25th-75th percentile] room entries were 23 [16-31] in the treatment group and 26 per night [20-32] in the usual care group ($p = 0.4$). The proportion of room entries while patients were asleep was 6% [0-13] in the treated group vs 22% [4-32] in the usual care group ($p = 0.015$). After exclusion of the 14 patients in whom sleep episodes were systematically < 10min (10 in treated group and 4 in usual care group), total sleep time was higher in treated group (276min [214-345]) than in usual care group (183min [142-243], $p = 0.008$). Time spent in long sleep episodes was higher in treated group (211min [103-306]) compare to control group (117min [73-189], $p = 0.03$). Automatically scored N3 sleep time was higher in the treatment group (101min [43-154]) than in the usual care group (40min [15-100], $p = 0.037$).
Conclusions: Real-time automated sleep monitoring-guided nursing rounds improves sleep quantity and quality in nonsedated critically ill patients.

Topic: Acute respiratory failure and mechanical ventilation

000763

Physiotherapy provision and practice: a EuropeAn Intensive CarE Unit (ICU) Survey (PEAiCE) —mapping of ICU physiotherapy in Europe

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***763***

Introduction: Physiotherapists play a crucial role in the respiratory management and rehabilitation of patients in the Intensive Care Unit (ICU). However, provision and practice of physiotherapy in ICUs across Europe may vary.
Objectives: (1) To map the current provision of physiotherapy across European ICUs (2) To explore physiotherapists' role and practice in the delivery of respiratory care and rehabilitation in European ICUs.
Methods: An a-priori piloted survey, translated into 11 European languages (English, French, German, Spanish, Portuguese, Polish, Italian, Finnish, Greek, Albanian, Ukrainian), was disseminated via a secure, online platform (JISK V.2). We invited physiotherapy leads, or in their absence medical or nursing leaders, from each ICU through professional societies, networks, and social media. The survey included three sections targeting ICU structure, physiotherapy roles, and current practice. Ethical approval was obtained. Data were analysed descriptively.
Results: The survey was open from 19/02 to 21/07/2024. After duplicate removal, 845 responses from 33 countries were included. The highest number of responses were received from Spain (98/845, 12%), UK (95/845, 11%), and France (89/845, 11%, Fig. 1). The majority of respondents per ICU were physiotherapists (740/845, 88%) working in university hospitals (583/845, 69%) with adult patients (731/845, 87%). Almost in all hospitals, physiotherapists treat patients in ICU (839/845, 99%) but may need a referral to start physiotherapy (437/839, 52%). Less than half were dedicated to ICU (346/839, 41%), although most had specific ICU training (672/740, 91%).The majority of responders performed respiratory assessment regularly (588/740, 80%) and provide both respiratory care and rehabilitation for mechanically ventilated patients (625/739, 85%). Variability was seen regarding respiratory techniques (Table 1). Just over half of all respondents reported to performing suctioning (356/647, 55%), or a manually assisted cough (330/647, 51%) regularly. Regular use of other techniques such as Mechanical Insufflation-Exsufflation (MIE) (128/647, 20%), saline instillation 116/647, 18%), and manual hyperinflation (100/647, 15%) were less frequently reported. Early mobilisation techniques were being regularly performed by responders for ventilated patients (Table 2), including sitting at the edge of the bed (596/703, 85%), standing (557/703, 79%) and walking (304/412, 74%).
Conclusions: Provision of physiotherapy in European ICU is heterogenous, demonstrating a wide variation in expertise and the use of specific techniques. The PEAiCE project has identified various levels of access to specialised ICU physiotherapy, along with a wide variation in expertise or specific techniques. Evidence-based methods, particularly early mobilisation techniques are highly reported across Europe. In contrast, other techniques, for example MIE are less commonly used. This may be due to a lack of research to underpin these techniques, or a lack of specialist training in certain areas.

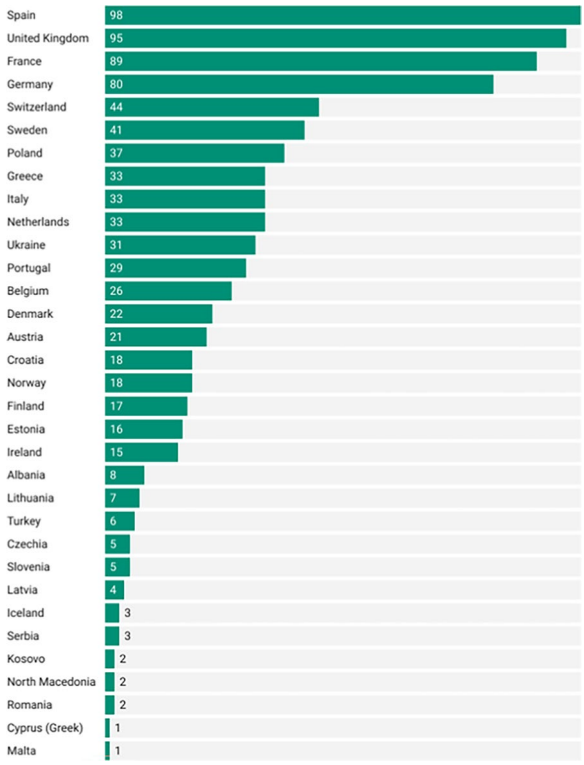


Fig. 1 (abstract 000763) Number of responses by country

Table 1 (abstract 000763) Respiratory techniques used for treating ventilated patients (n = 647)

Technique	Regularly performed N(%)	Occasionally N(%)	Never or not applicable N(%)	Countries where at least 1 physio reported using the technique
Mechanical Insufflation-Exsufflation	128 (20%)	342 (53%)	177 (27%)	27/31
Endotracheal suctioning	356 (55%)	99 (15%)	192 (30%)	27/31
Manual Techniques (e.g. percussion, vibration)	283 (44%)	154 (24%)	210 (32%)	31/31
Saline instillation	116 (18%)	212 (33%)	319 (49%)	25/31
Manual Hyperinflation	100 (15%)	228 (35%)	319 (49%)	26/31
Ventilator Hyperinflation	96 (15%)	141 (22%)	410 (63%)	21/31
Manually Assisted Cough	330 (51%)	248 (38%)	69 (11%)	31/31
Respiratory muscle training	194 (30%)	209 (32%)	244 (38%)	31/31

Table 2 (abstract 000763) Active rehabilitation techniques used for treating ventilated patients

Technique	N	Regularly performed N(%)	Occasionally N(%)	Never or not applicable N(%)	Countries where at least 1 physio reported using the technique
Active exercises in bed	740	436 (59%)	173 (23%)	131 (18%)	32/32
Cycling (cycle ergometer) in bed	740	319 (43%)	269 (36%)	152 (21%)	31/32
Verticalization/standing using a bed or a tilt table	740	260 (35%)	294 (40%)	186 (25%)	31/32
Lateral Transfer out of bed into rehabilitation chair e.g. sliding board	740	201 (27%)	276 (37%)	263 (36%)	31/32
Transfer out of bed into rehabilitation chair with a mechanical lift (hoist)	740	460 (62%)	209 (28%)	71 (10%)	31/32
Neuromuscular electrical stimulation	703	257 (37%)	147 (21%)	251 (36%)	28/31
Assist patient to sit on the edge of the bed	703	596 (85%)	88 (13%)	19 (3%)	31/31
Assist patient to stand	703	557 (79%)	120 (17%)	26 (4%)	31/31
Assist patient to step round to sit out in the chair	412	336 (82%)	63 (15%)	13 (3%)	24/24
Assist patient to walk	412	304 (74%)	105 (25%)	3 (1%)	24/24

Topic: Nursing care and physiotherapy

000764

Prevalence of compassion fatigue and perceived stress among healthcare workers in the intensive care unit of a Tertiary Hospital in the Philippines

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***764***

Introduction: Working in a dynamic and challenging department of the hospital might lead to stress and/or compassion fatigue and avoidance behavior among healthcare workers and consequently affect patient care and safety. Wide variations in the prevalence of compassion fatigue have been reported with higher levels of burnout reported among healthcare workers in intensive care units (ICUs) as they are exposed to a high level of job stress.
Objectives: This study aimed to determine the prevalence of compassion fatigue and the level of perceived stress among healthcare workers in the ICU of a tertiary hospital in the Philippines. It also aspired to identify the sociodemographic characteristics associated with perceived stress, compassion fatigue, and compassion satisfaction among ICU healthcare workers.
Methods: This single-center cross-sectional descriptive study was conducted in the ICU of a tertiary hospital in the Philippines from May 1 to July 31, 2024. It included ICU healthcare professionals who voluntarily participated in this study. The Professional Quality of Life Scale was used to measure compassion fatigue and satisfaction level among healthcare professionals, while the Perceived Stress Scale was utilized to gauge healthcare workers' perceptions of their stress levels. Both scales have proven adequate reliability in various studies, with Cronbach alpha of 0.75-0.88 and 0.80-0.86, respectively. Google form was

utilized to allow respondents to complete the questionnaire and sign the consent form.

Results: Out of the 114 total ICU staff, the study included one hundred one ($n = 101$) healthcare workers who completed the study questionnaire. However, five respondents ($n = 5$) were excluded due to pre-existing psychiatric illness. Thus, ninety-six healthcare workers ($n = 96$) were included in the present study, comprising the majority (84%) of the workforce. The majority of the respondents had a mean age of 30.34, with a median age of 30, female, single and had no children. Among the 96 respondents, 64 were nurses (66.67%), 21 were doctors (21.88%), and the remaining 11 were pharmacists (11.46%). For the type of work shift, majority had rotating shifts during their hospital duties (80.21%), worked 40 to 50 h per week (71.87%), and had more than 3 years of ICU service (39.58%). Moreover, 92.71% of the respondents had a monthly income range of Php 21,000 to Php 40,000. The results of the ProQoL and PSS showed an average score of 39.41 ± 5.47 for compassion satisfaction, 25.54 ± 5.99 for burnout, 25.10 ± 6.11 for secondary traumatic stress, and 20.30 ± 5.21 for perceived stress. The levels of compassion satisfaction, burnout, secondary traumatic stress level, and perceived stress were observed to be moderate levels among ICU healthcare workers. None of the respondents scored high on the burnout domain; however, 1 respondent scored high on secondary traumatic stress. Notably, 12 respondents had high scores on the perceived stress scale. A similar study by Hameed et al. reported that healthcare workers in critical care settings had average level of compassion fatigue and compassion satisfaction. Likewise, Alharbi and Alshehry reported that most of the ICU nurses in Saudi Arabia had a moderate level of perceived stress. The factors associated with high compassion fatigue and perceived stress among ICU healthcare workers were determined. The results showed that healthcare workers without children had a higher level of perceived stress ($p = 0.046$). In addition, healthcare workers with higher monthly income (> P60,000) had higher compassion satisfaction ($p = 0.000$) and lower perceived stress level ($p = 0.033$). Higher-income satisfaction and having more children were found to be independent protective variables against severe burnout in a cross-sectional multicenter study done by Wang et. al.

Conclusions: In conclusion, there was a predominance of moderate level of compassion fatigue, perceived stress, and compassion satisfaction among the ICU healthcare workers. This study highlighted the critical insights into the emotional challenges faced by healthcare workers in the ICU.

Table 2 (abstract 000764) Professional Quality of Life and Perceived Stress Scale Scores

	Total (n=96)	
	Mean±SD	
Compassion Satisfaction Level	39.41±5.47 (Median 40)	
Low	--	--
Moderate	62	64.58%
High	34	35.42%
Burnout Level	25.54±5.99 (Median 26)	
Low	31	32.29%
Moderate	65	67.71%
High	--	--
Secondary Traumatic Stress Level	25.10±6.11 (Median 25)	
Low	35	36.46%
Moderate	60	62.50%
High	1	1.04%
Perceived Stress Scale	20.30±5.21 (Median 20.5)	
Low	9	9.38%
Moderate	75	78.13%
High	12	12.50%

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Topic: Health services research and outcome

000765

Predictive value of ICU scores measured before and during NIV for intubation, mortality and prolonged ICU stay and the place of NIVO score

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***765***

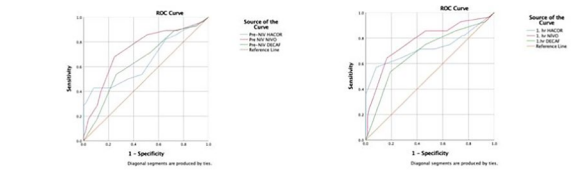
Introduction: Treatment failure increases mortality in patients with respiratory failure who receive noninvasive mechanical ventilation treatment, and predicting success is important. For this purpose, various scores and cutoff values are suggested. Although NIVO (Noninvasive Ventilation Outcomes) Score and DECAF (Dyspnoea, Eosinopenia, Consolidation, Acidaemia and atrial Fibrillation) scores have been shown to predict intubation and mortality in patients with COPD, there are not many studies on their place in the mixed ICU population.

Objectives: The aim of the study is to compare the performances of HACOR(Heart rate, acidosis, consciousness, oxygenation, and respiratory rate) NIVO and DECAF scores in predicting NIV failure, mortality and prolonged intensive care stay in in the mixed ICU patients with respiratory failure and intubation indication.

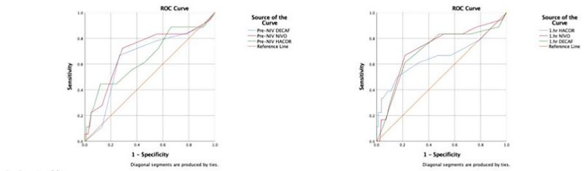
Methods: In the patients included in the study, HACOR, NIVO, DECAF scores were calculated before noninvasive MV and after 1 h and it was evaluated whether they significantly predicted intubation, mortality and prolonged ICU stay (> 14 days). Then, ROC curve analysis was performed and threshold values were calculated.

Results: 100 patients were included in the study. As a result of statistical analysis, it was concluded that all three scores, both before NIV and after the first hour, significantly predicted intubation (DECAF and NIVO > 3.5, HACOR > 5.5) and ICU mortality (DECAF and NIVO > 4.5,

HACOR > 5.5), and only NIVO score (threshold value > 3.5 for after first 1 h) predicted prolonged ICU stay.
Conclusions: In the mixed ICU patient population, HACOR, NIVO and DECAF scores can predict intubation and mortality, and only NIVO can predict prolonged ICU stay.



Intubation



Mortality

Table 1 (abstract 000765) Predictive values of the scores

	cutoff	sensitivity	specificity	p
NIV FAILURE(INTUBATION)				
Pre-NIV				
HACOR	5.5	68	44	0.02
NIVO	3.5	86	50	<0.001
DECAF	3.5	71	47	0.02
Post-NIV 1. hr				
HACOR	4.5	71	57	<0.001
NIVO	3.5	86	53	<0.001
DECAF	3.5	75	53	0.003
MORTALITY				
Pre-NIV				
HACOR	5.5	72	43	0.04
NIVO	4.5	72	85	0.008
DECAF	4.5	68	74	0.045
Post-NIV 1.hr				
HACOR	5.5	61	67	0.04
NIVO	4.5	68	79	0.003
DECAF	3.5	83	52	0.007
PROLONGED ICU STAY(>14 days)				
Post-NIV 1. hr				
NIVO	3.5	78	49	0.008

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Topic: Acute respiratory failure and mechanical ventilation

000766

Rethinking the 7 g/dL hemoglobin threshold for blood transfusion in ICU: analyzing provider and patient determinants of early blood transfusions

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***766***.

Introduction: Transfusion practices in critically ill patients often hinge on hemoglobin (Hb) thresholds [1]. While 7 g/dL is widely recommended as a transfusion trigger, real-world practices frequently diverge, influenced by both patient and provider factors [2, 3]. A deeper understanding of these influences can support more individualized transfusion decisions.
Objectives: The primary objective of this study was to identify patient and provider related factors that are associated with early blood transfusion in ICU patients with hemoglobin levels > 7 g/dL. The secondary objective was to develop a predictive model for transfusion decision-making that incorporates clinical parameters beyond the hemoglobin threshold.
Methods: A retrospective analysis was performed using the eICU Collaborative Research Database [4], which includes diverse ICU admissions across the U.S., and the study cohort was identified from 21 ICUs. Out of 14,984 patients initially considered, 2,098 individuals who had received at least one blood transfusion were selected. Following the exclusion of patients with hemorrhagic shock or acute bleeding and ensuring complete data availability, a final study cohort of 1,546 patients was identified. These patients were then stratified into two groups based on their hemoglobin levels at the time of transfusion: Group 1 with Hb < 7 g/dL and Group 2 with Hb ≥ 7 g/dL. A range of patient variables, including age, PaO2, hematocrit, platelet count, prothrombin time (PT)/ international normalized ratio (INR), activated partial thromboplastin time (aPTT), heart rate, mean arterial pressure (MAP), saturation of arterial oxygen (SaO2), APACHE score, and simplified acute physiology score (SAPS) along with provider variables such as ICU bed count, teaching status, physician specialty, and transfusion timing, were analyzed. The predictive performances of these variables were assessed using multivariate logistic regression analysis and gradient-boosted decision tree (XGBoost) model.
Results: Over half of the patients who received a blood transfusion (55.4%, $n = 857$) had hemoglobin levels at or above 7 g/dL. Multivariate logistic regression analysis using patient and provider variables demonstrated significant associations, achieving an AUC of 94.5%, a precision of 88.9%, and an F1 score of 0.882 (Fig. 1). The XGBoost model further uncovered complex, nonlinear interactions, identifying infusion time, physician specialty, patient heart rate, and hospital bed capacity as the most predictive variables (Fig. 2).
Conclusions: Our study suggests that transfusion practices in the ICU do not uniformly adhere to the 7 g/dL hemoglobin threshold and are

influenced by a range of clinical variables. Predictive modeling offers a promising tool for guiding more individualized transfusion decisions, potentially improving consistency and outcomes. Future efforts should focus on refining and validating these models while accounting for provider behavior and mortality outcomes.

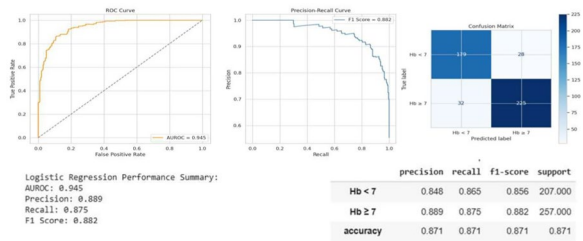


Fig. 1 (abstract 000766) Logistic Regression Model for Predicting Blood Transfusion Practices
This figure illustrates the performance of the multivariate logistic regression model in classifying transfusion decisions using patient and provider variables.

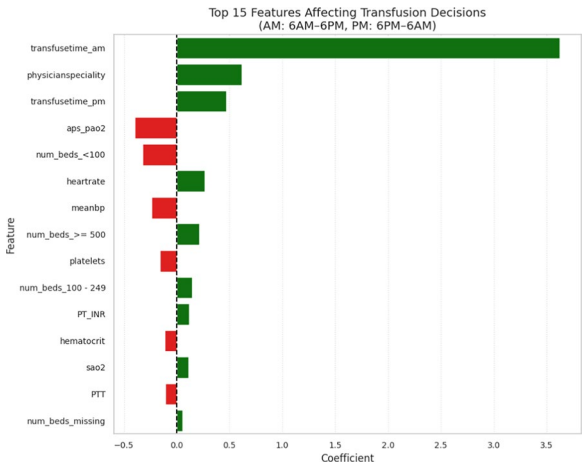


Fig. 2 (abstract 000766) Top predictive features influencing transfusion decisions identified by the XGBoost Model
This figure displays the top 15 features contributing to transfusion decision-making as identified by the XGBoost model.

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Topic: Transfusion and haemostasis disorders

000767

The mechanism of melatonin in promoting FUNDC1-dependent neuronal mitophagy in sepsis-related encephalopathy

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Intensive Care Medicine Experimental* 2025 13(Suppl 1):*767

Introduction: Sepsis-associated encephalopathy (SAE), a critical complication in ICU patients, leads to high mortality and cognitive impairment.
Objectives: Mitochondrial dysfunction and neuroinflammation are central to SAE pathogenesis, yet the regulatory role of FUNDC1 and therapeutic potential of melatonin remain undefined.
Methods: Wild-type, FUNDC1 knockout (KO), and FUNDC1-overexpressing (OE) mice were subjected to LPS-induced SAE. Cognitive function was assessed via Morris water maze and open field tests. Mitochondrial morphology, autophagy markers (LC3-II, Beclin1, P62), pyroptosis-related proteins (NLRP3, caspase-1, IL-1β), and energy metabolism were analyzed using electron microscopy, qRT-PCR, Western blot, and high-performance liquid chromatography. Primary hippocampal neurons and HT22 cells under LPS stimulation were used for in vitro validation.
Results: In SAE mice, FUNDC1 expression was significantly reduced ($p < 0.01$), accompanied by impaired mitophagy (decreased LC3-II and Beclin1, increased P62; $p < 0.01$), mitochondrial dysfunction (elevated ROS, reduced ATP; $p < 0.01$), and enhanced pyroptosis (upregulated NLRP3, caspase-1, and IL-1β; $p < 0.001$). Melatonin treatment significantly restored FUNDC1 levels, promoted mitophagy, and suppressed pyroptosis ($p < 0.001$). FUNDC1 KO mice exhibited severe cognitive deficits with prolonged escape latency, reduced platform crossings, which were ameliorated by melatonin. In vitro, FUNDC1 KO neurons showed reduced viability and mitochondrial membrane potential, both rescued by melatonin (all $p < 0.01$).
Conclusions: This study identifies FUNDC1 as a pivotal regulator of mitochondrial quality control and pyroptosis in SAE. Melatonin mitigates neuronal injury by restoring FUNDC1-mediated mitophagy and inhibiting NLRP3 inflammasome activation, offering a novel therapeutic strategy for SAE.

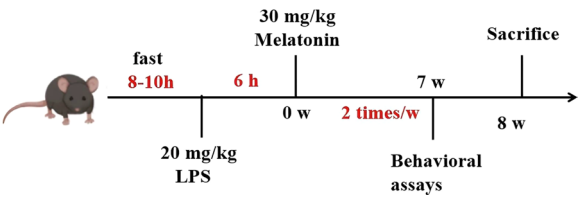


Fig. 1 (abstract 000767) Experimental Flowchart

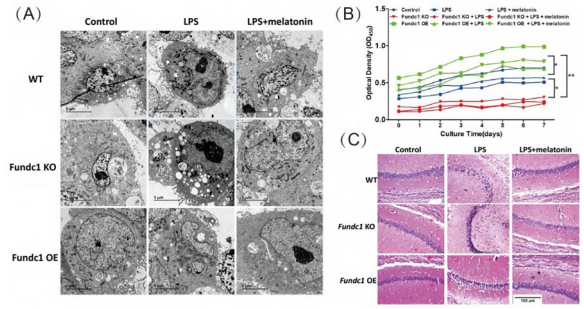


Fig. 2 (abstract 000767) Effects of melatonin on the morphology of hippocampal tissue in mice after Fundc1 knockout. Electron microscopy **A** was used to detect changes in mitochondrial morphology in the hippocampal tissue of mice in each group. MTT **B** was used to detect neuronal viability in mouse hippocampal tissue. H&E staining **C** showing the morphological changes in the hippocampal neurons of the mice in each group caused by melatonin. Scale bar = 5 μm, *$p < 0.05$; **$p < 0.01$, $n = 5$

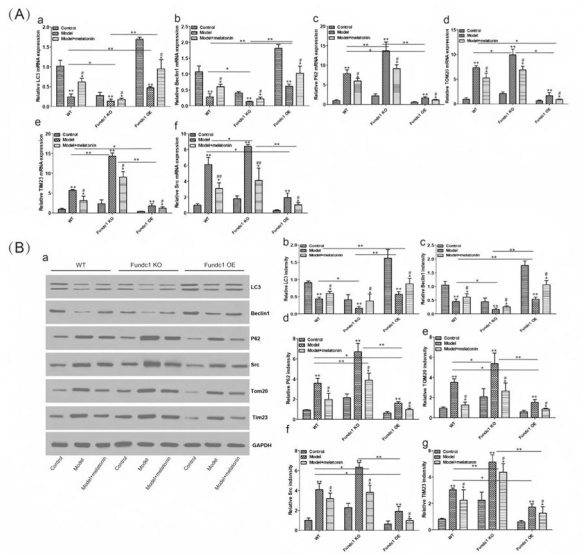


Fig. 3 (abstract 000767) Melatonin promotes autophagy in hippocampal tissue. qRT–PCR **A** was used to detect the mRNA expression of the autophagy-related markers LC3 (a), Beclin1 (b), P62 (c), TOM20 (d), TIM (e) and Src (f). WB analysis of the protein expression of autophagy-related markers; protein expression (a); and the expression of LC3 (b), Beclin1 (c), P62 (d), TOM20 (e), Src (f) and TIM23 (g). *$p < 0.05$; **$p < 0.01$, compared to the Control group; #$p < 0.05$; ##$p < 0.01$, compared to the Model group; ^$p < 0.05$; ^^$p < 0.01$, compared to the Model + melatonin group, $n = 5$

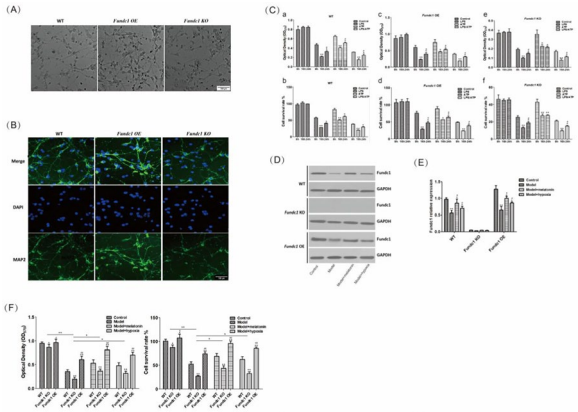


Fig. 4 (abstract 000767) Fundc1 gene knockout and overexpression affect the viability of HT22 cells. **A** Brightfield image of the cell status of each neuron. **B** Immunofluorescence identification of primary neuronal cells by MAP2. **C** MTT detection of the viability of each cell at different time points. Neuronal cells in the WT group (a, b), neuronal cells in the Fundc1 OE group (c, d), and neuronal cells in the Fundc1 KO group (e, f). **D**, **E** Western blot and quantitative reverse transcription polymerase chain reaction (qRT–PCR) results. F MTT analysis of the effect of melatonin on various neuronal cells. Scale bar = 100 μm, *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$, compared to the WT group; #$p < 0.05$; ##$p < 0.01$; ###$p < 0.001$, compared to the Fundc1 KO group

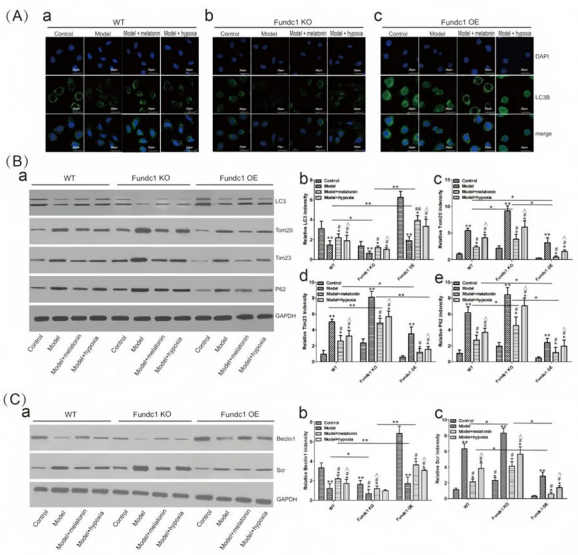


Fig. 5 (abstract 000767) Fundc1 knockdown down-regulates the autophagy level in individual neurons. Immunofluorescence was used to detect the expression of LC3B in neuronal cells in each group (**A**), the WT group (a), the Fundc1 KO group (b), and the Fundc1 OE group (c). Western blot analysis of autophagy-related markers (**B**), protein expression (a) and statistical analysis of LC3 (b), Tom20 (c), Tim23 (d), and P62 (e) expression. Western blot analysis of autophagy-related pathway markers (**C**), protein expression (a), Beclin1 (b), and Src (c) expression. Scale bar = 100 μm, *$p < 0.05$; **$p < 0.01$, compared to the Control group; # p < 0.05; ## p < 0.01, compared to the Model group; ^$p < 0.05$; ^^$p < 0.01$, compared to the Model + Melatonin group, $n = 5$

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39. This research was supported by the National Science Foundation for Young Scientists of China (Grant No. 81901935)

Topic: Neurointensive care

000768

A nomogram model to predict the pulmonary embolism risk related to genetic polymorphisms in pregnant women

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***768***.

Introduction: Pulmonary embolism (PE), the most serious presentation of venous thromboembolism (VTE), is associated with a high rate of mortality and expense [1-3]. Pregnancy could increases the risk of VTE by four to five times.Globally, PE-related deaths during pregnancy account for 3% of all pregnant deaths. Clinical studies on pregnant women with PE are scarce.
Objectives: The aim of this study was to analyze the clinical impact of genetic polymorphisms and establish a predictive model for pregnant women.
Methods: A total of 53 pregnant women with PE were enrolled between September 2022 and August 2023. Using the propensity score matching method, 106 consecutive pregnant women without VTE were 1:2 matched. We categorized the patients into the model group (n = 120) and the internal validation group (n = 39) in a 3:1 ratio. We collected the basic information, relevant laboratory test results, history of previous illnesses, and other clinical information from both the groups and assessed and followed up on the outcome of the treatment of pregnant women with PE.
Results: Our study showed that 4G/4G homozygous mutations increased the risk of pregnant PE fourfold (OR = 4.46, 95% CI = 1.59-12.50, P = 0.004), whereas the 4G allele mutation increased the risk twofold (OR = 2.33, 95% CI = 1.35-4.04, P = 0.002). Statistically significant differences were observed in the recessive (4G/4G vs. 5G/4G + 5G/5G) and additive (4G/4G vs. 5G/4G vs. 5G/5G) models (OR = 3.76, 95 CI% = 1.53-9.28, P = 0.004 and OR = 2.07, 95% CI = 1.23-3.49, P = 0.006, respectively). We established a nomogram to predict the risk of pregnant women with PE by four predictive features including plasminogen activator inhibitor-1 (PAI-1) genetic polymorphisms, international normalized ratio, antithrombin-III activity, and platelet count. The area under the curve (AUC) of the nomogram was 0.821 (0.744-0.898). The AUC of the internal validation group was 0.822 (0.674-0.971). Decision curve analysis revealed that the nomogram has a higher net benefit in the following threshold: probability interval of ≥ 15%.
Conclusions: The PAI-1 4G/4G genotype is an independent risk factor for pregnant women with PE. And the presence of the 4G allele can increase the risk of PE. Constructing a thrombosis risk prediction model for pregnant women in China is important, and our prediction model could serve as a valuable reference for early intervention strategies.

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4. The authors thank the study volunteers and the study staff for their participation. We also thank the assistance of Obstetrics and Gynaecology teams.

Topic: Cardiovascular issues in ICU

000769

Audit investigating the effectiveness of physiotherapy using the Coventry Cardiac Screening Tool (CCST)

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***769***

Introduction: Guidelines for the Provision of Intensive Care Services (1) recommend a physiotherapist to patient ratio of 1:4 in intensive care units (ICU). With a need to direct limited resources, scores to determine patients most at risk of post-op pulmonary complications are being increasingly used for general surgery populations (2). Formerly, on our cardiothoracic ICU, the surgical postoperative screening tool (SPOST) was utilised to screen all postoperative cardiac patients. Clinically, we have identified that the SPOST may; however, overestimate risk in cardiac surgery patients due to high scores related to anaesthesia duration or high initial prophylactic use of oxygen in the immediate post-operative period. The Coventry Cardiac Screening Tool (CCST) was created based on available evidence to simplify risk prediction by replacing numerical values with a straightforward 'Yes/No' assessment for each factor. A previous project was completed to compare the SPOST and the CCST, demonstrating the CCST resulted in a higher proportion of cardiac surgery to be screened out, without adversely affecting re-referral rates. Collectively, as a team, decision was made to replace the SPOST with the CCST for screening cardiac surgery patients.
Objectives: To evaluate the effectiveness and feasibility of using the CCST to identify high risk patients requiring physiotherapy following cardiac surgery.
Methods: All patients undergoing cardiac surgery between 16th December 2025 and April 2025 were included in the analysis. The CCST was completed by all members of the cardiothoracic physiotherapy team on the first postoperative day following cardiac surgery. Patients identified as low risk received nurse led postoperative mobilisation, with no physiotherapy involvement. Patients who were deemed at high-risk received standard physiotherapy including respiratory interventions and mobilisation. Data was analysed to establish proportion of patients that were screened out, alongside the re-referral rate for those patients deemed to be low risk.
Results: A total of 103 patients were included in the analysis, of which 57 (55%) were deemed low risk and screened out of the physiotherapy service. Of these 14/57 (25%) were re referred for physiotherapy due to respiratory complications such as an increase in oxygen requirements or changes on CXR. Interestingly, of those patients deemed to be low risk only 4/14 (29%) met the department standard of mobilising out of bed on the first postoperative day.
Conclusions: The Coventry Cardiac Screening Tool resulted in just over half of all patients being deemed low risk and screened out of the physiotherapy service. Whilst this helped to free up capacity and physiotherapy service delivery, rates of day 1 mobilisation were low in those patients screened out and around one in four were ultimately re referred for physiotherapy input. Future work will aim to improve nursing staff education to support early mobilisation, as well as reviewing the key components of the tool with an aim to improve identification of high-risk patients.

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Topic: Nursing care and physiotherapy

000770

Efferon LPS NEO hemoadsorption in pediatric sepsis patients: a multicenter controlled study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***770***

Introduction: Hemoadsorption (HA) is an adjuvant therapy of life-threatening sepsis. Novel HA device, Efferon LPS cartridge containing a porous polymeric adsorbent with surface-immobilized LPS-selective ligand, has demonstrated therapeutic benefits in adult patients with septic shock (SS) [1].
Objectives: To study feasibility of HA using Efferon LPS NEO, pediatric version of the cartridge, in children with sepsis.
Methods: This multicenter study (NCT05707494) compared the clinically relevant effects of HA in pediatric patients with sepsis. A total of 78 children (aged 1-204 months) were included. Of these, 32 received HA (hemoadsorption group, HAG), while 46 received standard of care (control group, CG). Patients in the HAG received two hemoadsorptions using the Efferon LPS NEO cartridge, with a total cumulative treatment duration of 18 h. The primary endpoint was the effect of HA on the pediatric Sequential Organ Failure Assessment (pSOFA) score.
Results: At baseline (day 0), there were no significant differences between the HAG and CG in the following parameters: mean pSOFA score—10.1 (SD 3.5) vs 9.6 (2.8), respectively; incidence of vasopressor use—78% vs 85%; median vasopressor-inotropic score (VIS) among patients in SS—35 (IQR 14-90) vs 36 (15-86); and mean oxygenation index (PF ratio)—242 (SD 144) vs 236 (174) mmHg. The groups also showed no significant differences in pediatric risk of mortality (PRISM) scores, the incidence of acute kidney injury, the use of invasive mechanical ventilation (IMV), or key coagulation parameters. The primary endpoint was achieved: on day 7, the mean pSOFA was 4.9 (SD 4.6) in the HAG and 7.8 (4.2) in the CG, $p = 0.006$. Patients in the HAG discontinued IMV and vasopressor support significantly faster ($p = 0.003$ and $p = 0.001$, respectively); half of the patients were weaned from IMV by day 6 vs day 37, and off vasopressors by day 3 vs day 9 in the CG. In patients with SS, it was accompanied by a marked reduction in vasopressor requirements by day 3: the median VIS was 0.6 (IQR 0-7) in the HAG, compared with 10 (1-65) in the CG, $p = 0.004$. On day 3, the mean PF ratio was significantly higher in the HAG compared with the CG: 314 (SD 144) vs 238 (99), $p = 0.012$. By day 2, patients in the HAG demonstrated a significant reduction in inflammatory markers concentrations: mean serum C-reactive protein decreased from 189 (SD 110) mg/L to 130 (93) mg/L, $p = 0.003$; median interleukin-6 decreased from 700 (IQR 112-4339) to 42 (11-158) pg/mL, $p < 0.001$; and median tumor necrosis factor-alpha decreased from 19 (4.7-66) pg/mL to 6.0 (1.7-17) pg/mL, $p < 0.001$. The 28-day mortality rate was 35% in the control group and 9% in the HA group, OR = 0.2 (95%CI 0.05-0.74), $p = 0.008$.
Conclusions: Efferon LPS NEO decreased severity of multiple organ failure and improved survival in pediatric sepsis. The promising results of this study support the need for adequately powered RCTs to evaluate the potential benefits of HA.

Reference

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Topic: Sepsis

000771

The utility of controlling nutritional status (CONUT) score as a preoperative risk assessment in patients with rheumatic heart disease

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***771***

Introduction: Rheumatic heart disease (RHD) remains a significant burden in developing nations, often leading to complications such as heart failure and malnutrition. The Controlling Nutritional Status (CONUT) score, a screening tool initially developed for hospitalized patients, has garnered attention as a prognostic marker in various medical conditions. Its parameters—serum albumin, total cholesterol, and lymphocyte count—are derived from commonly requested biochemical and immunologic tests. However, its role in predicting outcomes for patients undergoing surgery for RHD remains unclear. This retrospective cohort study aimed to assess whether the preoperative CONUT score could serve as a risk assessment tool in this population.
Methods: A total of 93 adult patients who underwent valve surgery for rheumatic heart disease were included in this retrospective cohort study. Medical records from the Philippine Heart Center, spanning January 2022 to January 2024, were reviewed. Patients were selected through purposive sampling, with inclusion based on the availability of complete preoperative laboratory results required to compute the CONUT score. Postoperative outcomes, including mortality and complications, were also collected.
Results: The study found that patients who experienced clinical outcomes were significantly older than those who did not, but there were no notable differences in gender, BMI, valve involvement, comorbidities, or laboratory values between the two groups. The mean CONUT score was 3, indicating mild nutritional risk for most patients, but it did not significantly predict clinical outcomes such as prolonged hospital stay, bleeding, or infections. Although four patients died and one experienced a stroke, these outcomes were excluded from the odds ratio analysis due to statistical limitations. Overall, the CONUT score was not a significant determinant of adverse outcomes in this cohort.
Conclusions: Although the CONUT score has demonstrated prognostic value in other medical conditions, its utility in predicting outcomes for RHD surgery was not validated in this study. Other validated screening tools for nutritional assessment may be more suitable in this population. Prompt surgical intervention remains crucial in managing RHD, especially given the association between age and adverse outcomes. However, this study's limitations, including its retrospective design and small sample size, warrant further prospective validation studies in larger patient cohorts to elucidate the role of nutritional assessment in RHD management.

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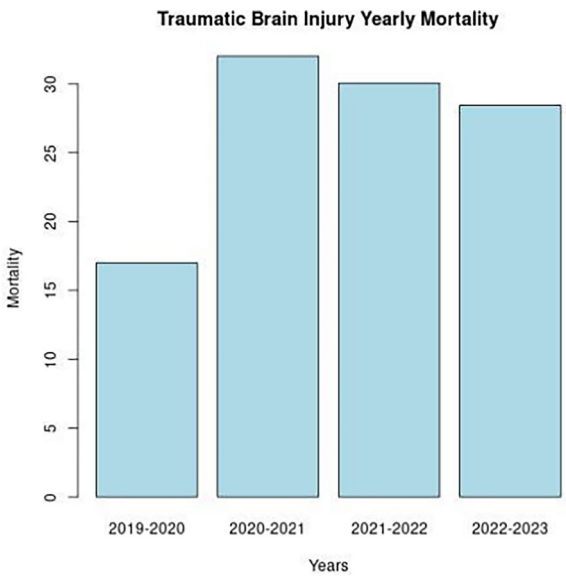
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Topic: Metabolism, endocrinology, liver failure and nutrition

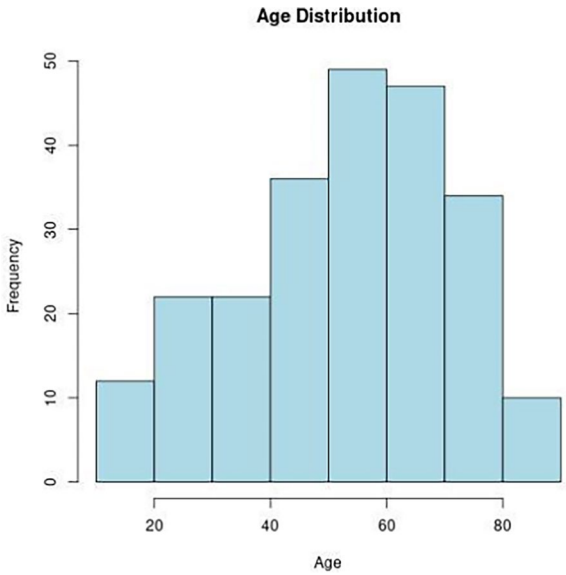
Traumatic brain injury at King's College Hospital Critical Care Centre (2022–2023)

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***772***

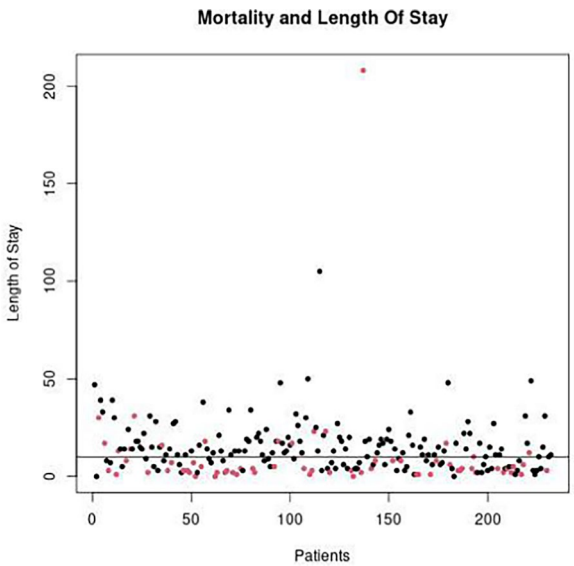
Introduction: Traumatic Brain Injury (TBI) is the commonest cause of death and disability in the under 40's living in high income countries. (1) There are 1.3 million people in the UK living with disability resulting from TBI.(1) The evolution of the TBI whilst in our ICU are poorly understood.
Objectives: This work is an ongoing attempt to describe and understand the progression of the disease during the ICU stay.
Methods: Identified all the patients admitted to our ICU with a diagnosis of TBI from the first of June 2022 to the 31st of May 2023. The data was analysed using R (R-foundation at r-project.org). For numerical data, we used descriptive statistics: minimal and maximum values, medians and means, standard deviations or interquartile range. Comparisons of normally distributed data were done with t-test for probability. For Not normally distributed data we used the Wilkinson test of probability. We established a p value of < 0.05 to demonstrate statistical significance.
Results: 232 Patients with TBI were admitted to our ICU during the observation period. Mean age was 53.91 years (SD 18). 66 patients died during their ICU stay (ICU mortality of 28.4%). The average length of stay (LOS) was 13.84 days (SD 17.57). The LOS between ICU survivors and nonsurvivors was different (means 15.48 vs. 9.68. $p < 0.08$). The average Mean Arterial Pressure (MAP), and the average body temperature, was significantly lower in the nonsurvivors (MAP means 85.07 mmHg SD 9.34 vs. 92.86 mmHg SD 11.91 P = 4.946 e22 − 07, Temperature means 36.53 oC SD 0.59 vs. 37.03 oC SD 0.31. $P = 1.272e - 08$). Nonsurvivors in ICU, had significantly higher average serum glucose, average Na levels, and average PaO2 (Average glucose 8.3 SD 1.21 mmol/dl vs. 7.6 SD 1.21mmol. P = 0.00015, average Na level 148.21 SD 5.88 mmol/L vs. 140.95 SD 4.05 mmol/L. $P = 1.985e - 14$, and average mean paO2 14.67 Kpa SD 4.6 vs. 11.58 Kpa SD 1.46. P = 1.862e − 06). 41 (17.6%) patients in the entire group had Intra Cranial Pressure (ICP) monitors placed. In this group, the average ICP was significantly higher in the patients that died.(23.65 mmHg SD 10.4 vs 13.7 mmHg SD 6.61. P = 0.006). Survivors had significantly higher arterial PH (7.44 SD 0.02 vs. 7.39 SD 0.07. P = 4.119e − 07) and had lower serum lactate concentration (1.00 SD 0.26 vs. 2.06 SD 2.48. P = 0.0010). There was no difference in the PaCO2 levels.
Conclusions: We had an in-ICU mortality of 28.4%, Nonsurvivors are more likely to die within 10 days of ICU admission. The MAP and temperature were lower in nonsurvivors. Glucose, Na and PaO2 were higher in nonsurvivors. Survivors had higher PH and lower lactate concentrations. 17.6% of patients had ICP monitoring in place. Nonsurvivors had higher ICP.



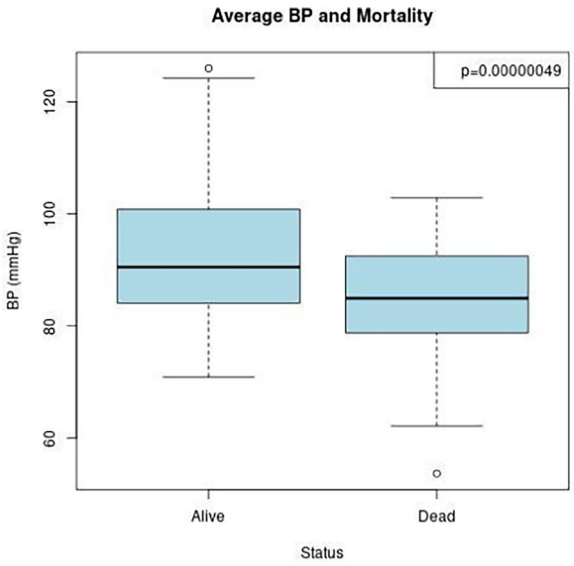
Yearly TBI Mortality at KCH ICU



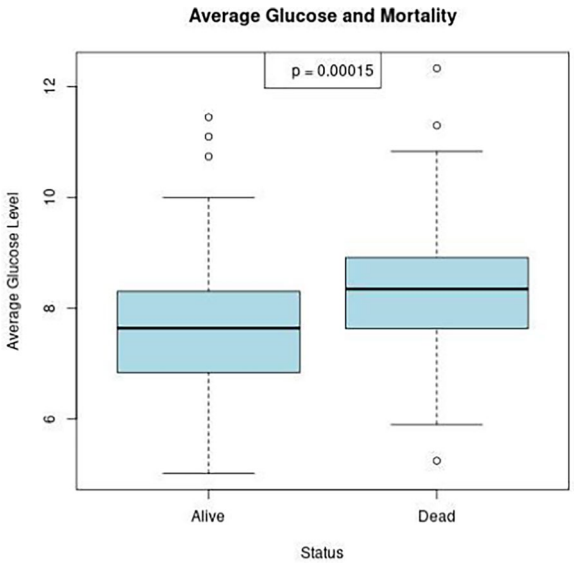
Age distribution
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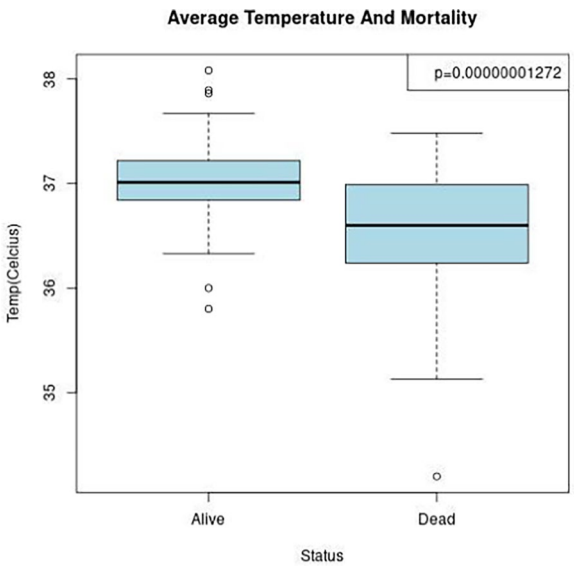
Mortality and LOS



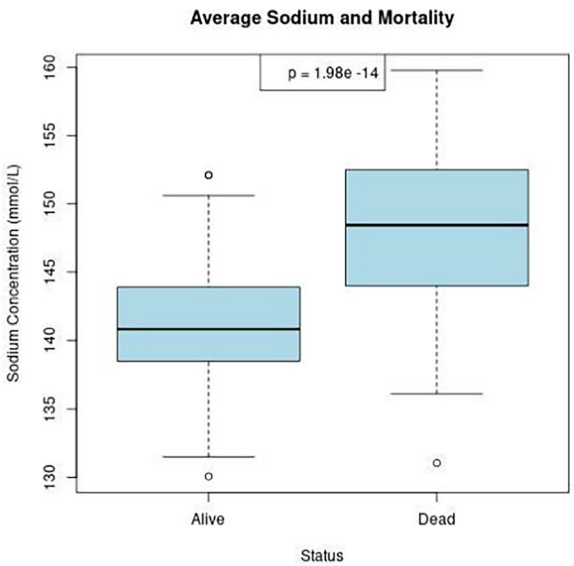
Blood pressure and mortality



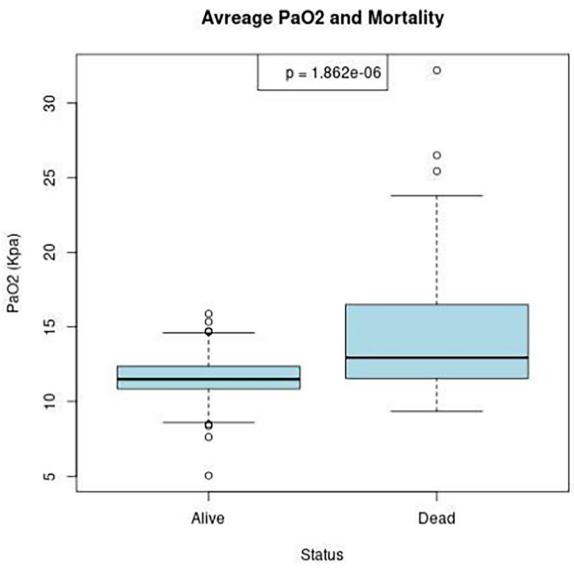
Average glucose and Mortality



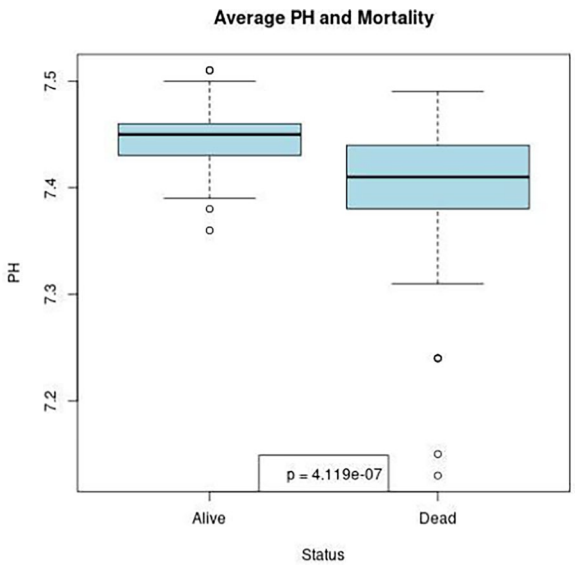
Body temperature and mortality



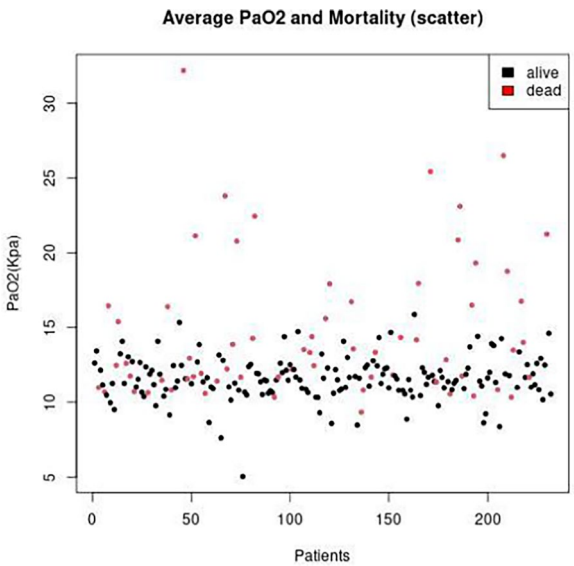
Average Sodium and Mortality



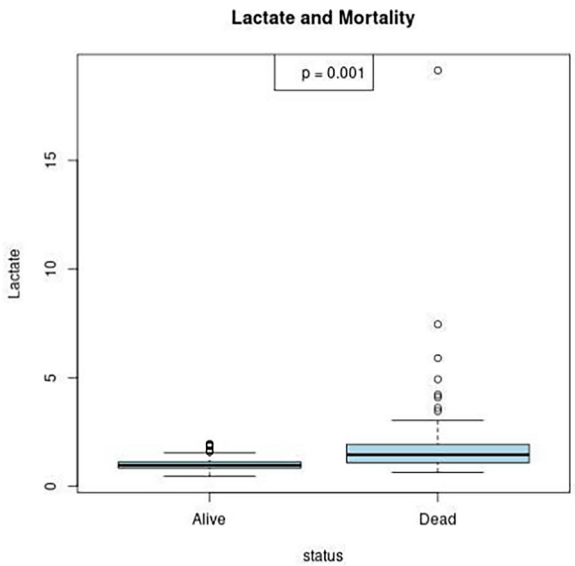
PaO2 and mortality boxplot



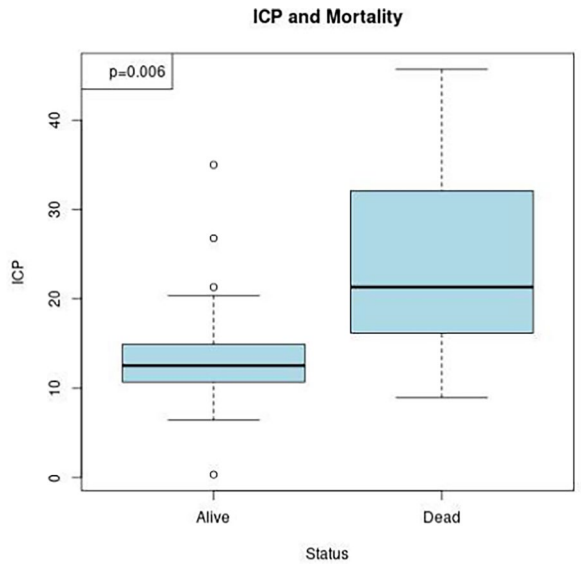
PH and Mortality



PaO2 and mortality scatter plot



Lactate and mortality



ICP and mortality

Table 1 (abstract 000772) XXXX

	Alive	Dead	p
n	166	66	
Age.on.admission (mean (SD))	54.04 (17.87)	53.59 (18.76)	0.864
Gender = Male (%)	98 (59.0)	38 (57.6)	0.955
APACHEII (mean (SD))	13.40 (6.19)	16.48 (6.96)	0.006
ICU.Length.of.Stay..days. (median [IQR])	13.00 [7.00, 19.00]	4.00 [2.00, 8.00]	<0.001
Vent.Free.Days (median [IQR])	6.00 [2.00, 10.00]	0.00 [0.00, 0.00]	<0.001
Avg.Na (median [IQR])	140.83 [138.48, 143.91]	148.45 [143.99, 152.50]	<0.001
Avg.Glucose (median [IQR])	7.64 [6.84, 8.31]	8.35 [7.63, 8.92]	<0.001
Avg.pH..t. (median [IQR])	7.45 [7.43, 7.46]	7.41 [7.38, 7.44]	<0.001
Avg.Lactate (median [IQR])	0.97 [0.84, 1.13]	1.45 [1.08, 1.94]	<0.001
Avg..PaO2..t. (median [IQR])	11.50 [10.84, 12.36]	12.94 [11.56, 16.49]	<0.001
Avg.PaCO2.t. (median [IQR])	5.14 [4.82, 5.37]	5.19 [4.90, 5.50]	0.051
Avg.Temp (mean (SD))	37.03 (0.31)	36.54 (0.59)	<0.001
AVG.BP (mean (SD))	92.87 (11.91)	85.08 (9.35)	<0.001
Avg.ICP (mean (SD))	13.70 (6.61)	23.65 (10.48)	0.001
hadEVD = Yes (%)	38 (22.9)	12 (18.2)	0.542
hadICP = Yes (%)	28 (16.9)	13 (19.7)	0.75
hadLevetiracetam = Yes (%)	120 (72.3)	46 (69.7)	0.815
hadPropofol = yes (%)	135 (81.3)	52 (78.8)	0.797
hadMidazolam = yes (%)	27 (16.3)	22 (33.3)	0.007

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3. None

Topic: Neurointensive care

000773

Comparison of the accuracy of methods for estimating resting energy expenditure in critically ill adult patients admitted to the ICU: a prospective observational study

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*773

Introduction: Assessing resting energy expenditure (REE) is essential for providing appropriate nutritional support to critically ill adult patients admitted to the ICU. This study aimed to evaluate the accuracy and correlation of various equations as clinical support tools by comparing them with REE measured through indirect calorimetry.
Methods: In this prospective study, 14 mechanically ventilated (MV) critically ill patients were admitted to adult intensive care units. We performed 24-h indirect calorimetry to obtain a gold standard EE. Simultaneously, we collected 24-h ventilator-derived VCO2, extracted the respiratory quotient of the administered nutrition. REE and respiratory quotient (RQ) were measured on the 1st, 3rd, 5th, and 7th day of ICU admission. Measured REE values was compared to several equations (Weight-based, Harris-Benedict, Ireton-Jones, and calculation formula EE based on ventilator-derived VCO2) using intraclass correlation coefficients (ICC) and Bland-Altman analysis.
Results: The highest REE was observed on day 5 (32.5 ± 10.3 kcal/kg), followed by day 3 (32.0 ± 19.0 kcal/kg), day 7 (31.3 ± 14.5 kcal/kg), and day 1 (28.8 ± 8.2 kcal/kg). The highest RQ was seen on day 7 (0.70 ± 0.04), followed by day 1 (0.69 ± 0.04), day 5 (0.68 ± 0.04), and day 3 (0.68 ± 0.05). Among the predictive equations, calculation formula EE based on ventilator-derived VCO2 showed more precise and higher correlation with measured REE on all days than the predictive equations (ICC—Day 1: 0.78; Day 3: 0.84; Day 5: 0.74; Day 7: 0.81).

Variables	Day 1		Day 3		Day 5		Day 7	
	REE	ICC95% (CI)	REE	ICC95% (CI)	REE	ICC95% (CI)	REE	ICC95% (CI)
Indirect calorimetry	2052 ± 639		2301 ± 1178		2465 ± 630		2252 ± 929	
calculation formula EE based on ventilator-derived VCO2	1756 ± 556	0.78 [0.47-0.92]	1909 ± 957	0.84 [0.6-0.94]	1948 ± 601	0.74 [0.37-0.9]	2178 ± 1093	0.81 [0.53-0.93]
Weight-based equation	1788 ± 301	0.35 [– 0.12-0.72]	1837 ± 318	– 0.01 [– 0.5-0.5]	1963 ± 350	– 0.04 [– 0.53-0.47]	1875 ± 319	0.04 [– 0.46-0.54]
Harris–Benedict equation	1885 ± 335	0.55 [0.07-0.83]	1915 ± 340	0.02 [– 0.48-0.53]	1933 ± 363	0.19 [– 0.34-0.63]	1916 ± 359	0.09 [– 0.42-0.58]
Ireton–Jones equation	1645 ± 288	0.37 [– 0.16-0.74]	1821 ± 362	– 0.01 [– 0.51-0.5]	1643 ± 288	– 0.06 [– 0.54-0.46]	1638 ± 290	– 0.07 [– 0.55-0.45]

Conclusions: Calculation formula EE based on the ventilator-derived VCO2 is accurate and more precise than frequently used predictive equations. Therefore, this calculation formula may be considered a useful alternative to indirect calorimetry for nutritional planning and management in critically ill patients with mechanical ventilation.

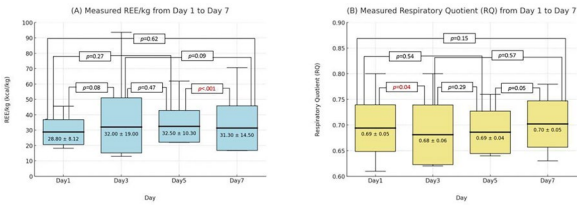


Fig. 2 (abstract 000772) Mean differences of measured resting energy expenditure and respiratory quotient from Day 1 to Day 7. **A** Measured resting energy expenditure (kcal/kg/day); **B** respiratory quotient

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2. Ventilator-derived carbon dioxide production to assess energy expenditure in critically ill patients: proof of concept. Critical Care (2015) 19:370
3. There is no acknowledgement

Topic: Metabolism, endocrinology, liver failure and nutrition

000774

Association between TMP/GFR, hypophosphatemia development and 90 days mortality

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***774***

Introduction: There is a debate in current literature regarding the association between hypophosphatemia (Pi < 2.5 mg/dL) and mortality(1). The kidney handling of phosphate in this setting has been scarcely studied. Fractional Tubular Reabsorption of Phosphate (TRP) is considered a marker of tubular efficiency in phosphate reabsorption. Tubular Maximum of Phosphate to Glomerular Filtration Rate (TMP/GFR), is considered the serum cutoff level below which no urine phosphate excretion is expected(2).
Objectives: Describing the association between TMP/GFR and hypophosphatemia development in critically ill patients, and its association with mortality.
Methods: A prospective observational study in an 18-bed mixed medical-surgical ICU in a tertiary university-affiliated hospital. Urine collection was performed from midnight to 06:00 in the first five days of admission of all patients admitted ventilated to the ICU. Patients whose ICU admission lasted more than 48 h were included. Patients who had hypophosphatemia during their first admission day and patients with urological manipulations were excluded. Urine collection volume, creatinine and phosphate levels were evaluated. Serum creatinine and phosphate were assessed each morning. 6 h Creatinine Clearance (CrCl6hr) and TMP/GFR were calculated. The amount of phosphate and calories provided to the patient were recorded daily. Using time-varying COX regression analysis, the factors associated with hypophosphatemia development and 90d mortality were evaluated.
Results: 145 patients were included in the analysis, 75 (51.72%) of them developed hypophosphatemia during their first five admission days. These patients were younger, had lower APACHE2 score, lower kidney SOFA score, and suffered more from trauma. Their TMP/GFR was lower (Table 1). 90d mortality of patients with hypophosphatemia was lower (21.33 vs 44.28%, p = 0.003). Hypophosphatemia was found to be significantly associated with decreased mortality (HR 0.76, 95% CI 0.58, 0.99) after adjustment to baseline covariates; TMP/GFR was not found to be significantly associated with mortality in such analysis (Fig. 1). Univariate analysis for hypophosphatemia development demonstrated several significantly associated covariates: Age, BMI, hospital LOS before ICU admission, APACHE2, Admission SOFA, Admission category, daily SOFA score, daily CrCl, TRP, and TMP/GFR. Among the significant covariates in the univariate analysis, only TMP/GFR was found significant in the multivariate analysis (Fig. 2).
Conclusions: Hypophosphatemia development after 1 day of ICU admission was found to be associated with decreased mortality. TMP/GFR was the only examined covariate significantly associated with hypophosphatemia, regardless of renal phosphate reabsorption. This might merely reflect the obvious association between phosphate level and TMP/GFR. As no other variable was associated with hypophosphatemia, it might be suggested that hypophosphatemia development is a recovery marker.

Table 1 (abstract 000774) Baseline characteristics

	Patients with hypophosphatemia	Patients without hypophosphatemia	p-value
n	75 (51.72%)	70 (48.28%)	-
Age (yr)	54.67 (33.93, 71.35)	63.32 (51.93, 72.43)	0.006
Male sex	52 (69.33%)	51 (72.86%)	0.64
BMI (kg/m²)	24.69 (22.53,27.93)	26.39 (23.46, 31.15)	0.115
APACHE2	19 (13, 22)	22 (17, 26.75)	0.0006
SOFA	9 (7, 10)	9 (8, 11)	0.02
Kidney SOFA	0 (0,1)	1 (0, 2)	0.001
Admission Category			
Medical	25 (33.33%)	26 (37.14%)	0.011
Surgical	(26.67%)	31 (44.29%)	
Trauma	30 (40%)	13 (18.57%)	
TMP/GFR (mg/dl)			
Day2	1.18 (0.81, 1.68)	2.63 (2.19, 3.71)	0.007
Day3	1.70 (1.29, 2.57)	2.71 (1.96, 3.79)	0.015
Day4	1.46 (1.14, 1.95)	2.94 (2.07, 3.74)	0.009
Day5	1.57 (1.24, 2.22)	2.91 (2.35, 3.63)	0.063

Numerical variables are represented by median (IQR); categorical variables are represented by (n, percentage); BMI—Body Mass Index; APACHE2—Acute Physiology And Chronic Health Evluation 2; SOFA—Sequential Organ Failure Assessment; TMP/GFR—Tubular Maximum of Phosphate to Glomerular Filtration Rate

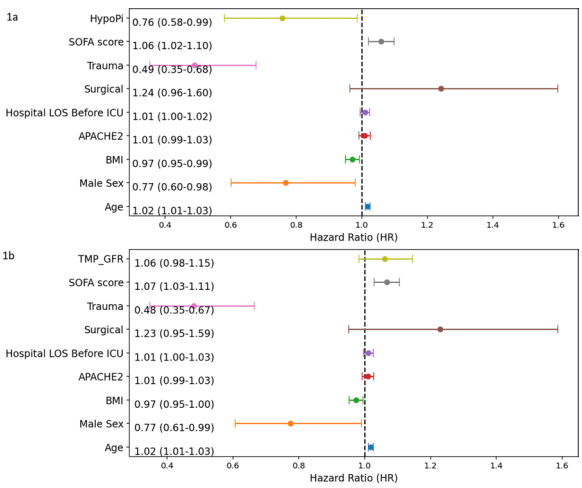


Fig. 1 (abstract 000774) Multivariate Time-varying Cox regression for 90d mortality. Cox regression with hypoPi as explaining covariate. Cox Regression

with TMP/GFR as explaining covariate. HypoPi—hypophosphatemia; SOFA score—Daily Sequential Organ Failure Assessment;; LOS—length of stay; APACHE2—Acute Physiologic and Chronich Health Evaluation 2 score at admission; BMI—Body Mass Index

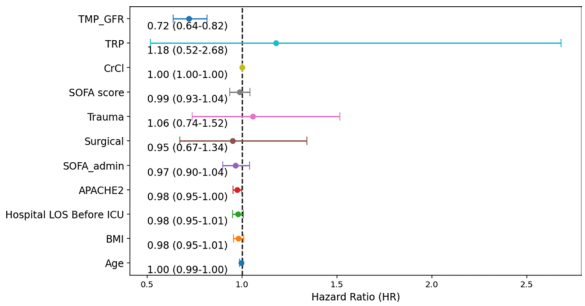


Fig. 2 (abstract 000774) Multivariate Time-varying Cox regression for hypophosphatemia. TMP_GFR—Tubular Maximum of Phosphate to Glomerular Filtration Rate; TRP—Fractional Tubular Reabsorption of Phosphate; CrCl—Creatinine Clearance based on 6 h urine collection; SOFA score—Daily Sequential Organ Failure Assessment; SOFA_admin—SOFA score at admission; APACHE2—Acute Physiologic and Chronich Health Evaluation 2 score at admission; LOS—length of stay

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Topic: Metabolism, endocrinology, liver failure and nutrition

000775

Fibrinogen variants limit endothelial permeability in a rat polytrauma model

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*775

Introduction: Fibrinogen is administered to treat bleeding due to trauma, because it is the precursor of fibrin, which is needed to form a blood clot. However, results on efficacy of fibrinogen are conflicting. Fibrinogen also has other properties, which depends on its isoform. High molecular weight (HMW) form (340 kDa), comprising 60-70% of the plasma concentration. When in the circulation, also other isoforms occur, such as γ′, which comprises around 10% of total circulating fibrinogen. γ′ has other functions then HMW, such as binding to cells as well as some anti-coagulant properties. We hypothesized that fibrinogen therapy would reduce endothelial leakage via decreasing inflammatory cytokines and NETosis in rat polytrauma and those different fibrinogen isoforms have differential effects.
Objectives: To investigate the effect of HMW (wild-type (WT), recombinant), fibrinogen γ′ (recombinant) and standard fibrinogen (mixture of isoforms, represents physiological ratio) on endothelium, inflammation and coagulation parameters in rat poly-trauma model.
Methods: After anesthesia, trauma was inflicted on rats of 350 g by femur fracture and clamping of the gut and liver. Blood was withdrawn to induce shock with a mean arterial pressure of 40 mmHg. After 1 h, rats were randomized to resuscitation with crystalloids supplemented with either fibrinogen standard (Fibryga, Octapharma), fibrinogen WT (Fibriant BV) or fibrinogen γ′ (Fibriant BV), all in a dose of 50 mg/kg. Controls received vehicle. At the end of the experiment, 70-kDa fluorescein isothiocyanate-labeled dextran was injected to determine endothelial leakage. Blood samples were taken to assess markers of endothelial damage, inflammation and ROTEM. Organs were harvested to quantify pulmonary FITC–dextran leakage.
Results: The trauma model was characterized by an increase in lactate, cytokines, markers of endothelial damage, leakage in the lung, and kidney edema. All fibrinogen groups significantly mitigated vascular leakage in the lung compared to the trauma control ($p < 0.01$, Fig. 1) and decreased sVCAM-1 levels as compared to the trauma control ($p < 0.05$). Traumatic injury resulted in an increase in syndecan-1 ($p < 0.05$), which was not seen after fibrinogen administration (all isoforms, Fig. 1). Fibrinogen WT resulted in lower IL-6 levels as compared to trauma ($p < 0.05$). Fibrinogen standard reduced TNF levels as compared to trauma ($p < 0.01$). Both fibrinogen WT and fibrinogen γ′ groups showed a decrease in MPO–DNA complex levels ($p < 0.01$). Fibrinogen γ′, but not the other fibrinogen isoforms, resulted in increased EXTEM CT and lower FIBTEM A10 compared to both sham and trauma ($p < 0.05$, data not shown).
Conclusions: All types of fibrinogens decrease vascular leakage following trauma, associated with a reduction in inflammation and NETosis. Differential fibrinogen isoforms had different effects on coagulation, inflammation, and endothelial function. These findings shed a new light on the role of fibrinogen in trauma and may partially offer an explanation for conflicting findings in the recent trials. Future studies on the efficacy of fibrinogen should consider its pleiotropic functions.

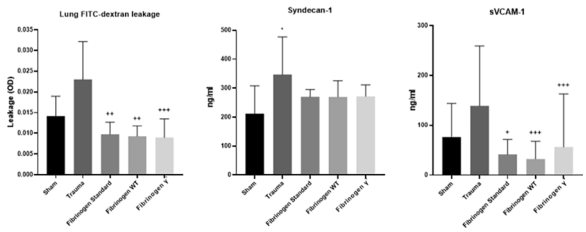


Fig. 1 (abstract 000775) Endothelial permeability markers. Data are represented as mean and SD. *($p < 0.05$); significance as compared to sham. + ($p < 0.05$), + + ($p< 0.01$), + + + ($p< 0.001$); significance compared to trauma

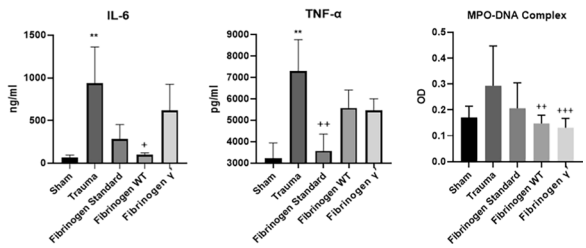


Fig. 2 (abstract 000775) Inflammation and NETosis markers. Data are represented as mean and SD. **($p < 0.01$); significance compared to sham. + (p < 0.05), + + (p < 0.01), + + + (p < 0.001); Significance as compared to trauma

Topic: Trauma

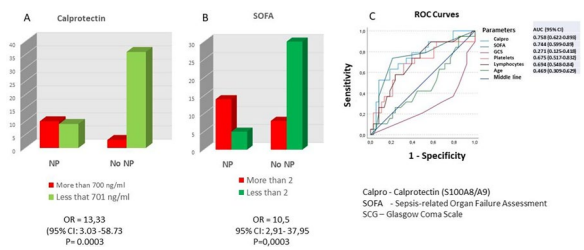
000776

Calprotectin predicts nosocomial pneumonia development in patients with consequences of severe brain damage

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Intensive Care Medicine Experimental 2025 13*(Suppl 1):*776

Introduction: Calprotectin (CP), a heterodimer of S100A8/S100A9 molecules, accounts nearly for 45% of the cytosolic protein of neutrophils. Calprotectin is released upon activation of neutrophils and plays an important role in developing inflammatory responses. Elevated levels of calprotectin have been found in blood plasma of patients with rheumatoid arthritis, COVID-19, sepsis and pneumonia. The predictive value of calprotectin for the development of nosocomial pneumonia (NP) has not been studied.
Objectives: Our goal was to evaluate the informative value of CP as a predictive biomarker for NP in patients with sequelae of severe brain injury who have been treated for the latter pathologies in another hospital and admitted to our hospital with no clinical signs and KT/MRT patterns of pneumonia (Pn).
Methods: The observational study included 297 patients with consequences of severe brain damage and no Pn on admittance; of them, 110 patients were diagnosed with NP later and 187 patients did not develop Pn. The age of patients Me (IQR) was 65 (48-74) years, women 55%, SOFA score on admission, Me (IQR): 2 (1-3). Of these samples, plasma specimens from 58 patients were randomly selected for determining calprotectin concentration on admittance using ELISA. Data were statistically treated (SPSS 27.0), and distribution of variable determined; Fisher exact test, Chi-square statistic, log rank test, ROC analysis and univariate/multivariate regression analysis.
Results: Increased lethality was associated with NP development (n = 19) vs control (patients resistant to NP during hospitalization, $n = 39$): 22% vs 5.%, $P < 0.001$, OR = 4.94 (95%CI: 2.26 to 10.79). On admittance, patients that developed NP later, exhibited increased calprotectin level (ng/ml) compared to control: 705 (470-868) vs 434 (326-596), $p = 0.002$. Fisher exact test showed OR = 13.3(3.03 -58,07) for increased CP and patients who developed Pn after 10 days in the hospital (late Pn vs no Pn, $p = 0.0003$) (Fig. 1A). Similar predictive values were received for SOFA as a predictor on admittance for a late NP development by Fisher test (Fig. 1B). ROC analysis also revealed most increased values for both CP and SOFA (AUC = 0.758 (95% CI: 0.6-0.9), $P = 0.003$, and AUC 0.744 (95%CI: 0.599-0.89), $P = 0.0023$, respectively, Fig. 1C). Univariant logistic regression proved the best prediction for independent predictors, SOFA and CP. However, multivariate logistic regression analysis left only two significant NP predictors, CP and age, with OR = 1.002 (95%CI: 1-1.003), $P = 0.037$, and OR = 1.005 (1.001-1.008), $P = 0.008$, respectively. Finally, bivariate regression (CP and age) revealed only significant link of NP to CP concentration on admittance, with OR = 1.006 (95% CI: 0.97-1.044), $P = 0.037$, while for the age $P = 0.75$.
Conclusions: Data demonstrate a strong trend for CP to serve as a novel candidate biomarker to predict late NP on admittance for patients with consequences of brain catastrophes.



Prognostic value of biomarkers on admittance to predict nosocomial pneumonia: **A**—Calprotectin as a predictor, Fisher test; **B**—SOFA as a predictor, Fisher test; **C**—ROC analysis to compare biomarkers showed significance on univariate logistic regression

Reference
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Topic: Infections and prevention

000777

Effectiveness and safety of the prone positioning maneuver in the immediate postoperative period of cardiac surgery in adults

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Introduction: Evidence regarding the use of the prone positioning (PP) maneuver in acute respiratory distress syndrome (ARDS) during the immediate postoperative period of cardiac surgery is limited.
Objectives: This study aims to analyze the efficacy of the PP maneuver, its complications, and the incidence of mediastinitis in this patient group.
Methods: A retrospective descriptive study was conducted on patients requiring PP in the immediate postoperative period of cardiac surgery from 2004 to 2024. Descriptive statistics and paired numerical comparisons were performed using the Student's t-test, with multivariate analysis via logistic regression and generalized linear models. Statistical analysis was conducted using JASP.
Results: A total of 39 patients requiring PP were analyzed. The mean age was 68 years, and 77% of the patients were male. Risk factors for mediastinitis included osteoporosis (7.7%), chronic obstructive pulmonary disease (15.4%), diabetes (15.4%), antiplatelet use (23%), body mass index (median 26), and internal mammary artery use (30.8%). The pre-existing risk of mediastinitis was moderate, with a median Med-Score 24 of 8 (IQR 6-10). Indications for surgery included aortic dissection (31%), valve surgery (23%), mixed surgery (21%), coronary revascularization (15%), and endocarditis (8%). Forty-nine percent of surgeries were urgent. The mean cardiopulmonary bypass time was 101.6 min, and the aortic clamping time was 64 min. Postoperative infections occurred in 92.31% of patients, with respiratory infections being the most common (76.9%). The most common cause of ARDS was ventilator-associated pneumonia (49%). The median number of PP cycles was 1, with a mean duration of 24 h. Pre-PP PaO2/FiO2 was 75, increasing to 174 at 4 h and 185 at the end ($p < 0.001$). The dosing of vasoactive drugs showed no significant changes before and after PP. Reported PP complications included orotracheal tube obstruction (2.5%), sternal ulcers (2.5%), and pneumothorax (5.12%). Three patients developed mediastinitis, with only one occurring post-PP, in association with sternal dehiscence (2.56%). Mortality was 46%, with no significant difference by cause ($p = 0.068$). Multivariate analysis revealed that higher age and baseline PaCO2 levels were associated with increased mortality ($p = 0.016$ and $p = 0.032$, respectively).
Conclusions: Prone positioning in the postoperative period of cardiac surgery is a safe and effective maneuver, with an incidence of mediastinitis lower than expected for this high-risk group. Mortality was associated with older age and higher baseline PaCO2 levels during PP.

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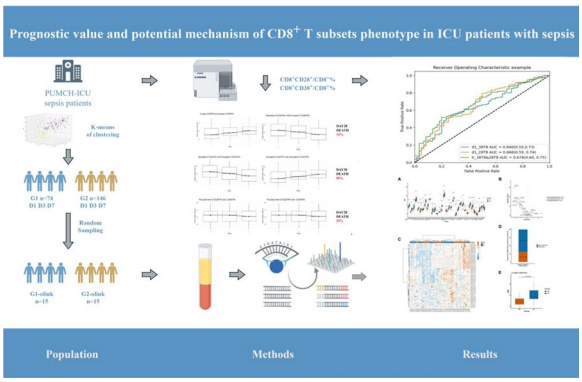
Topic: Perioperative care

000778

Prognostic value and potential mechanism of CD8 + T subsets phenotype in ICU patients with sepsis

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***778***

Introduction: The Global Burden of Disease report reveals that nearly 50 million cases of sepsis occur worldwide annually, with sepsis-related deaths comprising 19.7% of all global fatalities1. From the late twentieth century to the early twenty-first century, clinical trials of sepsis therapies targeting the immune system were largely unsuccessful, partly due to the unaddressed heterogeneity in patients' underlying immune imbalances.2,3. The previous study had shown that changes in various T cell subsets during the onset of sepsis have clinical predictive value 4. The distinct manifestations of CD8 + T cell functional subsets and activation subsets are closely associated with the prognosis of sepsis 5 6. Nonetheless, the role of repeated measurements of CD8 + T cell subsets in predicting prognosis over time, as well as the impact of these indicators on overall T cell function in sepsis patients, remains unclear. Dynamic monitoring may be pivotal in identifying future immunotherapy targets and distinguishing immune-suppressed state. In the present study, we aim to predict the 28-day mortality rate in sepsis patients using cluster analysis based on CD8 + CD28 + /CD8 + % (CD28T8%), CD8 + CD38 + /CD8 + % (CD38T8%), and CD8 + DR + / CD8 + % (DRT8%). In addition, we investigated the specific molecular mechanisms involved using Olink proteomics.
Objectives: Each enrolled patient provided informed consent. ICU patients were included if they met the following criteria (Supplement Fig. 1): aged over 18 years, ICU stay exceeding 24 h, and fulfillment of the 2016 sepsis definition established by the American and European Societies of Critical Care Medicine, which characterizes sepsis as life-threatening organ dysfunction caused by a dysregulated host response to infection7. Organ dysfunction was defined as an acute change of ≥ 2 points in the Sequential Organ Failure Assessment (SOFA) score. Demographic data, SOFA scores, Acute Physiology and Chronic Health Evaluation (APACHE) II scores, chronic comorbidities, laboratory results, sources of infection, and 28-day mortality were extracted from electronic medical records within 24 h of admission. Patients were carefully excluded if they met the following criteria: (1) aged less than 18 years; (2) ICU stay of less than 24 h; (3) pregnant or breastfeeding; (4) receiving glucocorticoids or immune suppressants.
Methods: The study included 220 ICU patients with sepsis (2023.08-2024.05). K-means clustering analysis based on CD8 + CD28 + / CD8 + %, CD8 + CD38 + /CD8 + %, and CD8 + DR + /CD8 + % was used to categorize patients into two groups. Clinical data were collected and analyzed for 28-day mortality prediction. Fifteen patients from each group were selected for Olink proteomics analysis to investigate differentially expressed proteins and conduct functional enrichment analysis.
Results: Using K-means clustering analysis based on CD8 + T cell subset phenotypes, patients were divided into Group 1 (n = 74) and Group 2 (n = 146), with Group 2 demonstrating significantly higher 28-day mortality compared to Group 1 (32.3% vs 17.6%, P < 0.001). Further dynamic trend analysis revealed that patients exhibiting continuously decreasing CD8 + CD28 + /CD8 + % and increasing CD8 + CD38 + /CD8 + % had the poorest prognosis, with a 28-day mortality rate of 50%. The combined measurement of CD8 + CD28 + / CD8 + % and CD8 + CD38 + /CD8 + % showed enhanced prognostic value (AUC = 0.676) compared to individual measurements, indicating the importance of monitoring multiple T cell subset markers. In addition, Olink proteomic analysis identified IL-12Rβ1 as a key molecular mediator closely associated with CD8 + T cell function and activation subsets, providing insights into the underlying mechanism of immune dysfunction in sepsis patients.
Conclusions: CD8 + T cell subset phenotypes serve as important prognostic indicators in sepsis, with IL-12Rβ1 potentially being a key molecule affecting CD8 + T cell function, providing a new potential target for sepsis monitoring and immunotherapy.



The 28-day mortality rate was assessed in relation to the levels of CD28T8% and CD38T8% on different days, categorized by their trend. ROC analysis of parameters predicting 28-day mortality rate. All DEPs in immune response biomarkers between Group 1 and Group 2. **A**, **D** Protein expression in Group 1 (n = 15) and Group 2 (n = 15). **B** Volcano plot visualization of DEPs based on 92 immune-response-related biomarkers. **C** Heatmap illustrating the expression of 92 inflammation-related proteins. **E** Differential levels of IL12RB1 between the two groups

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11. We would like to thank Clinical Biobank, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences, which has received accreditation to ISO 20387: 2018, for the proper preservation and handling of our samples. Besides, we extend our sincere gratitude to BestopCell Co., Ltd. (Beijing) for their assistance with the proteomics section of this article.

Topic: Sepsis

000780

Improving confidence and competency through implementing ICU in-situ simulation: a qualitative improvement initiative at Northwick Park Hospital

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*780

Introduction: In situ simulation (SIM) training in the Intensive Care Unit (ICU) has emerged as an effective method to improve staff confidence and performance in managing ICU emergencies [1]. At Northwick Park Hospital, we implemented ICU simulation in situ as part of a quality improvement initiative to better prepare ICU staff for high-pressure situations [2]. The dynamic nature of ICU highlights the need for realistic training [3]. By replicating real-life emergencies in the actual clinical setting, staff can build confidence, and reinforce decision-making skills, as well as critical competencies [2].
Objectives: The study consists of two phases. First phase evaluates participants' experience and confidence levels before and after SIM sessions for managing ICU emergencies. It aims to assess pre-existing experience, the effectiveness of simulation sessions, areas for improvement, and feedback for future training. Phase two will analyse the sustainability of confidence levels six months post-simulation for specific clinical scenarios.
Methods: We conducted pre- and post-SIM surveys among 36 healthcare professionals—doctors, advanced critical care practitioners (ACCPs), and nurses in a total of four ICU SIM sessions between November 2024 and March 2025. These surveys were designed to identify previous ICU SIM exposure, areas of clinical experience, confidence in managing ICU emergencies, and perceived learning impact. We used Likert-scale responses and open-ended questions for qualitative insights [4]. Responses were anonymized and surveyed using descriptive and thematic analysis [5]. In the second phase, we will gather qualitative feedback via Likert scale response and open-ended questions [4].
Results: The study involved 36 candidates: 17 doctors, 11 nurses, 8 ACCPs on various ICU experience levels: 9 beginners with < 6 months experience, 16 intermediates with 6-36 months experience, and 11 with > 3 years of experience. Only 11 participants had previously taken part in an in-situ ICU simulation (Fig. 1). The average confidence score was 3.6 out of 5 with 4 candidates scoring low on confidence self-assessment scale, 15 reporting neutral and 14 reporting feeling confident prior SIM (Fig. 2). Post-SIM feedback was highly positive, with 72% rating the training as highly effective. Confidence improvement was evident regardless of prior ICU experience. The intermediate group showed the most notable gains, with 8 individuals experiencing a marked increase in confidence. Among beginners, 4 participants felt significantly more confident, and 5 felt moderately improved (Fig. 3).
Conclusions: These results prove the simulation's effectiveness in building confidence and reinforcing learning outcomes across diverse clinical team. The measurable gain in self-reported confidence highlights the value of incorporating simulation into routine training. Particularly for those with limited and intermediate ICU experience.



Fig. 1 (abstract 000780) ICU staff stratification according to their role, experience and previous SIM exposure

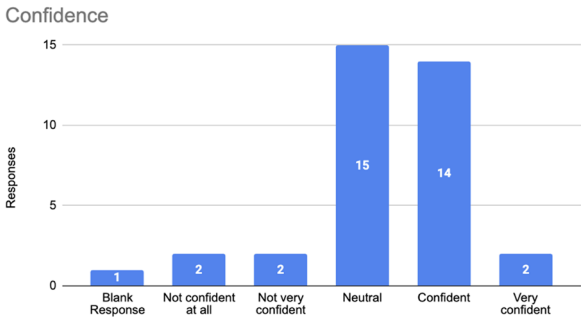


Fig. 2 (abstract 000780) Level of confidence to manage ICU emergency scenario

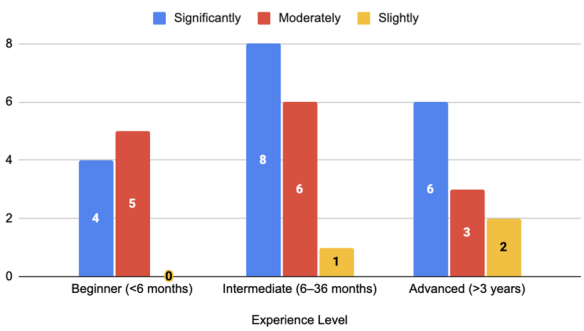


Fig. 3 (abstract 000780) Confidence impact by experience level

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Topic: Health services research and outcome

000781

Safety and efficacy of perioperative low-dose vasopressin in pediatric cardiac surgery

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*781

Introduction: Postoperative hypotension following cardiovascular surgery with cardiopulmonary bypass (CPB), referred to as vasoplegic syndrome, is characterized by decreased systemic vascular resistance with a concomitant increase in cardiac output. The syndrome leads to diminished catecholamine responsiveness and increased capillary permeability, which contribute to an elevated risk of adverse outcomes and significantly impact patient prognosis. Depletion of endogenous vasopressin has been suggested as a potential cause of the syndrome, with particularly low postoperative vasopressin levels observed in children.
Objectives: To assess the effect of perioperative low-dose vasopressin administration on postoperative course and clinical outcomes after pediatric cardiac surgery with CPB.
Methods: This retrospective study was approved by the Japanese Red Cross Medical Center Institutional Review Board (No. 1647). Among 119 children who underwent cardiac surgery with CPB at our institution between September 2021 and January 2025, 60 patients since May 2023 received perioperative vasopressin (Group V), and 59 patients did not (Group C). In Group V, vasopressin was initiated at 0.0003 U/kg/min during CPB weaning, and was discontinued with tapering by the first postoperative day. Milrinone was started at 0.5 μg/kg/min in the operating room and continued in the intensive care unit. Postoperative course and clinical outcomes were compared between the two groups.
Results: One patient in Group C (1.7%) died of low output syndrome due to high pulmonary blood flow, and No one in Group V died. Group V had a lower incidence of tachyarrhythmias (3 [5%] vs. 12 [20%]; $p < 0.05$). There was no difference in the need for peritoneal dialysis and extracorporeal oxygenation, and in the incidence of necrotizing enterocolitis, deep sternal wound infection, and digital ischemia. Fewer patients required epinephrine administration in Group V (5 [8%] vs. 17 [29%]; $p < 0.01$). Inotrope score was lower in Group V. (Postoperative day 0; 5 [3-6] vs. 10 [6-11], day 1; 3 [1-4] vs. 5 [3-8], day 2; 2 [0-3] vs. 3 [2-5], $p < 0.001$) (Fig. 1), and inotrope administration duration was shorter in Group V (3 [1-5] vs. 5 [3-7] days, $p < 0.01$). Total transfusion intake was reduced in Group V (30 [19-44] vs. 54 [35-70] mL/kg, $p < 0.001$)(Fig. 2), and each type of transfusion was also reduced (RBC: 12 [5-20] vs. 25 [17-39] mL/kg, $p < 0.001$, FFP: 12 [8-18] vs. 16 [10-23] mL/kg, $p < 0.05$, Platelet: 4 [0-8] vs. 7 [1-10] mL/kg, $p < 0.05$). Chest tube drainage volume by day 2 was lower in Group V (23 [15-36] vs. 30 [21-48] mL/kg; $p < 0.05$), and drain tube duration was shorter in Group V (3.5 [3-6] vs. 5.0 [4, 5] days, $p < 0.05$).
Conclusions: Perioperative low-dose vasopressin in pediatric cardiac surgery with CPB was safe, and was associated with reduced postoperative tachyarrhythmias, inotrope requirements, transfusion intake and chest drainage duration.

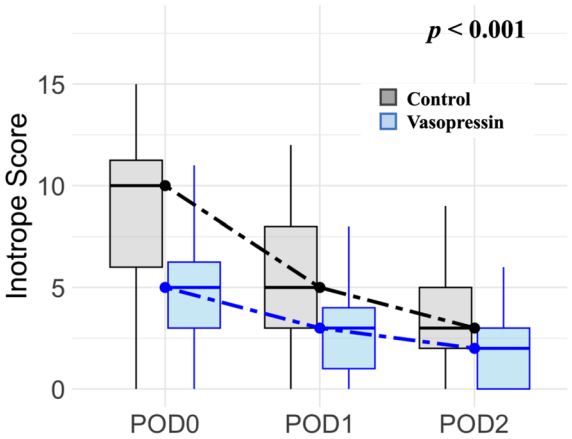


Fig. 1 (abstract 000781) Time course of Inotrope Score
Inotrope score = dopamine dose (μg/kg/min) + dobutamine dose (μg/kg/min) + 100 × epinephrine dose (μg/kg/min).

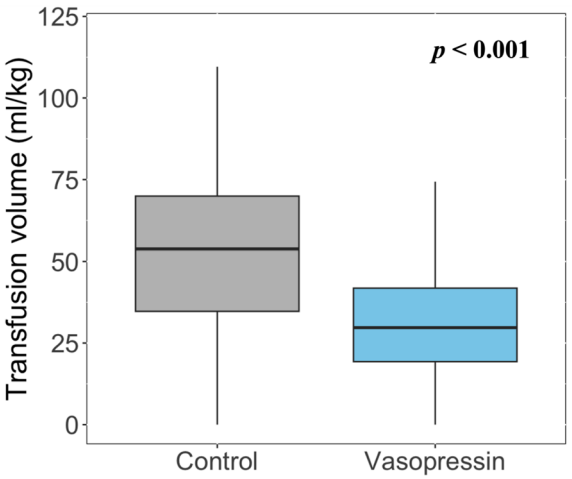


Fig. 2 (abstract 000781) Comparison of cumulative transfusion volume by day2

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Topic: Perioperative care

000782

Outcomes of adult patients with severe TOXoplasmosis in the ICu (TOXIC): a multicenter case series

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***782***.

Introduction: Toxoplasmosis is a life-threatening infection in immunocompromised patients. The direct detection of *Toxoplasma gondii* DNA using PCR has revolutionized the diagnosis of this condition and has been routinely used since almost two decades. While pyrimethamine-sulfadiazine remains the gold standard treatment, alternative regimens are available, offering different routes of administration and safety profiles.
Objectives: We aimed to describe the characteristics and prognosis factors of ICU-admitted patients with PCR-confirmed toxoplasmosis. Specifically, we aimed to study the impact of different treatment regimens on outcomes.
Methods: TOXIC (TOXoplasmosis in the ICu) is a multicenter retrospective case series conducted across 46 European ICUs between January 2012 and January 2023, involving consecutive adult patients with confirmed toxoplasmosis requiring ICU care. Inclusion criteria were 1) age $\geq$ 18 years 2) a severe infection, defined by at least one organ failure (Sequential Organ Failure Assessment sub-score $\geq$ 2) on ICU admission 3) a positive *Toxoplasma gondii* PCR result in any fluid or tissue sample collected within 7 days before or after ICU admission. The primary endpoint was mortality at 90 days after ICU admission.
Results: Among the 210 included patients, the main reasons for ICU admission were neurological failure (n = 119, 56.7%) and respiratory failure (n = 69, 32.9%). The most common underlying conditions were HIV infection (n = 119, 56.7%) with a median CD4 count of 20/µl [IQR 8-44] and hematological malignancies (n = 67, 31.9%), primarily allogeneic hematopoietic stem cell transplantation recipients (n = 50/67, 74.6%). These two populations exhibited distinct clinical, biological and prognosis characteristics. On ICU admission, 58 patients (27.6%) had a concomitant opportunistic infection, with *Pneumocystis jiroveci* pneumonia being the most common (n = 31, 14.8%). Therapeutic management included a pyrimethamine-based regimen (n = 131, 62.7%) or trimethoprime-sulfamethoxazole (n = 67, 32.1%), administered for a median of 42 [IQR 22-58] days. During ICU stay, 143 patients (68.1%) required invasive mechanical ventilation, 90 (42.9%) required vasopressors/inotropes and 47 (22.4%) required renal replacement therapy. At 90 days, 75 (35.7%) patients died. Treatment discontinuation due to toxicity occurred in 11% (22/210) of patients. Overall, ICU and one-year mortality were 29.5% and 47.7%, respectively. Survival analysis is currently underway to identify prognosis factors associated with D90 mortality, including the potential effectiveness of different antiparasitic treatment regimens.
Conclusions: Toxoplasmosis is associated with a dismal prognosis in critically ill patients and impacts immunocompromised patients differently, depending on the underlying condition. Different antiparasitic treatments are currently used, but their relative effectiveness requires further evaluation.

Topic: Infections and prevention

000783

Use of hemoadsorption in acute liver failure as a bridge to liver transplantation. preliminary results

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***783***

Introduction: Hemoadsorptive therapy (HAT) is an extracorporeal blood purification technique designed to remove inflammatory mediators and toxins. In acute liver failure (ALF), where severe dysfunction leads to toxin accumulation and a dysregulated inflammatory response, HAT may represent a promising therapeutic strategy, potentially allowing stabilization of the patient while awaiting liver transplantation (LT).
Objectives: To describe the utility and safety of HAT in ALF patients as a bridge to LT.
Methods: A retrospective observational study was conducted between 2022 and 2025, including ALF patients who underwent HAT prior to urgent LT. HAT was initiated upon poor response to conservative treatment and continued until LT. Demographic, etiological, and analytical variables were collected before HAT and every 12 h until LT. Results are presented as proportions, medians with interquartile ranges, and means with 95% confidence intervals. Statistical analysis was performed using a Wilcoxon test (SPSS software, version 30.0.0).
Results: 11 patients were included, 55% female, with a median age of 34 years (28.5-42). The leading cause of ALF was toxic origin (55%). Median severity scores were: APACHE II 11 (9-23), SAPS II 41 (30-56,5), MELD 42 (37.5-43.5), and King's College Criteria 2 (1-2.5). After listing, LT was performed after a median of 1 day (1-2.5). HAT was maintained for a median of 31.5 h (27.5-43). A statistically significant decrease was observed in creatinine ($p = 0.009$) and lactate ($p = 0.05$) within the first 12 h, with a nonsignificant downward trend in transaminases. Coagulation parameters and pH remained stable. Thrombopenia ($p = 0.02$) occurred after HAT initiation, without hemorrhagic complications requiring treatment interruption.

	Creatinine	GOT	GPT	Lactate	pH	INR	Platalets (10^3)
0 h (mean, median)	1,8(0,5-3,2) 1(0,54-3,12)	4912(643-9181) 2200(1215-7120)	4230(1775-6684) 3020 (1611-7883)	5,9(1,7-10,1) 2,5(2,1-8,9)	7,35(7,24-7,45) 7,41(7,2-7,44)	4,1(2,9-5,3) 3,9(3-5)	157(70-244) 145 (70-219)
12 h (mean, median)	1,4(0,5-2,2) 0,7(0,4-2,4)	3095(932-5257) 1913(548-5774)	3586(1350-5822) 3122 (788-5598)	3,1(1,9-4,3) 2,9(1,6-3,7)	7,39(7,7,33-7,44) 7,4(7,36-7,42)	4,3(2,8-5,9) 3,8(3,2-4,4)	103(67-159) 82 (68-107)
24 h (mean, median)	1,3(0,2-2,3) 0,7(0,5-2)	2085(507-3663) 1508(378-3075)	2799(801-4797) 1972(850-4288)	2,6(1,8-3,4) 2,5(2,2-2,6)	7,38(7,32-7,44) 7,4(7,34-7,43)	4(2,6-5,5) 4(2,7-5,2)	106(40-172) 92(43-117)

Median ICU stay was 8 days (5.5-10), and hospital stay was 20 days (15.5-25). ICU mortality was 9.1%, involving one patient after LT, not attributable to HAT

Conclusions: In this preliminary series, HAT in ALF as a bridge to LT appears safe and potentially useful, with significant improvements in creatinine and lactate. Although thrombopenia was observed—also common in liver dysfunction—no relevant bleeding complications occurred. These findings suggest HAT may help stabilize patients in a critical phase, gaining time until LT. Larger prospective studies are needed to confirm findings and assess prognostic impact.

Topic: Metabolism, endocrinology, liver failure and nutrition

000784

Cystatin C values as an early marker of patients at risk of developing contrast-associated nephropathy (CN)

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***784***.

Introduction: Cystatin C is more sensitive than serum creatinine to rapidly detect acute changes in renal function.
Methods: We analysed the values of Cystatin C as an early marker of CN in a sample of 71 patients at risk of developing this pathology, recording its increase in relation to the time after exposure to a contrast medium (24 h after the performance of a coronary intervention). According to the KDIGO guidelines: the increase (Δ) of Cystatin C greater than or equal to 10% 24 h after exposure to contrast medium (Δ Cys C ≥ 10%) was the best cut-off value for early identification of patients at risk of CN.
Classic definition of CN: exists whenever a relative increase of 25% or more, or an absolute increase of 0.5 mgr/dl or more, in serum creatinine from baseline is present at 48-72 h after exposure to contrast medium.
Results: As shown in the accompanying table, we found that 61% of patients with Cystatin C increases ≥ 10% developed CN according to the classical definition, reaching statistical significance (p = 0.004).
Conclusions: Cystatin C could be a reliable marker for early diagnosis and prognosis of contrast-induced acute kidney injury.
Cys C levels in the first 24 h post-catheterisation in relation to the development of CN

	Contrast-associated nephropathy		
	Classic definition		
	Number of cases n (%).		
	Δ Creatinine ≥ 25% o Δ ≥ 0.5 mg/dl; *n (%)*		
	No	yes	*p*-value
Δ Cystatin C			0,004
< 10%	39 (76)	12 (24)	
≥ 10%	7 (39)	11 (61)	

Cys C levels in the first 24h post-catheterisation in relation to the development of CN.

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Topic: Acute kidney injury and hemofiltration

000785 The addition of glycine to plasma improves endothelial barrier integrity in a rat polytrauma model

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***785***

Introduction: Current resuscitation approaches to treating trauma-induced bleeding includes early transfusion of plasma. In clinical practice, several products are used. Fresh frozen plasma (FFP) is derived from a single donor, while solvent detergent plasmas (SDP) is pooled from multiple donors. Observational studies suggest a benefit from SDP over FFP. An explanation may be that SDP contains a high amount of glycine. Our hypothesis is that a high amount of glycine in plasma is beneficial in trauma via conserving endothelial integrity and decreasing inflammation.
Objectives: To investigate the effect of glycine in plasma product on endothelium and inflammatory parameters in rat poly-trauma model.
Methods: After anesthesia, trauma was inflicted on rats by femur fracture and clamping of the gut and liver. Shock was induced via blood withdrawal, aiming to reach mean arterial pressure of 40 mmHg. After 1 h, animals were randomized to resuscitation with rat plasma or glycine supplemented rat plasma (50 mg/kg). The aim of the resuscitation was maintaning MAP > 65 for 2 h. At the end of the experiment, for determining endothelial leakage, 70-kDa fluorescein isothiocyanate-labeled dextran was injected. Blood and organ samples were taken for determination of markers of endothelial damage, inflammation and organ injury.
Results: Trauma induced endothelial leakage, which was prevented by plasma with glycine, but not by plasma alone. Similarly, in glycine group, syndecan-1 levels were significantly decreased ($p < 0.05$). Both plasma and glycine groups showed decreased sVCAM-1 levels ($p < 0.01$, Fig. 1). Plasma supplemented with Glycine, but not plasma, decreased IL-6 levels significantly compared to trauma ($p < 0.05$). Both plasma ($p < 0.05$) and plasma + glycine groups decreased NETosis markers ($p < 0.01$) and trend towards lower TNF levels (Fig. 2).
Conclusions: Plasma supplemented with glycine confers superior conservaton of endothelial integrity, at least in part via reduction of inflammation marker levels. Results suggest a mechanism underlying the observation of the benefit of SDP plasma on the endothelium in trauma.

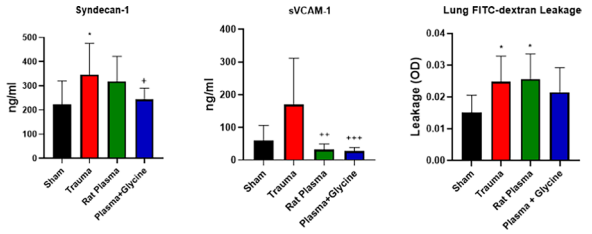


Fig. 1 (abstract 000785) Markers of endothelial damage. Data are represented as mean and SD. *($p < 0.05$); significance compared to sha m. + ($p < 0.05$), + + ($p < 0.01$), + + + ($p < 0.001$); significance compared to trauma

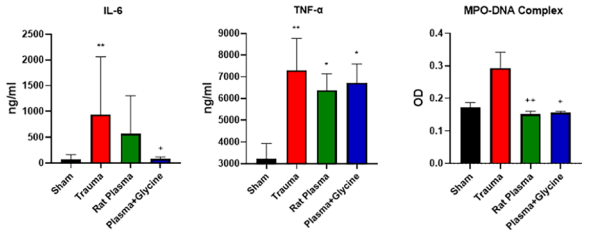


Fig. 2 (abstract 000785) Inflammatory and NETosis markers. Data are represented as mean and SD. *($p < 0.05$), **($p < 0.01$); significance compared to sham. + ($p < 0.05$), + + ($p < 0.01$); significance compared to trauma

Topic: Trauma

000786

Hemodynamic impact of vasopressin and angiotensin II in a mixed cohort of refractory vasoplegic shocked patients

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Intensive Care Medicine Experimental ***2025*** 13(**Suppl 1**):786

Introduction: Vasopressin (AVP) is the second-line vasopressor currently recommended by the Surviving Sepsis Campaign [1, 2] for refractory shock. In the recent years, following the results of the ATHOS-3 trial [3], Angiotensin II (Ang-II) has also emerged as a second-line vasopressor alternative in selected patients to maintain adequate mean arterial pressure (MAP) and reduce norepinephrine (NE) requirement.

Objectives: To compare the kinetics in macro-hemodynamic parameters and the reduction of the NE dosage in patients with refractory shock receiving second-line treatment with AVP or Ang-II.
Methods: Patients older than 18 years, admitted to the ICU between May 2024 and March 2025 with refractory shock, eligible for second-line treatment with AVP or Ang-II, were included in an ongoing prospective registry study. We analyzed clinical, hemodynamic and echocardiographic data collected before the initiation of the second vasopressor infusion and at 3 and 6 h post-administration.
Results: A total of 48 patients were analyzed: 38 received AVP and 10 Ang-II. The median age was 63 (56;72) years, 73% were male, with an APACHE II score at admission of 25 (22;30). Baseline characteristics were comparable between the two populations (Table 1). The NE dose significantly decreased over time in both groups. Specifically, in the Ang-II group, a significant reduction was observed at 3 h (p = 0.01) and 6 h (p = 0.03), while in the AVP group, a significant decrease was noted only at 3 h (p = 0.02). Analyzing the differences between groups at each timepoint, in the first 3 h a reduction in NE dosage was observed, which was significantly greater in the Ang-II group compared to the AVP group [median difference -31.6% (-40; -24) vs. -6% (-36; 0); p = 0.03]. This reduction persisted at 6 h, along with a concomitant decrease in the Vasoactive-Inotropic Score (VIS score), although the difference between the groups was no longer statistically significant. This reduction in catecholamine load was primarily attributed to the addition of the second vasopressor, as reflected by a similar fluid balance in both groups and a simultaneous decrease in the need for resuscitative fluids during the first 6 h (Fig. 1). Meanwhile, MAP and cardiac index remained stable over time.
Conclusions: In this prospective cohort of patients with refractory shock, a significantly greater reduction in NE dosage at 3 h was observed in the Ang-II group compared to the AVP group, while macrohemodynamic parameters remained stable between the two groups. This reduction in NE load was achieved without the need for additional fluid resuscitation and with a similar fluid balance.

Table 1 (abstract 000786) Demographics and clinical characteristics of study population

CHARACTERISTICS	All patients (n 48)	Vasopressin (n 38)	Angiotensin II (n 10)	*p*
Age, median (IQR)	63 (56-72)	63 (56-72)	64 (62-72)	0.73
Male, n. (%)	35 (72.9)	29 (76.3)	6 (60.0)	0.43
BMI, median (IQR)	29.2 (26.0-33.9)	29.2 (26.4-34.9)	27.9 (23.3-31.7)	0.45
Score at admission				
APACHE, median (IQR)	25.5 (22-30-3)	24.5 (20.5-31)	28 (25.3-30)	0.40
SOFA, median (IQR)	12 (10-16)	12 (10-14.5)	13.5 (10.5-16)	0.62
Drug history, n. (%)				
ACEi	11 (23.0)	7 (18.4)	4 (40.0)	0.15
ARB	7 (14.6)	7 (18.4)	0	0.14
Type of shock, n. (%)				
Septic	16 (33.3)	10 (26.3)	6 (60.0)	0.06
Cardiogenic	9 (18.8)	8 (21.1)	1 (10.0)	0.66
Mixed	15 (31.3)	12 (31.6)	3 (30.0)	1.00
Other	8 (16.7)	8 (21.1)	0 (0.0)	0.18
Shock management				
Steroids, n (%)	45 (93.8)	36 (94.7)	9 (90)	0.91
NE dose before starting 2nd vasopressor, median (IQR)	0.92 (0.76-1.57)	0.94 (0.74-1.66)	0.82 (0.78-1.53)	0.75
Dobutamine, n (%)	21 (43.8)	16 (42.1)	5 (50.0)	0.64
PDE, n (%)	11 (22.9)	6 (15.8)	5 (50.0)	0.04
Levosimendan, n (%)	8 (16.7)	6 (15.8)	2 (20.0)	0.66
Vis Score baseline, median (IQR)	95.5 (78-156)	98.5 (78.3-162)	81 (78.3-142)	0.684
Adverse events, n. (%)				
De novo AF	10 (20.8)	9 (23.7)	1 (10.0)	0.34
Acute myocardial ischemia	1 (2.1)	1 (2.6)	0	0.6
AKI	36 (75.0)	29 (76.3)	7 (70.0)	0.68
Need for RRT	21 (43.8)	17 (44.7)	4 (40.0)	1.00
Mesenteric ischemia	11 (22.9)	9 (23.7)	2 (20.0)	0.81
Peripheral ischemia	2 (4.2)	1 (2.6)	1 (10.0)	0.60
Thrombosis	3 (6.3)	2 (5.3)	1 (10.0)	0.58
Outcomes				
ICU death, n. (%)	33 (68.8)	27 (71.0)	6 (60.0)	0.48
WLST, n. (%)	26 (54.2)	20 (52.6)	6 (60.0)	0.35

BMI: body mass index; ACE-i: angiotensin-converting enzyme inhibitors; ARBs: angiotensin II receptor blockers; NE: norepinephrine; PDE: phosphodiesterase inhibitors; AF: atrial fibrillation; AKI: acute kidney injury; RRT: renal replacement therapy; ICU: intensive care unit; WLST: withdrawal of life support

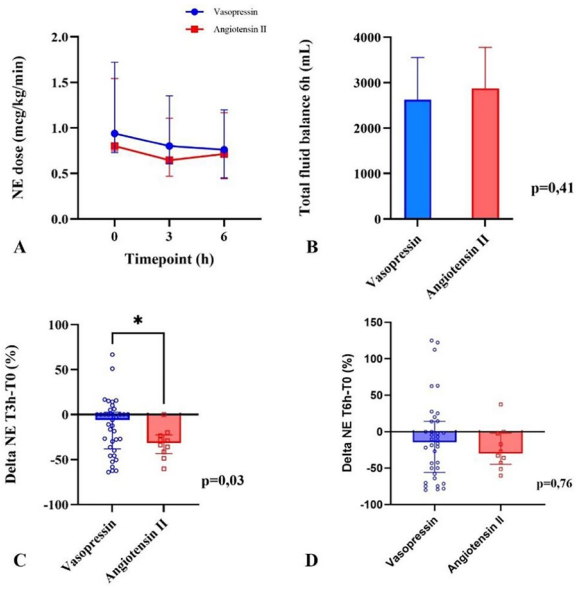


Fig. 1 Trend in NE dosage over the first 6 h (A); total fluid balance at 6 h (B); delta NE between T0 and T3h (C), T0 and T6h (D)

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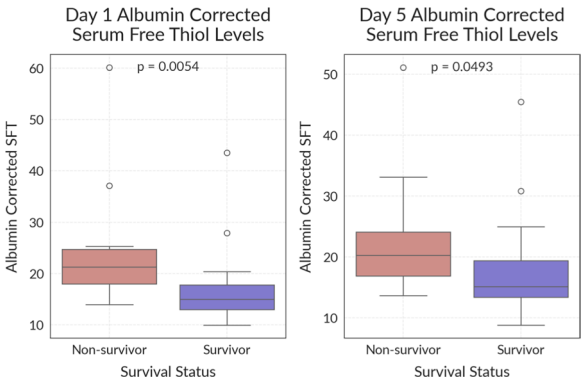
Topic: Cardiovascular issues in ICU

000787

Assessment of serum thiol levels and outcome in patients with sepsis and septic shock: a prospective observational study

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Intensive Care Medicine Experimental 2025 **13(Suppl 1):*787***

Introduction: Progressive oxidative stress is one of the major drivers of dysregulated host response in sepsis [1]. Compounds containing thiol groups (-SH-) buffer the oxidative load and hence, thiol levels have been studied as a potential marker of the body's oxidative stress. Serum albumin is the largest carrier of thiol groups [2]. There is a paucity of literature analysing thiol homoeostasis in patients with sepsis and septic shock [3].
Objectives: To assess serum thiol levels as a biomarker for prediction of outcome in patients with sepsis & septic shock.
Methods: In this ongoing prospective observational study, all consecutive adult patients diagnosed with sepsis or septic shock at ICU admission were included after written informed consent. Data collected included age, gender, SOFA scores at admission and outcome at 28 days of ICU admission (survivor or nonsurvivor). On days 1 and 5 of ICU admission, 2 ml of blood sample was collected for measuring Serum-Free Thiol (SFT, in micromol/L) levels using Ellman's Method [4] and serum albumin (in g/dL). Albumin-corrected SFT was calculated by dividing day 1 and day 5 SFT levels by their corresponding serum albumin levels. $P < 0.05$ was considered statistically significant.
Results: During the study period (July 2024–February 2025), 32 patients met the inclusion criteria. The median age was 42.0 years (IQR: 29.5-63.2). Twenty (62.5%) patients were male. Mean SOFA score at admission was 7.8 ± 3.4. At 28 days of ICU admission, 20 patients (62.5%) survived. **SFT in survivors and nonsurvivors:** At day 1, SFT levels were significantly higher in nonsurvivors compared to survivors (nonsurvivors: median 49.77 [IQR: 45.27-61.85], vs. survivors: median 41.87 [IQR: 37.00-48.76]; $p = 0.011$). Similarly, at day 5, non-survivors exhibited significantly higher levels (nonsurvivors: median 56.79 [IQR: 53.39-67.67], vs. survivors: median 43.55 [IQR: 34.03-52.79]; $p = 0.008$). **Albumin-corrected SFT in survivors and nonsurvivors (Figure):** At day 1, albumin-corrected SFT levels were significantly higher in nonsurvivors compared to survivors (nonsurvivors: median 21.32 [IQR: 18.02-24.74], vs. survivors: median 15.00 [IQR: 13.02-17.80]; $p = 0.0054$). Similarly, at day 5, non-survivors exhibited significantly higher levels (nonsurvivors: median 20.29 [IQR: 16.92-24.13], vs. survivors: median 15.15 [IQR: 13.43-19.43]; $p = 0.0493$).
Conclusions: The interim analysis shows that nonsurvivors have significantly higher levels of both SFT and Albumin corrected SFT than survivors on days 1 and 5 of ICU admission. Elevated thiol levels in nonsurvivors may reflect a compensatory upregulation of thiol production in the initial stages of sepsis [1], representing an effort by the body to counteract overwhelming inflammation and oxidative damage.



Boxplots depicting the distribution of albumin-corrected serum free thiol levels on days 1 and 5, stratified by 28-day outcome, in patients with sepsis and septic shock

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5. No grants were received for the study.

Topic: Sepsis

000790

Applied mechanical power in mechanically ventilated critically ill children: associations with ards severity, ventilation mode, and fluid balance

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:790***

Introduction: Mechanical ventilation in critically ill children is a life-saving intervention, however, it carries the risk for ventilator-induced lung injury (1). Increased applied mechanical power (MP) encompasses all parameters, including volume, pressure, flow, resistance and respiratory rate, and despite the adoption of lung protective strategies, adverse outcomes remain high (2,3).
Objectives: This study aims to investigate the applied MP in critically ill children and its associations with risk factors and PICU outcomes.
Methods: A retrospective single-centre study was conducted in an academic pediatric ICU between 2017 and 2024. All patients < 18 years of age consecutively admitted to PICU, who required invasive controlled mechanical ventilation for at least 24 h were included. Demographic, clinical-laboratory data, fluid balance, mechanical energy and power in constant and decreasing flow ventilation modes, at 0 h-12 h-24 h-36 h-48 h-60 h-72 h time points, along with outcome indicators were recorded.
Results: The study included 235 children {60.4% boys, median age 4.5 (IQR 2-11), PELOD-2 6 (IQR 4-8), Pediatric ARDS N = 87 (37%)}. The 28-day mortality rate was 8.9%, and the PICU length of stay was 10 days (IQR 5-18). Longitudinal trends in constant-flow ventilation modes, showed that MP was lower compared to decreasing flow models ($p < 0.001$). Normalized to ideal body weight MP was significantly higher in the PARDS group compared to the no-PARDS group ($p < 0.001$), at all time points ($p < 0.001$). Also, the severity of PARDS was significantly associated with applied MP in decelerating flow ventilation models (Fig. 1). The same correlation was found in square flow models as well. The total fluid overload at 72 h of PICU hospitalization differed significantly between the PARDS group (7.7% vs. no-PARDS 5.3%; $p = 0.017$). Positive correlations were identified between fluid accumulation and MP at 24 h ($r = 0.207$, $p = 0.002$), 48 h ($r = 0.230$, $p = 0.001$), and 72 h ($r = 0.156$, $p = 0.05$). The duration of mechanical ventilation was independently associated with age ($p = 0.014$), clinical severity (PELOD-II, $p = 0.018$), and the presence of PARDS ($p = 0.025$). Mortality at 28 days was not associated with the applied MP. ROC analysis revealed that clinical severity (AUROC 0.864, $p < 0.001$), multiple organ failure (AUROC 0.768, $p < 0.001$), and *P/F* ratio at 12 h (AUROC 0.633, $p = 0.023$) were significant predictors of 28-day mortality.
Conclusions: Decelerating flow ventilation models, pediatric ARDS and increased severity of PARDS are associated with higher mechanical power. Fluid accumulation is positively correlated with MP. Our data do not show that outcome indices are associated with the applied mechanical power. Further studies on continuous monitoring of mechanical power in controlled modes are needed, in order to clarify the relationship with clinical outcomes in the pediatric population.

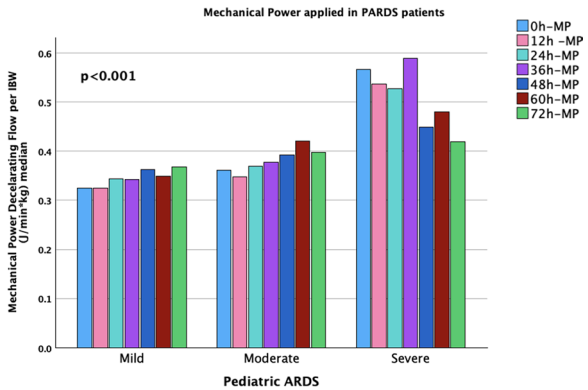


Fig. 1 (abstract 000790) Applied mechanical power differed in children with PARDS ventilated with decelerating flow-controlled mode

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Topic: Acute respiratory failure and mechanical ventilation

000791

Time from randomization to hemoglobin nadir in neurocritical patients: a post hoc analysis of the TRAIN study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:791***.

Introduction: The TRAIN1 study reported that patients with an acute brain injury (ABI) and anaemia randomized to a liberal transfusion strategy were less likely to have an unfavourable neurological outcome than those randomized to a restrictive strategy. However, whether the timing of transfusion can impact this association, remains to be studied.
Objectives: To explore associations between time from randomization to nadir haemoglobin that triggered transfusion and neurological outcomes in ABI patients.
Methods: This is a post hoc analysis of the TRAIN study, a multicentre, open-label randomized clinical trial, conducted in 72 intensive care units across 22 countries, investigating the impact on neurological outcome of two different haemoglobin threshold (7 g/dl vs. 9 g/dl) in ABI patients. We performed a logistic regression analysis adjusted for age, Glasgow Coma Scale (GCS) on admission, group of randomizations (liberal vs. restrictive) and diagnosis (traumatic vs. nontraumatic brain injury) to assess the impact of time to Hb nadir and neurological outcome. Unfavourable neurological outcome was defined as a Glasgow Outcome Scale Extended of 1-4.
Results: Our cohort included 820 ABI patients, most with a diagnosis of traumatic brain injury($n = 486$, 59.3). Median GCS on admission was 5 (IQR 3.00-8.00). The median Hb nadirvalues was 8 g/dL (IQR 7.10-8.40). Patients with unfavourable outcome (median 7.7 IQR 7.0-8.3) had lower nadir Hb levels ($p < 0.001$) compared to patients with favourable outcome (median 8.0 IQR 7.2-8.6) at 6 months. In a multivariable analysis, nadir Hb was not associated with the occurrence of unfavourable neurological outcome at 6 months (OR 1.03; IC (0.83–1.28); $p = 0.79$). Haemoglobin nadir occurred at a median of 3 days (IQR1.00-8.00) after randomization; patients with unfavourable outcome (median 3 IQR 1-8)had a statistically similar duration of the time from randomization to the nadir when compared with patients with favourable outcome (median3 IQR 1-7) at 6 months ($p = 0.13$). Similarly, no independent relationship was observed between timing

of Hb nadir from randomizationand neurological outcome (OR 1.00; IC (0.97- 1.02); $p = 0.77$).
Conclusions: In this post hoc analysis of the TRAIN study, the lowest haemoglobin value and the timing to reach such value were not associated with neurological outcome.

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Topic: Neurointensive care

000795

Improving clinical deterioration recognition by using electronic medical record integrated spot monitors: a pilot study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***795***

Introduction: Early recognition of patient deterioration is crucial in hospital settings, where timely intervention can prevent adverse outcomes (1). Proactive monitoring of vital signs is essential for this purpose. Spot monitors are portable devices that enable healthcare staff to quickly assess key health parameters such as blood pressure, pulse rate, temperature, and oxygen saturation during patient evaluations across various settings.
Objectives: We hypothesized that the implementation of electronic medical records integrated spot monitors (integrated SM) could improve the identification of potentially deteriorating patients in hospital wards by improving the availability of Early Warning Score (EWS) measurement in a tertiary academic centre.
Methods: In this single center, retrospective study, patients > 18 years-old admitted to medical and surgical wards between July 2021 and July 2024, who had at least one EWS calculated during their hospital stay, were included in the study. Our pre–post analysis consists of a comparison of patients whose parameters were registered with manual registration (= pre-technology) vs integrated SM (= post-technology). Primary outcome was time efficiency in the registration of EWS, measured as prevalence of expired EWS. An expired EWS was defined as an EWS registered with more than 30 min delay from the expected time of registration, according to the hospital protocol. Secondary outcomes were the following: prevalence of expired EWS, stratified for type of patient (medical vs surgical), mortality in the wards and need for intensive care.
Results: 757,495 EWS registrations and 34,709 patients were included in the study. A significant reduction in expired EWS was seen after the introduction of the technology: 50,532 (31.9%) pre-technology vs 165,568 (27.6%) post-technology ($p < 0.001$). (Fig. 1). A significant reduction was confirmed stratifying patients for type of admission, medical vs surgical ($p < 0.001$). (*Fig. 2*). There was no significant difference in terms of mortality or admission to the intensive care unit.
Conclusions: Our results show that the use of integrated SM led to a more efficient registration of EWS and a significant reduction in expired EWS. However, no significant changes were observed in clinical outcomes such as mortality or intensive care needs. To our knowledge, no relevant changes in terms of ward staff expertise, training or resources occurred during the study time. More data will be needed to clarify whether integrated SM are a cost-effective investment for hospitals.

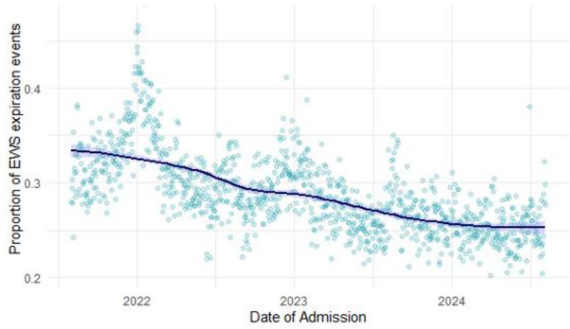


Fig. 1 (abstract 000795) Expired EWS (overall population)

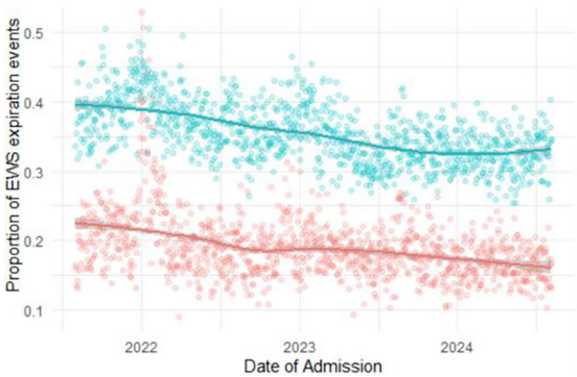


Fig. 2 (abstract 000795) Expired EWS (blue line = medical patients, red line = surgical patients)

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2. None

Topic: Health services research and outcome

000796

Results of extracorporeal oxygenation membrane as a bridge to lung transplantation: four years experience

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***796***

Introduction: The use of extracorporeal membrane oxygenation (ECMO) systems as a bridge to lung transplantation (LT) has increased in the last decade. The aim of this study is to describe the

characteristics, relevant data, in-hospital mortality and mid-term survival of patients receiving ECMO therapy as a bridge to LT.
Objectives: To describe the characteristics, relevant data, in-hospital mortality and mid-term survival of patients receiving ECMO therapy as a bridge to lung transplantation (LT).
Methods: Method: Retrospective study (2020–2024). We included all patients treated with ECMO, either venovenous (V–V) or venoarterial (V–A), as a bridge to LT admitted to ICU. Characteristics, mortality, and survival (30 days and 6 months after LT) were analyzed. Data were obtained from the electronic medical record. Categorical variables: percentage (absolute value); quantitative variables: mean ± standard deviation (SD) or median (IQR 25-75).
Results: Fifteen patients were included. Mean age: 59 ± 9 years, 60% (9) male. Most common comorbidity: pulmonary hypertension (40%; 6). Thirteen patients (86%) were under home oxygen therapy. Before ICU admission, 87% (13) received high-flow oxygen. Median pre-ICU hospital length of stay: 4 (3-14) days.Upon ICU admission, 43% (6) were undergoing pre-transplant evaluation, 35% (5) were on the transplant waiting list, and 26% (4) had not yet started evaluation. All patients were admitted to the ICU due to isolated respiratory failure. Femoro-jugular V–V ECMO was employed in all cases. Six patients (40%) required mechanical ventilation (MV). Half were successfully weaned and two needed to be tracheostomized before LT. During pre-transplant ECMO, 86% (13) reached a RASS of 0, and 66% (10) participated in active physiotherapy. Pre-transplant mortality was 26% (4), with the remaining 74% (11) undergoing transplantation. Median ICU stay before LT: 5 (4-10) days. Median pre-transplant days on MV and ECMO: 4.5 (2-22) and 4 (2-4), respectively.ECMO was used intraoperatively in all cases (11). Three patients left the operating room without ECMO, 7 continued on V–V, and one was converted to V–A ECMO. Post-transplant durations of the ECMO run and MV were 4 ± 3 and 14 (4-74) days, respectively. Nine patients required tracheostomy after LT. One patient died post-transplant.Median ICU stay (pre- and post-transplant): 27 (8-42) days. In-hospital mortality for the full cohort: 33% (5). Survival at 30 days and 6 months post-transplant: 66% (10) and 60% (9).
Conclusions: The survival rate in our cohort (66%) is comparable to published data (50-80%) and demonstrates that ECMO as a bridge to LT in selected candidates is associated with favorable outcomes.

Topic: Acute respiratory failure and mechanical ventilation

000798

Music genre and EEG correlates under varying attentional loads -implications for patient care in intensive care settings

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***798***

Introduction: Music is an emerging noninvasive therapeutic tool in clinical settings, shown to modulate stress responses, enhance mood, and aid pain management, particularly in patients with limited communication. Electroencephalography (EEG) provides a quantitative evaluation of neural activity and can be implemented at the bedside in critically ill populations. This study investigates the dose-response relationship between music and brain activity.
Objectives: The objective of this study is to examine how rhythmic structure and genre influence neural activity, as measured by EEG, in healthy adults. This will allow us to determine the relative influence of different musical elements, providing a more granular understanding of how music interventions can be optimized for critically ill, noncommunicative populations.
Methods: EEG data were recorded from healthy subjects (n = 40) using a 32-channel BrainCap MR system. Subjects listened to four music genres: Western "classical" instrumental, ambient, English popular, and foreign (Spanish, Japanese, French) popular, each with high and low beat salience, and during 3 conditions with varying attentional loads (eyes closed-EC; eyes open-EO; Purdue peg board test-PG) to examine how rhythmic structure influences neural engagement and attention. EEG data were securely stored and analyzed using MATLAB®-based preprocessing for filtering, rereferencing, artifact reduction, and spectral decomposition. Distributions of 26 EEG metrics were examined using medians and interquartile ranges. The Kruskal–Wallis test was used to compare EEG metrics across groups.
Results: Higher Relative Alpha Power in low-attention conditions like ambient music, low salience (median = 1.13), compared to high-attention states like English pop, high salience (median = 3.32), suggests that certain music genres may promote a calm, wakeful neural state, which is valuable for patient comfort in ICU settings. In contrast, elevated Relative Delta Power in high-load conditions and low signal variability may reflect more pathological or sleep-like brain states, indicating that certain music under high cognitive demand could potentially disrupt neural regulation in vulnerable populations. Approximate Entropy (ApEn), a measure of signal complexity, increased as attentional load intensified ($p = 5.6 \times 10^{-5}$; see Fig. 1). This upward trend suggests that more cognitively demanding tasks elicit greater signal complexity in EEG activity. Attentional load, a surrogate for patient acuity, was statistically significant across conditions, underscoring the relevance of ApEn as a potential marker for neural engagement in lab and clinical settings.
Conclusions: The results underscore the importance of tailoring musical interventions in the ICU not only by genre but also by considering beat salience and environmental demand, guiding the use of EEG-informed music therapy in clinical populations and research contexts.

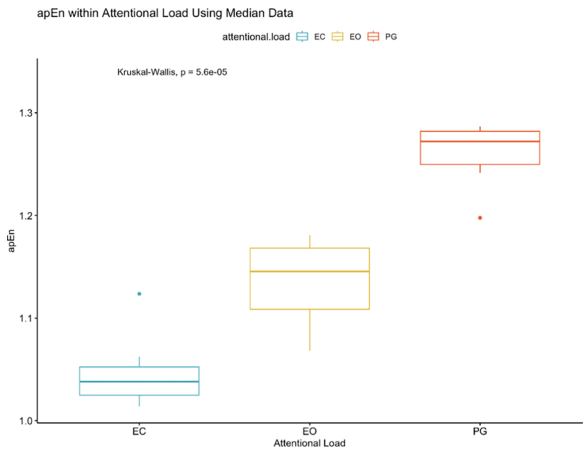


Fig. 1 (abstract 000798) Approximate Entropy (ApEn) increases with attentional load. A Kruskal–Wallis test showed a significant difference across conditions ($p = 5.6 \times 10^{-}5$)

Topic: Health services research and outcome

000799

Comparison of the accuracy of ISS and APACHE II scores in predicting mortality in trauma patients admitted to ICU

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***799***

Introduction: Injury Severity Score (ISS) and the Acute Physiology and Chronic Health Evaluation II (APACHE II) are prominent tools for assessing patient's survivability and predicting mortality (1-4). ISS remains valuable for anatomical injury assessment but shows limitations in capturing dynamic physiological changes (4); whereas APACHE II evaluates 12 physiological variables, age, and previous health status to generate a score that correlates with mortality risk (5).
Objectives: this study delves into the comparison of the accuracy and predictive power of ISS and APACHE II scores in predicting mortality in trauma patients admitted to icu at the largest trauma center in southern Iran during 2024-2025.
Methods: A total of 1427 ICU patients were enrolled in the study. The study group was divided into deceased and survived groups. ISS and APACHE II were calculated and compared using IBM SPSS v27 and MedCalc v22. Median and interquartile range (IQR) and mean and standard deviation (SD) were reported for nonparametric and parametric variables, respectively. Area under the receiver-operator curve (ROC), sensitivity, and specificity were reported for the scoring systems. *P* value under 0.05 was considered significant.
Results: Of 1427 patients, 211 were deceased. Median (IQR) of the patients' age was 50 (31-71). unlike gender, the age of the patients was significantly different among the two groups. 1.8% of patients had acute renal failure. Median (IQR) of GCS, creatinine, FiO2, pH, potassium, sodium, heart rate, mean arterial pressure, respiratory rate, temperature, WBC count and hematocrit are as follows: 12 (6-14), 1 (0.86-1.17), 45% (40%-45%), 7.42 (7.37-7.46), 4.2 (4.2- 4.5), 139 (136-142), 99 (88-111), 102.5 (93-113), 20 (19-23), 37.5 (37-37.8), 12.1 (9-15.9), 36.3% (31.8%-41.1%).The details of ROC analysis of the scoring systems are summarized in Table 1; both of which could predict ICU mortality. APACHE II was significantly more accurate ($P < 0.0001$) (Fig. 1).

Table 1 (abstract 000799) ROC characteristics of the scoring systems

Characteristics	APACHE II	ISS
P value	< 0.001	< 0.001
area under the ROC	0.827	0.604
sensitivity (95% CI)	73.1 (64.9-80.2)	54.5 (47.5-61.4)
specificity (95% CI)	78.5 (75.8-81.1)	61.8 (59.0-64.6)
positive likelihood ratio (95% CI)	3.4 (2.90-3.98)	1.43 (1.24-1.65)
negative likelihood ratio (95% CI)	0.34 (0.26-0.45)	0.74 (0.63-0.86)

Conclusions: As demonstrated in this study, both APACHE II and ISS were capable of predicting mortality in trauma patients admitted to ICU. APACHE II showed a higher accuracy than ISS, which is aligned with previous studies, in which both systems showed proper sensitivity and specificity, but APACHE II's inclusion of physiological variables gave it an edge in ICU mortality prediction; nevertheless, ISS demonstrated stronger performance in polytrauma cases with multiple severe injuries (4, 6, 7). the accuracy and availability of APACHE II makes it a proper tool for risk assessment among ICU patients, especially in trauma setting. Further meta-analysis and cohort studies are required to confirm these findings. Furthermore, using machine learning and advance wearable monitoring devices that measure vital signs, trauma scoring systems can reduce the mortality and morbidity risk of trauma patients.

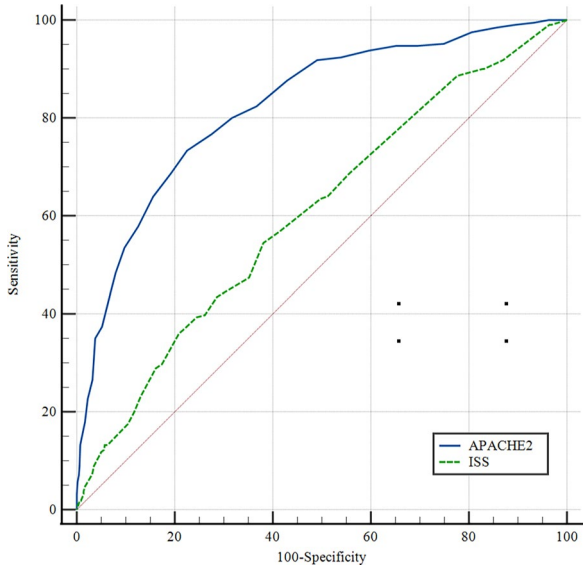


Fig. 1 (abstract 000799) Receiver-operator curve of the ISS and APACHE II scores

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8. Not applicable

Topic: Trauma

000800

A Europe-wide survey on palliative care and law perception [ClinicalTrials.gov ID: NCT06245525]

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:800***

Introduction: Studies reported variation in end-of-life (EOL) practices and legislation across European intensive care units (ICUs) [1-3].
Objectives: As part of the Enhancing Palliative Care in ICU (EPIC) project, we conducted a Europewide survey to address the following questions: (1) "How much of ICU everyday practice is palliative care (PC) and how is it practiced?"; and (2) "How do clinicians perceive the medico-legal framework for therapy limitations, patient autonomy and EOL discussions with patient/family?
Methods: A descriptive, open, anonymous survey with 180 questions was administered to ICU healthcare professionals (HCPs). HCPs were invited via e-mail, and social media channels of the European Society of Anaesthesiology and Intensive Care. Questionnaire was set up at a website using LimeSurvey. Survey database was hosted by CHARITE, Berlin. A sample of ≥ 500 HCPs from > 20 European countries was targeted. Participants provided data on their age, gender, religion, country, professional focus/grade, and ICU type/number of beds. Countries/study data were grouped according to Northern, Central and Southern Europe.1 Participants shared their perceptions of (1) PC practice (i.e. physical/psychosocial aspects of care, EOL communication/planning, family role/support, and system-level support); (2) laws pertaining to advance directives, terminal analgesia/sedation, treatment limitations, euthanasia, and EOL decision-making; and (3) specific EOL practice elements of EOL practice score [3]. Responses were graded by + 1 when positive and by 0 when negative, thereby enabling determination of primary outcomes, i.e. the PC/legal and EOL practice scores. Data analyses included comparisons of participant/ICU characteristics, and PC/legal/EOL practice scores among Northern, Central and Southern Europe. Predictors of high PC/legal scores (defined as positive response-rates ≥ 2/3 of total corresponding responses) were determined by generalized estimating equations (GEE) analyses.
Results: 518/860 (60.2%) HCPs from 40 European countries responded to all survey sections. HCPs' professional focus/grade and numbers of ICU beds differed among European regions (P = 0.005 to < 0.001). Median PC, legal and EOL practice scores were, respectively, 4-6%, 35-75% and 29% higher in Northern compared to Central and Southern Europe (P < 0.001) (Table 1). Predictors of high PC score were European region [Northern vs. Southern, odds ratio (OR) = 2.15, (95% confidence interval:1.20-3.86)] and EOL practice score [OR = 1.18 (1.12-1.25)] (P = 0.01 to P < 0.001). Predictors of high legal score were age [OR = 1.07 (1.05-1.09)], gender [OR = 0.51 (0.31-0.83)], religion [OR = 1.58 (1.33-1.87)], European region (Northern vs. Southern) [OR = 2.71 (1.36-5.44)], professional grade [OR = 0.75 (0.56-0.99)] and EOL practice score [OR = 1.21 (1.13-1.28)] (P = 0.046 to < 0.001).

Table 1(abstract 000800) Results on primary outcomes

		Region of Europe			
	Total	**Northern**	**Central**	**Southern**	***P* value**
Palliative care score, median (IQR)*	23 (20-25)	24 (21.5-25)	23 (20-25)	22.5 (18.5-25)	< 0.001
Legal score, median (IQR)**	13 (4.5-28.5)	25.5 (17.5-32.5)	16.5 (6.5-31)	6.5 (2.5-18)	< 0.001
EOL practice score, median (IQR)	5 (2-9)	7 (4-10)	5 (2-9)	5 (1-9)	0.003

EOL, end-of-life; *, **: maximum possible respective values: 27, 39

Conclusions: Perceptions of PC practice were strikingly similar across Europe. The frequent absence of a clear EOL legal framework was evident, especially in Southern Europe. Future studies should assess the interplay between PC awareness/practice and EOL legislation.

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4. We thank Torsten Schroeder for his valuable help
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Topic: Ethics and end of life care

000801

Impact of airway pressure release ventilation on right ventricular function in ARDS: a randomized controlled trial

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:801***

Introduction: Acute respiratory distress syndrome (ARDS) is a prevalent and life-threatening condition in the intensive care unit (ICU). Despite advances in mechanical ventilation management, the mortality rate of ARDS remains relatively high [1, 2]. Right ventricular dysfunction (RVD) is a severe complication that often develops as a secondary manifestation of ARDS. Previous studies have demonstrated an approximate prevalence rate of 20-50% for acute RVD in ARDS patients, which is associated with worse organ function and higher mortality compared to patients with normal right ventricular function [3-5]. The implementation of airway pressure release ventilation (APRV) has been used in patients with ARDS for over three decades [6, 7]. Research has shown that APRV facilitates alveolar recruitment and significantly improves oxygenation in patients with ARDS by maintaining high airway pressure (Phigh) during inspiration and briefly releasing pressure during expiration. This mode helps optimize both lung ventilation and perfusion [8-10]. However, there is currently no evidence to suggest that APRV can reduce mortality in ARDS patients. Owing to the elevated mean airway pressure and increased intrathoracic pressure associated with APRV, concerns remain regarding its potential impact on right ventricular function and hemodynamics, which limits its clinical application. Moreover, it remains unclear whether APRV that is not accompanied by spontaneous breathing affects right ventricular function. Animal experiments have shown that APRV can improve systemic blood flow and organ perfusion during

spontaneous breathing, indirectly suggesting that it may improve cardiac output and protect the right ventricle. However, there is a lack of research on whether APRV affects right ventricular function in ARDS patients, especially in the early stages of ARDS, when deep sedation and even neuromuscular blocking agents are administered to avoid spontaneous breathing. In this study, we aimed to investigate the impact of APRV on right ventricular function in patients with moderate to severe ARDS during the early stage of mechanical ventilation using transthoracic echocardiography (TTE), compared to low tidal volume (LTV) ventilation.

Objectives: To evaluate the impact of APRV compared to LTV on the incidence of RVD in patients with moderate to severe ARDS during the early phase.

Methods: Patients diagnosed with moderate or severe ARDS according to the 2014 Berlin definition and anticipated to require mechanical ventilation for more than 48 h were allocated to either the APRV or LTV group for ventilation. Baseline data, including demographics, hemodynamic parameters, ventilator settings, respiratory mechanics, arterial blood gas analysis results, and echocardiographic data, will be collected from the enrolled patients. Echocardiographic data, hemodynamic parameters, ventilator settings, respiratory mechanics parameters, and arterial blood gas analysis results will be reassessed and recorded at 24 and 48 h after enrollment. The primary outcome was the incidence of RVD at 24 h after enrollment. The secondary endpoints included hemodynamic parameters, oxygenation, respiratory mechanics, and clinical outcomes.

Results: 60 patients were included and randomized to the APRV or LTV ventilation group (30 per group). APRV was not associated with an increased incidence of RVD compared to the LTV at either 24 h [23.3% (7/30) vs. 36.7% (11/30), respectively; $P = 0.398$] or 48 h [20.0% (6/30) vs. 26.7% (8/30), respectively; $P = 0.760$]. By 24 h, the APRV group demonstrated improved oxygenation (PaO2/FiO2 ratio: 280.20 ± 102.67 vs. 210.42 ± 68.19, $P = 0.003$), with this advantage persisting at 48 h (295.00 ± 94.56 vs. 233.42 ± 67.93, $P = 0.005$). While no spontaneous breathing was observed in either group at 24 h, the APRV group demonstrated significantly higher spontaneous breathing rates by 48 h (53.3% vs 26.7%, $P = 0.035$). Regardless of spontaneous breathing status, the incidence of RVD did not differ significantly between APRV and LTV groups.

Conclusions: Compared with conventional LTV, APRV in patients with moderate to severe ARDS did not increase the incidence of right ventricular dysfunction or compromise hemodynamic stability.

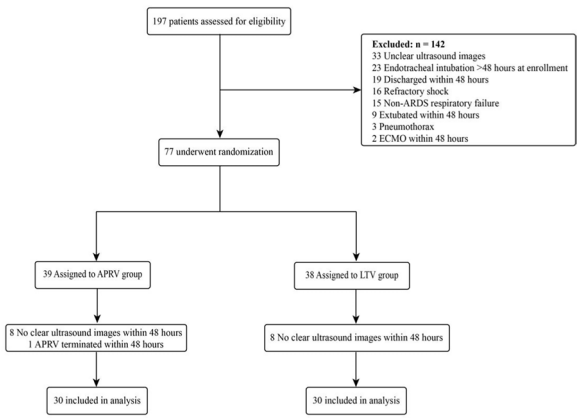


Fig. 1 (abstract 000801) Flow chart of the study protocol. APRV, airway pressure release ventilation, ECMO, extracorporeal membrane oxygenation, LTV, low tidal volume ventilation

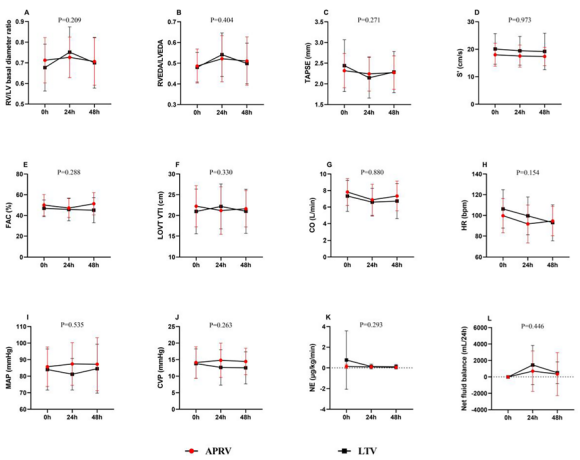


Fig. 2 (abstract 000801) Transthoracic ultrasound parameters and hemodynamics parameters at baseline, 24 h and 48 h. P values were calculated by repeated-measures analysis of variance. A. right to left ventricular basal diameter ratio, B. right ventricular end-diastolic area/left ventricular end-diastolic area, C. tricuspid annular plane systolic excursion, D. tricuspid annular plane systolic velocity, E. right ventricular area change, F. left ventricular outflow tract time velocity integral, G. cardiac output, H. heart rate, I mean arterial pressure, J. central venous pressure, K. norepinephrine, L. net fluid balance. All parameters and variables were compared between the two groups at baseline, 24 h and 48 h. A two-sided P value < 0.05 was considered statistically significantly different

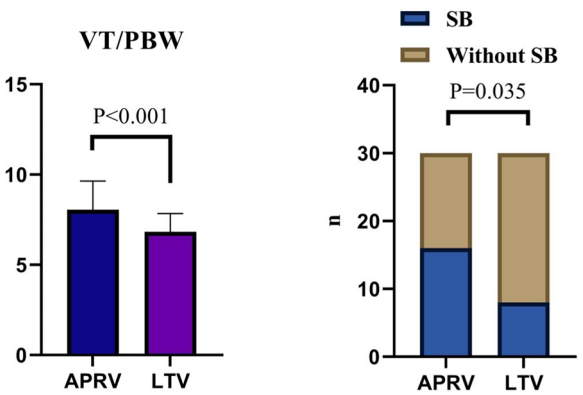


Fig. 3 (abstract 000801) Temporal changes in RVD incidence during APRV and LTV ventilation

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11. The authors declare no specific funding for this study.

Topic: Cardiovascular issues in ICU

000802

Characterization and outcomes of low cardiac output syndrome in the immediate postoperative period of cardiac surgery: a cohort study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:802***.

Introduction: Low cardiac output syndrome (LCOS) remains a frequent and severe complication following cardiac surgery, associated with poor outcomes1. A 2012 consensus2 defined different LCOS subtypes based on severity and clinical presentation.
Objectives: To describe the characteristics, management, and outcomes of patients developing LCOS in the immediate postoperative period after cardiac surgery, and to analyze differences between its subtypes.
Methods: We performed an observational study using a prospectively collected database of adult patients admitted to the ICU after cardiac surgery between February 2022 and October 2023. Demographics, preoperative status, surgical features, and ICU outcomes were recorded. LCOS cases were identified and classified into clinical LCOS, monitored LCOS, or cardiogenic shock according to the 2012 consensus. Statistical comparisons were made using ANOVA or Kruskal–Wallis for continuous variables and chi-square tests for categorical variables.
Results: Of 594 patients, 128 (21.5%) developed LCOS: 49 clinical (38.3%), 13 monitored (10.2%), and 66 cardiogenic shock (51.6%). Overall, 63% were male; 65% had hypertension, 25.4% diabetes, and 56.6% dyslipidemia. Most patients were NYHA class II (61.5%) or III (25.8%), with a median LVEF of 59% (IQR 50-64) and median EuroSCORE II of 2.3 (IQR 1.28-4.36). Most common surgical procedures included CABG (22.6%), valve replacement (17.2%), and aortic surgery (10.9%), with a median CPB time of 134 min (IQR 103-176). Patients with LCOS had significantly longer ICU (7 vs 3 days, $p < 0.001$) and hospital stays (16 vs 10 days, $p < 0.001$), and higher mortality ($p < 0.001$) (Table 1). Among LCOS subtypes, cardiogenic shock patients required longer mechanical ventilation (11.25 vs 2.09 vs 2.16 days, $p < 0.001$), higher norepinephrine doses (0.66 vs 0.27 vs 0.29 mcg/kg/min), more vasopressin use (85.7% vs 15.4% vs 12.2%, $p < 0.001$), and higher dobutamine doses (10.83 vs 8.18 vs 6.8 µg/kg/min, $p < 0.001$). They also showed higher rates of renal failure requiring renal replacement therapy (50% vs 15.3% vs 8.8%, $p < 0.001$), longer ICU stay (10 vs 8 vs 5 days, $p < 0.001$), and higher mortality (24.6% vs 0% vs 4.1%, $p = 0.003$) (Table 2).
Conclusions: LCOS is a prevalent complication after cardiac surgery and is associated with worse clinical outcomes, including increased ICU and hospital stay and higher mortality. Cardiogenic shock represents the most severe LCOS phenotype, with significantly greater need for advanced therapies such as renal replacement therapy and hemodynamic support, and a poorer prognosis.

Table 1 (abstract 000802) Comparison between patients with and without low cardiac output syndrome (LCOS)

Variable	Without SBGC (n=466)	With SBGC (n=128)	p-value
ICU length of stay (days, median)	3	7	<0.001
Hospital length of stay (days, median)	10	16	<0.001
Mortality (%)	4.5%	17.2%	<0.001
Duration of mechanical ventilation (days, median)	1.2	4.5	<0.001
Maximum norepinephrine dose (µg /kg/min, mean)	0.16	0.49	<0.001
Vasopressin use (%)	8.8%	56.3%	<0.001
Maximum dobutamine dose (µg/kg/min, mean)	6.2	9.3	<0.001
Renal replacement therapy required (%)	7.1%	32.8%	<0.001

Table 2 (abstract 000802) Comparison of clinical variables and outcomes among SBGC subgroups

Variable	Clinical SBGC (n=49)	Monitored SBGC (n=13)	Cardiogenic Shock (n=66)	p-value
Duration of mechanical ventilation (days, median)	2.09	2.16	11.25	<0.001
Maximum norepinephrine dose (µg /kg/min, mean)	0.27	0.29	0.66	<0.001
Vasopressin use (%)	15.4%	12.2%	85.7%	<0.001
Maximum dobutamine dose (µg/kg/min, mean)	8.18	6.8	10.83	<0.001
Renal replacement therapy required (%)	15.3%	8.8%	50.0%	<0.001
ICU length of stay (days, median)	8	5	10	<0.001
Mortality (%)	0%	4.1%	24.6%	0.003

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Topic: Cardiovascular issues in ICU

000803

Incidence and risk factors of post traumatic cerebral infarction in pediatric patients- a retrospective study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:803***

Introduction: Incidence of pediatric stroke in India is 13-33/100,000 per year. Childhood stroke is associated with high mortality and serious morbidity for the survivors. Traumatic brain injury (TBI) has been reported to be an important cause of childhood stroke or post traumatic cerebral infarction (PTCI). The precise frequency of PTCI, however, is often debated in adult TBI, and even less is known about its frequency in pediatric TBI. Most common mode of pediatric brain injury in India is road traffic accident (47%), followed by fall from height (39%), assault/battered baby and others (14%). It is generally

believed that PTCI is an important contributing risk factor to secondary injury and, consequently, to poor outcome.

Objectives: Primary objective of this study will be to calculate the incidence of post traumatic cerebral infarction in children. Secondary objectives will be to find out the association between post traumatic cerebral infraction and outcome at discharge in pediatric patients. Other secondary objectives are to find out the risk factors of PTCI in pediatric TBI.

Methods: This is a retrospective chart review of all pediatric patients admitted with traumatic brain injury (TBI) in a tertiary care hospital between January 2016 to August 2021. Institutional ethics board approval with number NIMHANS/33rd IEC (BS&NS DIV.)/2021 was obtained. Patients < 18 years with isolated moderate to severe TBI were included for chart review. We defined patients with "isolated TBI" as TBI patients with or without injuries to other body regions of abbreviated injury score (AIS) (Appendix 1) severity 2 or < 2. Adult patients, patients with penetrating injury and patients with injuries to other body regions of AIS severity of 3 or more are excluded. Data were collected from eligible patient charts. Data collection included patient demographics (age, sex, approximate weight and height, mode of injury, time duration from TBI to presentation to hospital). Clinical details included, Glasgow coma scale (Appendix 2), pupillary size and reaction, blood pressure, diagnosis and Computed tomography (CT) findings. Clinical outcome of included patients at discharge were assessed using King's Outcome Score for Childhood Head Injury (KOSCHI) (Appendix 3). In the study centre, imaging protocol for all pediatric patients with history of head injury, would be an initial computed tomography (CT) in the Emergency Department followed by subsequent CT surveillance during hospital stay. Diagnosis of PTCI will be made on non-enhanced CT scan based on a well-demarcated or fairly discernible region of hypodensity following specific vascular territory.

Results: During the study period, 408 charts of patients with moderate to severe head injury were analysed. Of these 36 (8.8%) patients were diagnosed with PTCI before discharge or death. Among all study patients, 74% were male, with median age was 12 year (range 2 months to 18 years). The most common cause of TBI was fall from height (49%) followed by road traffic accident (RTA) (41%) and other causes (10%) (fall of an object, assault or any other cause). Demographic data of patients with PTCI and no PTCI are given is Table 1. PTCI group had younger patients as compared to no PTCI group. Similarly, mean GCS on admission was lower in PTCI group than the no PTCI group. Patients with PTCI have an odds ratio of 10.5 (P < 0.001) (95% CI 4.83-22.8) for having poor outcome. Death in patients with PTCI is (13/36) 36% whereas death in patients without PTCI is (7/372) 1% with a P value of 0.0001 (odds ratio 29, 95% CI 10.7-81). Table 2 shows univariate analysis of risk factors for PTCI in pediatric patients Table 3 shows multivariate logistic regression analysis of risk factors for PTCI in pediatric patients. Most striking risk factors of PTCI in our patient population are injuries like subdural hematoma/contusion/diffusion axonal injury (OR 12, CI 0.7-4.2, p = 0.006), fall from height as the mode of injury (OR 6, CI 1.9-3.7) and intraoperative hemodynamic instability (OR 14, CI 0.8-4.4, P = 0.004).

Conclusions: Incidence of PTCI is higher in pediatric patients 9% as compared to adults which is around 2%. Mode of injury, severity of injury and intraoperative hemodynamic state are the significant determinants of PTCI. Future prospective studies are indicated.

Table 1 (abstract 000803) Demographic data of patients with PTCI and without PTCI

Variable	With PTCI (N=36)	No PTCI (N=372)	P value
Age	8+/-6	11+/-5	0.022
Male	25 (69%)	275 (74%)	0.5
Weight	30+/-16	32+/-16	0.7
GCS on admission	9+/-3	12+/-3	0.01
Mode of injury			0.09
Road traffic accident	16%	42%	
Fall from height	58%	48%	
Others (fall of an object)	25%	10%	

Table 2 (abstract 000803) Uniivariate analysis of risk factors for PTCI

Variable	Z	P value	Odds Ratio
Age	2.5	0.012	1.09
weight	0.284	0.777	1.01
Gender	-0.581	0.561	0.802
SDH/Contusion/DAI	4.65	<.001	31.94
mode of injury	-1.64	0.101	0.275
Time duration from TBI to presentation	0.0266	0.979	1.00
Features of raised ICP":	-2.40	0.017	0.406
GCS ON PRESENTATION	2.42	0.015	1.20
abnormal reaction	0.949	0.343	1.57
Pulse	-0.249	0.804	0.996
Mean BP	2.62	0.009	1.01
Preop Hb	-0.117	0.907	0.980
Preop coagulopathy	0.896	0.370	1.66
"Introperative hemodynamic instability":	2.18	0.029	3.75
Post op Hb	-1.32	0.186	0.726

Table 3 (abstract 000803) Multivariate logistic regression analysis of risk factors for PTCI

Variable	Z	P value	Odds Ratio	95% Confidence Interval Lower	95% Confidence Interval Upper
Age	0.29184	0.770	1.020	-0.1137	0.15346
SDH/Contusion/DAI	2.74178	0.006	11.858	0.7052	4.24090
mode of injury	1.85684	0.063	5.913	1.987	3.65303
Features of raised ICP":	1.33591	0.182	0.406	-0.8683	6.416
GCS on presentation	0.08809	0.930	1.20	-0.1795	1.008
Mean BP	-1.52416	0.127	0.983	-0.0401	0.00502
"Introperative hemodynamic instability":	2.88187	0.004	13.805	0.8397	4.41034

1 = minor

2 = moderate

3 = serious

4 = severe

5 = critical

6 = maximum (Currently untreatable)

Appendix 1 (abstract 000803) Abbreviated INjury severity scale

Behavior	Response	Score
Eye opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time place and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obeys commands	6
	Localizes pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion(decorticate)	3
	Abnormal extension(decerebrate)	2
	No response	1

Appendix 2 (abstract 000803) Glasgow coma scale

KOSCHI category	Definition
1.Death	
2. Vegetative	The child is breathing spontaneously and may have sleep/wake cycles. He may have non purposeful or reflex movements of limbs or eye. There is no evidence of ability to communicate verbally or non verbally or to respond to commands
3. Severe disability	a) The child is atleast intermittently able to move part of the body/eyes to command or make purposeful spontaneous movements; for example, confused child pulling at nasogastric tube, lashing out at carers, rolling over in bed. May be able to communicate but not yet able to carry out any self activities such as feeding b) Implies a continuous high level dependency, but the child can assist in daily activities; for example can feed self or walk with assistance or help to place items of clothing. Such a child is fully conscious but may still have a degree of post traumatic amnesia
4. Moderate disability	a) The child is mostly independent but needs a degree of supervision/ actual help for physical or behavioral problems. Such a child has overt problems; for example, 12 year old with a moderate hemiplegia and dyspraxia insecure on stairs or needing help with dressing b) The child is age appropriately independent but has residual problems with learning/behavior or neurological sequelae affecting function. He probably should have special needs assistance but his special needs may not have been recognized/met. Children with symptoms of post-traumatic stress are likely to fall into this category.
5. Good recovery	a) This should only be assigned if the head injury has resulted in a new condition which does not interfere with the child's well being and/or functioning ; for example • Minor headache not interfering with social or school functioning • Abnormalities on brain scan without any detectable new problem • Prophylactic anticonvulsants in the absence of clinical seizures • Unsightly scarring of face/head likely to need cosmetic surgery at some stage • Mild neurological asymmetry but no evidence of affect on function of limb. Includes isolated change in hand dominance in young child b) Implies that the information available is that the child has made a complete recovery with no detectable sequelae from the head injury

Appendix 3 (abstract 000803) Koschi Score for Outcome

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5. None

Topic: Neurointensive care

000805

Characterisation of VA-ECMO patients into CSWG-SCAI cardiogenic shock phenotype and associated mortality outcome

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:805***

Introduction: Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) is mechanical circulatory support where by venous blood is withdrawn and via membrane lung, returned oxygenated and decarboxylated to the aorta; its applications in cardiogenic shock (CS) are numerous. Given the high mortality risk of CS with conventional treatment and significant risks with VA-ECMO, careful risk:benefit assessment is required. Previously 3 distinct clinical phenotypes (non-congested/ cardio-renal/ cardiometabolic) have been derived from machine learning analysis of a large CS multicentre international registry ($n = 1959$). Phenotyping CS could improve risk stratification and define individualised mortality risk profiling.

Objectives: Retrospective analysis of clinical records to demonstrate that identification of CS phenotype might help better define patients who would derive benefit from VA-ECMO.

Methods: This audit was formally registered locally. Anonymised clinical data were extracted from the referral portal and electronic medical records; consent was not sought from patients. Coding data were cross checked against an online referral system to capture all VA-ECMO patients. Based on the previously established tools for CSWG-SCAI shock phenotype and shock stage severity were categorised.

Results: Between October 2023 and November 2024, 21 patients (median age 45 years, 13 male) received VA-ECMO for acute CS during their ICU admission, or retrieved on mobile ECMO. Indications were heart failure (24%), acute myocardial infarction (19%), fulminant myocarditis (10%), and other (47%). 17 patients (81%) had initial peripheral canulation, 12 patients (57%) had femoral access and femoral return. 6 patients (28%) had hybrid V–AV with additional venous return. 12 patients (57%) had distal perfusion catheter at initiation. 9 patients (23%) required mechanical LV venting, 5 with LVAD impella, the remaining via IABP. CSWG-SCAI shock stage at time of VA cannulation were category E in 81% of patients. The Vasoactive-Inotropic Score ranged from 5 to 331. CSWG-SCAI shock phenotype was non-congested (19%); cardio-renal (9%); and cardio-metabolic (71%). Within each phenotype associated mortality were 25%, 50% and 28%, respectively [Fig. 1]. SCAI category D and E had associated 25% and 47% mortality, respectively. 6 (28%) patients died in ICU, 5 (23%) whilst on ECMO. 15 (71%) patients survived to ICU discharge or repatriation. Median time on ECMO amongst survivors was 6.1 days (2–13). 6 patients had an in hospital cardiac arrest with return of spontaneous circulation, one patient was ECMO-CPR.

Conclusions: In the cohort of 21 VA-ECMO patients 71% met the clinical characteristics of the cardio-metabolic phenotype; the mortality outcome compares favourably to similar clusters described in multicentre CS registries. VA-ECMO may have a greater efficacy in this cardio-metabolic phenotypic cluster but larger categorisation and analysis is required before any statical significance can be determined.

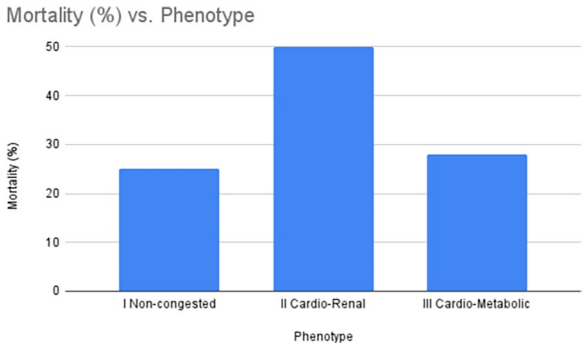


Fig. 1 (abstract 000805) In-hospital mortality in the 3 distinct phenotypes of cardiogenic shock (CS) of VA-ECMO patients
Phenotype I (noncongested) 1/4 25%, phenotype II (cardiorenal) 1/2 50%, and phenotype III (cardiometabolic) 6/15 (28%). Phenotype validated to in-hospital mortality across 2 international multicenter registries of CS attributable to acute myocardial infarction and acute-on-chronic heart failure.

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Topic: Cardiovascular issues in ICU

000806

Mirage or Malady? Mirror image artifact in paediatric lung ultrasound

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***806***

Introduction: Mirror image artifact occurs due to the reflection of ultrasound waves at strong acoustic interfaces, particularly at the diaphragm–lung or pleura–liver interfaces [1]. This artifact may mimic pulmonary pathology and has the potential to lead to pneumonia misdiagnosis and unnecessary interventions [2]. The incidence of this artifact in the paediatric febrile neutropenia population is currently unknown. Therefore, we analyzed data from a prospective study on lung ultrasound to determine the incidence of mirror image artifacts in pediatric neutropenia patients.
Objectives: To evaluate the incidence of mirror image artifacts in paediatric febrile neutropenia patients admitted to the intensive care unit (ICU).
Methods: The data from a prospective study that was assessing lung ultrasound scores in paediatric febrile neutropenia patients were analyzed for the presence of mirror image artifacts. The original study was approved by an independent ethics committee. A mirror image artifact was defined as the presence of a liver/spleen-like image cranial to the diaphragm, without continuation of the spine (Fig. 1). In contrast, true consolidation was defined by the continuation of the spine cranial to the diaphragm (the "Spine Sign").
Results: Data from a total of 81 patients, comprising 120 observations, with a median age of 7 years (interquartile range [IQR]: 4-12 years), were analyzed. Mirror image artifacts were identified in 37 (30.8%) observations on the right side and 39 (32.5%) observations on the left side.
Conclusions: Mirror image artifact is not uncommon in lung ultrasound examinations of pediatric febrile neutropenia patients. Distinguishing it from true consolidation is critical to avoid pneumonia misdiagnosis and unnecessary interventions.

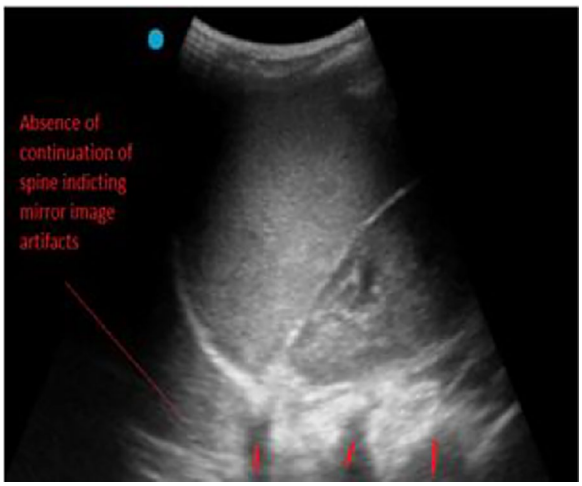


Fig. 1 (abstract 000806) Mirror image artifact identified by absence of continuation of spine above diaphragm

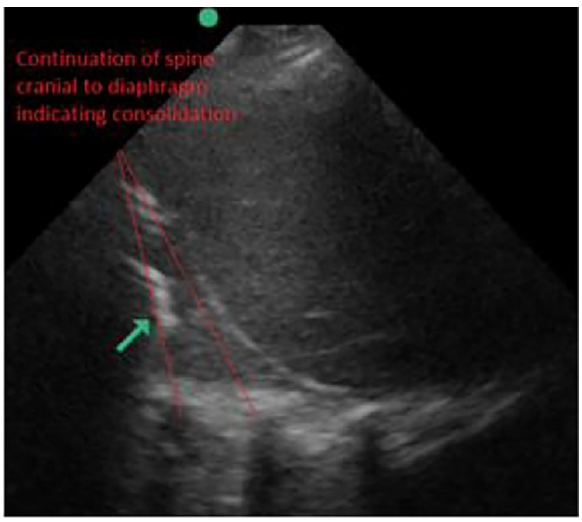


Fig. 2 (abstract 000806) True consolidation identified by continuation of spine above diaphragm

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3. nil

Topic: Acute respiratory failure and mechanical ventilation

000807

Effects of trunk inclination on respiratory mechanics during controlled mechanical ventilation: a comparison between ARDS patients with and without obesity

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:807***

Introduction: In mechanically ventilated ARDS patients, changing position from semi-recumbent to supine-flat reduces overdistension, leading to improved respiratory mechanics and CO2 clearance. In ARDS patients with obesity, a higher PEEP is usually required to counter-act the increased pleural pressure and prevent alveolar collapse. Thus, in this population, trunk inclination may exert different effects.
Objectives: The aim of this study was therefore to compare the effects of changes in trunk inclination between ARDS patients with and without obesity.
Methods: We performed a secondary analysis of two observational studies (1;2) on deeply sedated, paralyzed, mechanically ventilated patients with COVID-19 ARDS. Patients underwent three 15-min steps, where trunk inclination was changed from semi-recumbent (40° head-of-bed) to supine-flat (0° head-of-bed) and, back to semi-recumbent at constant ventilatory settings. Partitioned respiratory mechanics and gas exchange were assessed at the end of each step. The overall population was divided in obese and nonobese according to a BMI of 30 kg/m2 and a comparison of the variations in respiratory mechanics and PCO2 was performed.
Results: Two groups of 15 patients were analysed. BMI was 35 ± 3 kg/m2 in the group with obesity *vs.* 25 ± 3 kg/m2 in the group without ($p < 0.001$). PEEP was significantly higher in the group with obesity (15 ± 2 *vs.* 12 ± 2 cmH2O, $p = 0.013$). Despite the different baseline PEEP, variations in respiratory mechanics and CO2 clearance induced by changes in trunk inclination were similar in the two populations (**Fig. 1**). In both groups observed variations were fully reversible once placed back in semi-recumbent position.
Conclusions: Trunk inclination seems to exert similar effects in patient with and without obesity. Further studies are needed to confirm these findings in larger populations, possibly with higher BMI.

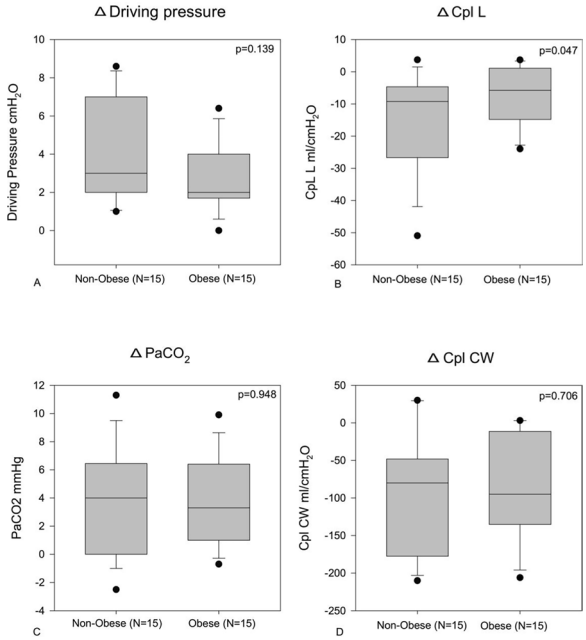


Fig. 1 (abstract 000807) Variation in driving pressure (**A**), Lung compliance (**B**), PaCO2 (**C**), Chest wall compliance (**D**) from semi-recumbent to supine-flat position in subgroup without obesity and with obesity

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Topic: Acute respiratory failure and mechanical ventilation

000808

The effect of fluid removal on muscle performance and weakness: a pilot study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:808***

Introduction: Fluid overload in critically ill patients has been associated with muscle edema, decreased tissue quality, and the potential development of intensive care unit-acquired weakness (ICU-AW). Ultrafiltration (UF), as part of continuous renal replacement therapy (CRRT), may help reverse these effects by removing excess extracellular volume.
Objectives: The objective was to evaluate the acute effect of ultrafiltration on ultrasound-based muscle parameters and global muscle strength in critically ill patients undergoing renal replacement therapy.
Methods: A total of 18 critically ill patients undergoing continuous renal replacement therapy (CRRT) with ultrafiltration (UF) were prospectively enrolled. Muscle ultrasound parameters—including

rectus femoris and vastus intermedius thickness, cross-sectional area, echogenicity, and connective tissue content—were assessed at ICU admission (T1) and again 36 h later (T2). Global muscle strength was evaluated at both time points using the Medical Research Council Sum Score (MRC-SS).

Results: Statistically significant post-UF changes were observed in muscle thickness (rectus femoris: 1.74 to 1.56 cm, $p = 0.030$; vastus intermedius: 1.14 to 0.95 cm, $p < 0.01$), echogenicity (91.7 to 78.3, $p < 0.0001$), and subcutaneous tissue thickness (1.98 to 1.78 cm, $p < 0.01$). Global muscle strength (MRC Sum Score) significantly increased after UF (45.0 to 49.0, $p = 0.06$). A positive correlation was found between UF volume (mL/kg) and post-intervention muscle strength ($\rho = 0.71$, $p = 0.0087$), as well as between UF volume and the reduction in muscle echogenicity ($\rho = 0.47$, $p = 0.04$).(Fig. 1). ROC curve analysis showed that a UF volume ≥ 82.12 mL/kg predicted an MRC Sum Score > 46 points, with an **area under the curve (AUC)** of 0.982 (95% CI: 0.928-1.000, $p = 0.04$), sensitivity of 92.9%, and specificity of 100%, indicating excellent discriminative performance.(Fig. 2).

Conclusions: Ultrafiltration, as part of continuous renal replacement therapy, was associated with acute improvements in muscle ultrasound parameters and global muscle strength in critically ill patients. The UF volume showed a strong correlation with both muscle strength recovery and reduction in muscle echogenicity, suggesting a potential role in reversing fluid-related muscle quality impairment. A UF threshold of ≥ 82.12 mL/kg of real body weight demonstrated excellent predictive accuracy for functional recovery, highlighting its clinical relevance as a potential therapeutic target in the management of ICU-acquired weakness.

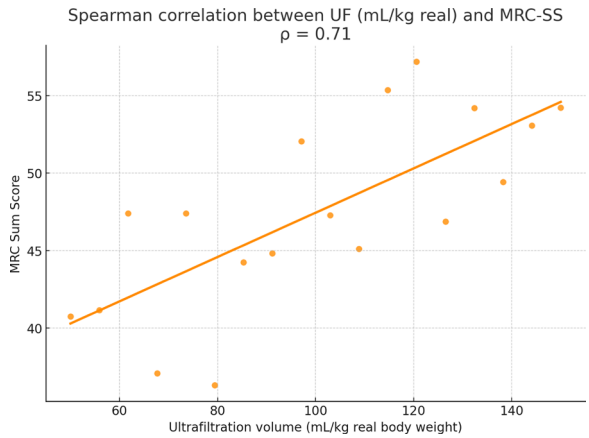


Fig. 1 (abstract 000808) Scatter plot and regression line showing the Spearman's correlation between ultrafiltration volume adjusted by real body weight (mL/kg) and post-intervention global muscle strength (MRC Sum Score). A significant positive correlation was observed ($\rho = 0.71$, $p = 0.00087$)Scatter plot and regression line showing the Spearman's correlation between ultrafiltration volume adjusted by real body weight (mL/kg) and post-intervention global muscle strength (MRC Sum Score). A significant positive correlation was observed ($\rho = 0.71$ $p = 0.00087$)

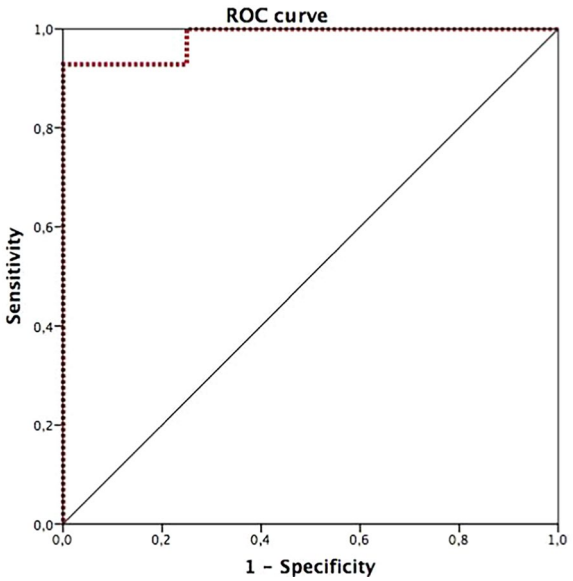


Fig. 2 (abstract 000808) Receiver-operating characteristic (ROC) curve evaluating the predictive performance of ultrafiltration volume adjusted by real body weight (mL/kg) for functional recovery (MRC Sum Score > 46 points) in critically ill patients. The area under the curve (AUC) was 0.982 (95% CI: 0.928-1.000, $p = 0.004$), indicating excellent discriminative ability. The optimal cutoff value was 82.12 mL/kg of real body weight, with 92.9% sensitivity and 100% specificity

Topic: Acute kidney injury and haemofiltration

000810

Impact of fluid overload on postoperative outcomes following cardiac surgery: a systematic review and meta-analysis

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:810***

Introduction: Fluid overload has emerged as a critical factor associated with adverse outcomes in critically ill patients, including renal failure, prolonged mechanical ventilation, and increased mortality. Although its impact is well established in conditions such as sepsis and acute lung injury, its role in the context of cardiac surgery remains poorly understood.

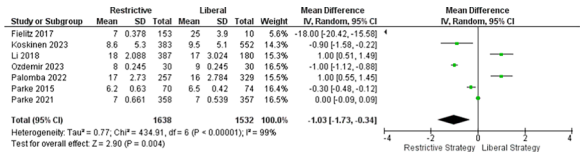
Objectives: We conducted a systematic review and meta-analysis to investigate the effect of fluid overload on postoperative outcomes in patients undergoing cardiac surgery.

Methods: We systematically searched PubMed, Embase, and Cochrane to find clinical trials (CTs) comparing postoperative outcomes in cardiac surgery patients with fluid overload versus those managed with a restrictive fluid strategy. Outcomes of interest included incidence of acute kidney injury (AKI), all-cause mortality, postoperative atrial fibrillation (POAF), intensive care unit length of stay (ICU-LOS), and total hospital length of stay (HLOS). Data were analyzed using random-effects models with 95% confidence intervals (CI).

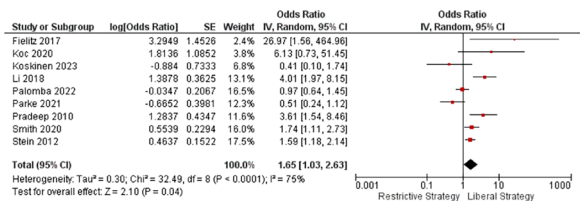
Results: Of the 3,311 studies initially screened, 17 clinical trials comprising a total of 11,349 patients met the inclusion criteria. Compared with those with fluid overload, patients managed with a restrictive

fluid strategy following cardiac surgery had a significantly shorter HLOS (MD = − 1.03 days; 95% CI: − 1.72 to − 0.33; $p < 0.05$). In addition, fluid overload was associated with a significantly higher risk of all-cause mortality compared to the restrictive group (OR = 1.65; 95% CI: 1.03-2.63; $p < 0.05$). No significant differences in the incidence of AKI were observed between the groups (OR = 1.17; 95% CI: 0.69-1.99; $p = 0.56$). Similarly, no significant differences were found for POAF or ICU-LOS.

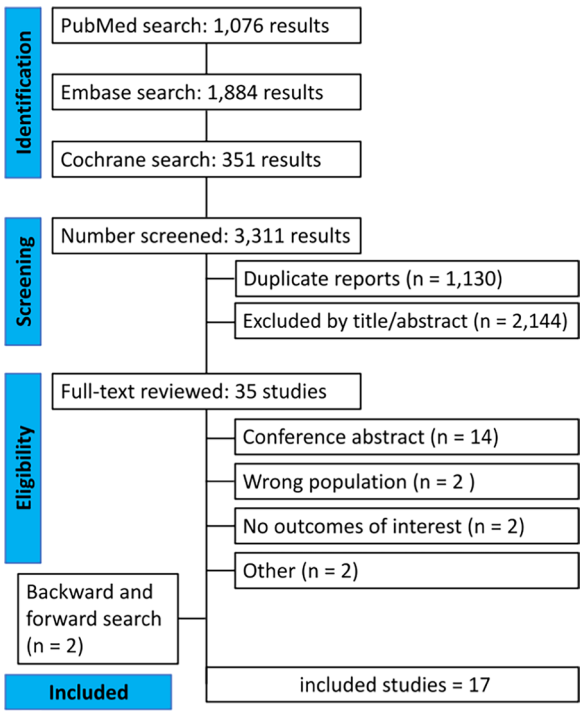
Conclusions: In patients undergoing cardiac surgery, a restrictive fluid management strategy was associated with a reduced hospital length of stay and decreased all-cause mortality. These findings support the potential benefits of a restrictive fluid approach in this patient population, warranting further investigation.



Forest plot comparing the mean difference in hospital length of stay between restrictive and liberal fluid management strategies



Forest plot of the odds ratios for mortality associated with restrictive versus liberal fluid management strategies across multiple studies



PRISMA flow diagram of study screening and selection

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Topic: Perioperative care

000811

Risk factors and incidence of ICU-acquired infections in critically injured trauma patients

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*811

Introduction: Infections represent a significant complication in critically injured trauma patients admitted to the ICU, with a notable impact on morbidity and mortality. This study aims to analyze the incidence of infections and associated risk factors in a cohort of patients with severe trauma.

Objectives: To determine the incidence and types of ICU-acquired infections in trauma patients and to identify independent risk factors associated with their development.

Methods: This is an observational study including all trauma patients admitted to a specialized Trauma and Emergency ICU from January 2014 to September 2024. No exclusion criteria were applied. Demographic data (age, sex), trauma mechanism, injury severity scores (ISS, RTS, APACHE), comorbidities at admission (immunosuppression, COPD, cirrhosis, cancer, diabetes), emergency surgical interventions, ICU length of stay, mortality, and infectious complications (pneumonia, urinary tract infection, bloodstream infection) were recorded. Descriptive statistics, Chi-square, Student's t-test, and binary logistic regression were applied.

Results: A total of 2,448 patients were included. The mean age was 44.8 years (SD 17.9), 79.2% were male, and traffic accidents were the most frequent mechanism (38.6%). Severe head trauma (MAIS $\geq$ 3) was present in 42.2%. The overall incidence of ICU-acquired infections was 8.1% (n = 198), with pneumonia being the most common (67.7%). In univariate analysis, factors significantly associated with infection included higher ISS ($p < 0.001$), longer ICU stay ($p < 0.001$), higher APACHE scores ($p < 0.001$), and emergency surgery ($p < 0.001$), especially in patients requiring three types of surgical interventions. Severe head injury (MAIS $\geq$ 3) was also strongly associated with infection ($p < 0.001$), particularly pneumonia (Table 1). In multivariate analysis, independent risk factors for infection were ICU length of stay (OR 1.131, $p < 0.001$), emergency surgery (OR 1.558, $p = 0.005$), and MAIS $\geq$ 3 in the head (OR 2.723, $p < 0.001$) (Table 2).

Conclusions: Infection in critically injured trauma patients is strongly influenced by injury severity, prolonged ICU stay, and multiple surgical interventions. These findings highlight key targets for prevention strategies and optimized ICU management in this high-risk population.

Table 1 (abstract 000811) Association between Head Injury Severity and Infection / Pneumonia

	No Infection	Infection	No Pneumonia	Pneumonia
MAIS head ≥ 3	87.71%	12.29%	91.81%	8.19%
MAIS head < 3	94.86%	5.14%	96.43%	3.57%

Table 2 (abstract 000811) Independent Risk Factors for ICU-acquired Infection (Multivariate Analysis)

Outcome	OR (95% CI)	p-value
ICU length of stay	1.131 (1.111 – 1.152)	<0.001
APACHE score	1.018 (0.997 – 1.039)	0.09
ISS	1.012 (0.997 – 1.027)	0.12
MAIS head ≥ 3	2.723 (1.976 – 3.753)	<0.001
Emergency surgery	1.558 (1.139 – 2.130)	0.005

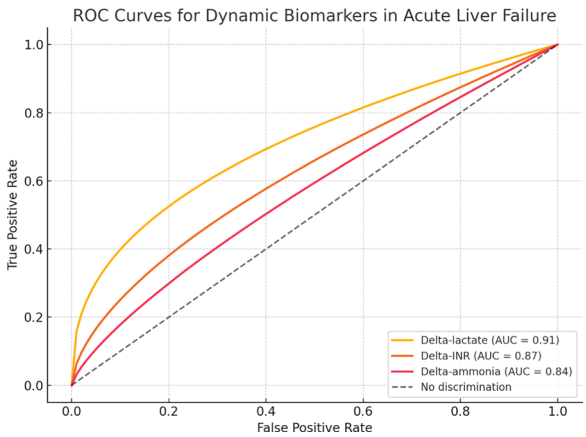
Topic: Trauma

000815

Prognostic value of dynamic biomarkers in acute liver failure: a prospective observational study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:815***

Introduction: Acute liver failure (ALF) is a life -threatening condition characterized by rapid deterioration of liver function, often leading to multiorgan failure and high mortality rates.. Identifying early prognostic factor [1,2,3] is crucial for guiding therapeutic decisions,including liver transplantation.Traditional static biomarkers may not fully reflect the evolving severity of liver dysfunction.
Objectives: So,this study aimed to evaluate the prognostic value of dynamic changes(delta) in arterial lactate, INR and ammonia levels over the first 72 h in ALF patients admitted to the intensive care unit(ICU).
Methods: This prospective observational study included 100 adult patients diagnosed with ALF and admitted to a tertiary ICU from january 2021 to december 2024 The mean age was 45.6 + -12.8 years; 60% male. Serum lactate, INR and Ammonia levels were collected at ICU admission(H0) and at 72 h(H72). Delta values were calculated as H72- H0. The primary endpoint was 28 day all cause mortality. Statistical analysis used Mann Whitney test to compare the different delta biomarkers between survivors and nonsurvivors. Receiver-operating charasteristic(ROC) curves were generated to assess the discriminative ability of each delta biomarker.
Results: Among 100 patients, 46(46%) died within 28 days. Nonsurvivors had significantly higher delta—lactate and delta-INR compared to survivors. ROC analysis showed: **Delta-Lactate AUC**: 0.91(95%CI: 0.85-0.97).
Delta-INR AUC: 0.87 (95% CI:0.80-0.94).
Delta-Ammonia AUC: 0.84 (95%CI:0.76-0.91).
The Mean delta values(H72-H0):
In Survivors, Delta-lactate was -0.8 mmol/L vs + 1.2 mmol/L in nonsurvivors $P < 0.001$.
In survivors, Delta-INR was -0.1 mmol/l vs + 0.6 mmol/L in nonsurvivors $P < 0.01$.
In survivors, Delta-ammonia was-10ùmol/L vs + 25ùmol/l in nonsurvivors $P < 0.01$.
We performed univariate logistic regression which clearly confirm that Delta-lactate is a strong predictor of 28-day mortality in ALF. With an odds ratio of 4.50 (95% CI:2.20-9.20, $p < 0.001$)and an AUC of 0.91,the statistical analysis demonstrate both high discriminative power and strong association with mortality.This means that for each unit increase in delta-lactate between H0 and H72, the odds of 28-day mortality increase significantly.
Conclusions: This study highlights the prognostic significance of dynamic biomarkers, specifically delta-lactate, delta-INR and delta -ammonia over the first 72 h of management in patients with acute liver failure. Dynamic changes in lactate, INR, and ammonia are strongly associated with 28-day mortality in ALF patients.Delta-lactate demonstrated the highest predictive value. This supports the hypothesis that sustained hyperlactatemia or failure to clear lactate reflects ongoing cellular hypoxia, metabolic failure,or persistent inflammation. Monitoring these biomarkers dynamically over the first 72h may offer early prognostic insight and support more individualized clinical decision -making in the management of acute liver failure. Further studies should evaluate whether integrating these dynamic variables into existing scores such as MELD or King's College Criteria could enhance their pronostic performance.



ROC curve comparing the predictive value of delta biomarkers for 28-day mortality in ALF.

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4. Thanks to my colleagues for their collaboration

Topic: Metabolism, endocrinology, liver failure and nutrition

000816

Impact of extracorporeal membrane oxygenation (ECMO) on meropenem, piperacillin/tazobactam and linezolid exposure in critically ill patients: a prospective observational study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:816***

Introduction: Optimizing antibiotic dosing is crucial in critically ill patients, as subtherapeutic exposure is associated with increased mortality. In patients receiving extracorporeal membrane oxygenation (ECMO), antibiotic pharmacokinetics remains poorly defined. Current evidence is primarily based on ex vivo studies and case series, offering conflicting results with limited clinical applicability. Notably, drug sequestration within ECMO circuit components—particularly the membrane oxygenator—has been reported (1,2), potentially leading to reduced plasma concentrations and therapeutic failure.
Objectives: To quantify antibiotic sequestration within the ECMO membrane oxygenator and to evaluate the pharmacokinetics of meropenem, piperacillin/tazobactam, and linezolid using a noncompartmental pharmacokinetic analysis (NCA).
Methods: We conducted a prospective observational study in the intensive care unit of a tertiary university hospital. Adult patients receiving ECMO support and treated with meropenem, piperacillin/tazobactam, or linezolid were eligible for inclusion. Serial plasma samples were collected simultaneously at two points in the ECMO circuit: pre- and post-membrane oxygenator. Between 8 and 12 paired samples were obtained per patient over a complete dosing interval, under steady-state conditions. Plasma concentrations were quantified using LC-MS/MS. Differences between pre and post-membrane concentrations were calculated to assess potential drug sequestration by the ECMO circuit. Pharmacokinetic measures were derived using NCA in R (version 4.4.2), considering the mode of administration (bolus or extended infusion). The parameters calculated included: Cmax, Tmax, AUC0-24, kel, t1/2, CL and Vd, based on both pre- and post-membrane concentrations.
Results: A total of 48 meropenem plasma concentrations were analyzed from five patients (two on venoarterial (VA) ECMO and three on venovenous (VV) ECMO). In addition, 28 piperacillin/tazobactam concentrations were obtained from three patients (two on VA, one on VV), and 32 linezolid concentrations from three patients (two on VV, one on VA). The mean ± standard deviation (SD) of the difference between pre and post-membrane concentrations were: 0.50 ± 4.25 mg/L for meropenem, 1.06 ± 7.41 mg/L for piperacillin, 0.51 ± 1.00 mg/L for tazobactam, and -0.08 ± 1.08 mg/L for linezolid. The results of the NCA are presented in Table 1:

Antibiotic	Infusion time	Blood samples type¥	Cmax (mg/L)	Tmax (h)	AUC0-24 (mg · h/L)	Kel (h-1)	t1/2 (h)	CL (L/h)	Vd (L)
Meropenem	4 h	Pre-M	49,9 ± 33,1	3,44 ± 1,10	534 ± 271	0,336 ± 0,0746	2,15 ± 0,520	11,0 ± 3,90	35,0 ± 6,20
		Post-M	46,0 ± 26,9	3,46 ± 1,11	530 ± 270	0,329 ± 0,123	2,45 ± 1,25	11,2 ± 3,98	38,4 ± 7,19
Piperacillin	0,5 h	Pre-M	223 ± 107	0,525 ± 0,0118	2209 ± 1517	0,353 ± 0,211	2,39 ± 1,43	7,72 ± 4,02	30,8 ± 29,8
		Post-M	226 ± 131	0,550 ± 0,000	2187 ± 1575	0,342 ± 0,222	2,57 ± 1,67	8,02 ± 4,48	35,1 ± 35,9
	3 h*	Pre-M	101	3,15	607	0,412	1,68	26,3	64,0
		Post-M	93,9	3,18	593	0,368	1,88	27,0	73,3
Tazobactam	0,5 h	Pre-M	20,6 ± 10,0	0,525 ± 0,0118	198 ± 111	0,336 ± 0,108	2,18 ± 0,702	9,88 ± 3,74	32,9 ± 21,8
		Post-M	19,2 ± 9,12	0,550 ± 0,000	190 ± 110	0,311 ± 0,112	2,38 ± 0,855	10,5 ± 4,21	38,5 ± 27,3
	3 h*	Pre-M	10,4	3,15	64,1	0,455	1,52	31,2	68,6
		Post-M	10,1	3,18	61,7	0,353	1,96	32,4	91,8
Linezolid	1 h	Pre-M	14,9 ± 4,81	1,24 ± 0,150	152 ± 62,3	0,170 ± 0,0713	4,79 ± 2,53	9,05 ± 4,21	58,6 ± 28,0
		Post-M	14,5 ± 5,33	1,27 ± 0,150	154 ± 64,2	0,169 ± 0,0622	4,49 ± 1,59	8,92 ± 4,14	53,5 ± 16,6

All pharmacokinetic measures are expressed as mean ± SD. ¥Pre-M: pre-membrane concentrations; Post-M: post-membrane concentrations.*data from one patient

Conclusions: No significant differences were observed between pre- and post-membrane concentrations for meropenem, piperacillin/tazobactam and linezolid, suggesting minimal drug sequestration by the membrane oxygenator. Pharmacokinetic measures were similar for both pre- and post-membrane concentrations.

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3. This research was funded by the Joaquim Bonal grant 2024-2026, awarded by the Catalan Society of Clinical Pharmacy (SCFC).

000818
Topic: Pharmacology and toxicology/poisoning

Etiological comparison of cerebrovascular physiology during progressive hypotension to circulatory arrest in humans

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:818***

Introduction: Central to circulatory arrest is the cessation of the brain's circulation and subsequent function thereafter leading to death. However, how the brain responds to stressors of progressive hypotension during circulatory arrest has not been described in humans despite it underpinning key concepts in the functioning of the human body. As different disease aetiologies have different locals of injury, the key question remains on whether this is associated with cerebral hemodynamics.
Objectives: We aimed to determine the relationships between cerebrovascular physiology indices in response to progressive hypotension during circulatory arrest in acute and nonacute critically ill humans.
Methods: We conducted a single center prospective observational cohort study investigating the cerebrovascular physiology of circulatory arrest following withdrawal of life-sustaining measures (WLSM) in

32 acute critically ill patients and medical assistance in dying (MAID) in 3 nonacute critically ill patients. Prior to WLSM, multimodal neuromonitoring was implemented consisting of middle and posterior cerebral artery blood velocities (MCAv, PCAv) using transcranial Doppler ultrasound and bilaterial near-infrared spectroscopy for continuous frontal lobe regional cerebral oxygen saturation (rSO2). Mean arterial pressure (MAP) was monitored via an in situ radial arterial catheter. Relationships between cerebrovascular physiologic variables and MAP were assessed visually and relationships were model fit when appropriate. Etiologic comparisons were made between post-cardiac arrest hypoxic ischemic brain injury (HIBI), sepsis, traumatic brain injury (TBI), and MAID patients.
Results: Collectively, MCAv ($P < 0.0001$) and PCAv ($P < 0.0001$) were linearly related to MAP with marked inter-individual variability of response. Reductions in MCAv and PCAv started at a lower MAP for sepsis patients compared to HIBI and TBI patients. The cerebral blood velocity slopes in MAID were less steep than acute critical illness. There was no relationship between rSO2 and MAP in any specific aetiology or across all aetiologies.
Conclusions: There may be aetiology-specific differences between HIBI, TBI, and sepsis in in the relationship between cerebral blood velocities and hypotension. Future work investigating the interplay between sedation and severity of acute critical illness is warranted to understand how different aetiologies may respond differently to clinical management (*e.g.,* vasopressors).

Topic: Ethics and end of life care

000819

Understanding the lived experience of LVAD patients and caregivers: a phenomenological study in progress

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***819***

Introduction: Left Ventricular Assist Devices (LVADs are increasingly used in end-stage heart failure, with critical care often forming the entry point to long-term mechanical circulatory support. While literature highlights quality of life (QoL) challenges and device-related burdens [1-2], the recent studies reveal profound emotional, existential, and identity transformations among recipients [3-7]. Patients report liminality, fear, shifting values, and changing social roles. However, little research explores how these experiences evolve through and beyond the ICU.
Objectives: To explore the lived experiences of LVAD recipients and their informal caregivers.
Methods: A qualitative study using Braun and Clarke's thematic analysis [8], informed by van Manen's hermeneutic phenomenology [9]. Twenty-one participants—12 patients and 9 caregivers—were recruited from two cardiothoracic centers in Greece. Data collection via semi-structured interviews began in May 2022 and is ongoing. Ethics approval was granted by the University of West Attica and participating hospitals.
Results (preliminary): Participants describe the ICU and early post-discharge period as liminal, marked by bodily vulnerability and identity shifts [3,5]. Caregivers mirror this, assuming ICU-like roles at home while managing fear and uncertainty [6]. Gratitude for survival coexists with reflections on dependence, time, and purpose [4,5]. Three experiential domains are emerging: a) From loss to resilience—the ICU is remembered as a turning point [3,5]; b) Carrying ICU "roles" back at home—caregivers live with prolonged vigilance and emotional burden [9]; c) Being saved, yet transformed—the device is both life-sustaining and identity-altering [6,7]. These findings deepen current understandings of liminality, value transformation, and caregiving in technologically mediated survivorship [4-7].
Conclusions: LVAD recipients and caregivers navigate complex emotional and existential landscapes that begin in the ICU and extend well beyond discharge. Patients experience a life shaped by functional limitations, fear, lifestyle changes, frustration, and what they often describe as an "up and down" journey. This trajectory requires a repertoire of adaptation strategies, hope, and continuous support from family and healthcare services. LVAD implantation introduces a new embodied experience—marked by the duality of feeling both "saved" and socially stigmatized. Along this path, many encounter a profound loss of identity and a sense of "liminality," reflecting what has been described as "biographical disruption" [7]. Understanding these lived experiences can inform more person-centered approaches to ICU care, discharge planning, and long-term psychosocial support. This study highlights the importance of attending not only to physical recovery, but also to identity, relationships, and what truly matters to patients and their families.

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10. This study is partially funded by the University of West Attica, Athens, Greece

Topic: Nursing care and physiotherapy

000821

Comparison of brain-derived versus systemic physiologic variables for predicting the dying duration for donation after circulatory death

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***821***

Introduction: Current paradigms for predicting time from withdrawal of life-sustaining measures (WLSM) to circulatory arrest are predicated on physician gestalt, cardiorespiratory dysfunction, and neurologic examination. Reliance on cardiorespiratory dysfunction may affect organ quality or disqualify heart and lung donation while physician gestalt has between-examiner variability, and the clinical exam can be

confounded by sedation or nonconvulsive status epilepticus. Alternative prediction methods without these limitations are needed.
Objectives: To assess cranial and extra-cranial measurements as predictors of length of dying duration from WLSM to circulatory arrest.
Methods: A single centre prospective observational cohort study in critically ill patients undergoing WLSM to death determination by circulatory criteria. Cranial and extra-cranial measurements were taken prior to WLSM. Cranial assessment consisted of cerebral blood velocities, jugular venous bulb saturations, and intracranial pressure (ICP) surrogates. Extra-cranial assessments consisted of respiratory and cardiovascular measurements. Times from WLSM to pulseless electrical activity were collected. Univariate predictions were based on time cutoffs of 30, 60, and 120 min.
Results: Thirty-five patients were included in the final analysis. Central venous pressures ($P = 0.04$), optic nerve sheath diameters ($P = 0.05$), and middle cerebral artery pulsatility index ($P = 0.01$) as surrogates of ICP were related to the dying duration. The area under the receiver-operator characteristic curve (AUROC) at 60 min for ICP surrogate measures was > 0.7. Middle ($P = 0.42$) and posterior ($P = 0.79$) cerebral blood velocities and jugular venous bulb oximetry ($P = 0.08$) were not related to the dying duration. The AUROC at 60 min for dead space and tidal volume were 0.79 and 0.69, respectively. For extra-cranial measurements, only dead space ($P = 0.02$) and tidal volume ($P = 0.01$) were related to the dying duration. Heart rate, cardiac output, mean arterial pressure, lactate, albumin, troponin, bilirubin, creatinine, end-tidal carbon dioxide, arterial carbon dioxide, PF ratio, and ventilation were not related to the dying duration ($P > 0.18$).
Conclusions: Brain-derived predictors were superior to extra-cranial predictors as univariate variables of the dying duration. Brain dysfunction is likely fundamental to the dying duration and may help reframe how the dying process is predicted. A prospective multicentre study is a necessary next step to determine the predictive ability of brain-specific variables for donation after circulatory determination of death.

Topic: Brain death, organ donation and transplantation

000822

Blood-based neurologic biomarkers for predicting the dying duration for donation after circulatory death

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***822***

Introduction: Current paradigms for predicting time from withdrawal of life-sustaining measures (WLSM) to circulatory arrest are predicated on physician gestalt, cardiorespiratory dysfunction, and neurologic examination. Reliance on cardiorespiratory dysfunction may affect organ quality or disqualify heart and lung donation while physician gestalt has between-examiner variability, and the clinical exam can be confounded by sedation or nonconvulsive status epilepticus. Alternative prediction methods without these limitations are needed.
Objectives: To assess blood-based neurologic biomarkers as predictors of length of dying duration from WLSM to circulatory arrest in humans.
Methods: A single centre prospective observational cohort study in critically ill patients undergoing WLSM to death determination by circulatory criteria. Blood samples from an in situ radial arterial line were obtained prior to WLSM. Serum and plasma blood samples were analyzed for biomarkers of the neurovascular unit across two analytical platforms. Specifically, glial fibrillary acidic protein (GFAP), neurofilament light chain (Nf-L), neuron-specific enolase (NSE), total tau, and ubiquitin C-terminal hydrolase L1 (UCH-L1) were quantified. Times from WLSM to pulseless electrical activity (defined as a radial pulse pressure < 5 mmHg) were collected. Univariate predictions were based on time cutoffs of 30, 60, and 120 min.
Results: Serum UCH-L1 ($P = 0.008$) and total tau ($P = 0.01$) were related to the dying duration while GFAP ($P = 0.87$) and Nf-L ($P = 0.89$) were not. Similarly, plasma UCH-L1 ($P = 0.004$) was related to the dying duration while GFAP ($P = 0.93$), Nf-L ($P = 0.84$), NSE ($P = 0.11$), and total tau ($P = 0.06$) were not. The area under the receiver-operator characteristic curves (AUROCs) for serum UCH-L1 were 0.81, 0.82, and 0.77 at 30, 60, and 120 min, respectively. The AUROCs for serum total tau were 0.78, 0.86, 0.74 at 30, 60, and 120 min, respectively. The AUROCs for plasma UCH-L1 were 0.82, 0.8, and 0.74 at 30, 60, 120 min, respectively.
Conclusions: Total tau and UCH-L1 were significant univariate predictors of the dying duration. Brain dysfunction is likely fundamental to the dying duration and may help reframe how the dying process is predicted. A prospective multicentre study is a necessary next step to determine the utility of total tau and UCH-L1 in predicting the dying duration.

Topic: Brain death, organ donation and transplantation

000823

Genetic variant in AQP4 3'-regulatory region in concert with immune cell biomarkers to predict unfavorable course and outcome in chronic critical illness patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***823***

Introduction: AQP4 molecules form water channels that control various cells movement and survival, immune cells migration and reactiveness to activating stimuli. Previous studies revealed the association of AQP4 rs1058427 variant single-nucleotide changes in the regulatory 3' region of the gene with unfavorable course and outcome after intracerebral hemorrhage and in patients with sepsis.
Objectives: The prospective observational uncontrolled cohort study included ICU patients diagnosed in chronic critical condition (CCC, n = 464; age 58 (IQR: 43-67), 41% women) as a consequence of cerebral catastrophes (strokes—59%, traumatic injuries -21%, anoxic injuries—6% and brain tumors- 9%, consequences of severe course of COVID-19—2%, others—3%); 192 patients were hospitalized with pneumonia on admittance, 107 patients developed nosocomial pneumonia. Mann–Whitney *U* test, t test, χ2 test with Yates' correction, Fisher's exact test, Kaplan–Meier log-rank test, ROC and logistic regression analyses were employed where appropriate. Univariate and multivariate regression analyses were used with the backward stepwise Wald method to confirm the significance. Differences were considered significant at $p < 0.05$. Statistical analysis was performed using SPSS Statistics version 27, MedCalc version 11.6 and SigmaStat version 3.5.
Methods: The prospective observational uncontrolled cohort study included ICU patients diagnosed in chronic critical condition (CCC, n = 464; age 58 (IQR: 43-67), 41% women) as a consequence of cerebral catastrophes (strokes—59%, traumatic injuries -21%, anoxic injuries—6% and brain tumors- 9%, consequences of severe course of COVID-19—2%, others—3%); 192 patients were hospitalized with pneumonia on admittance, 107 patients developed nosocomial pneumonia. Mann–Whitney *U* test, t test, χ2 test with Yates' correction, Fisher's exact test, Kaplan–Meier log-rank test, ROC and logistic regression analyses were employed where appropriate. Univariate and multivariate regression analyses were used with the backward stepwise Wald method to confirm the significance. Differences were considered

significant at $p < 0.05$. Statistical analysis was performed using SPSS Statistics version 27, MedCalc version 11.6 and SigmaStat version 3.5.
Results: Multivariate regression analysis adjusted for CIRS-G, SOFA, neutrophils, lymphocytes, gender, and age revealed that in a whole cohort Charlson comorbidity index (CCI), Glasgow coma scale (GCS) values, and NLR associated with mortality ($p < 0.001$; $p < 0.001$; $p = 0.035$, respectively). AQP4 genotyping of patients revealed that established links for neutrophil counts and mortality were significant only for carriers of AQP4 GG rs1058427 genotype (HR = 2.5 (95%CI:1.5–4.3), $n = 372$, log-rank test). In AQP4 rs1058427 T + carriers (genotypes AQP4 GT and TT), mortality was significantly associated with CCI and SOFA scale values, not NLR. Univariate regression confirmed significant link between mortality and NLR or neutrophil count only in carriers of AQP4 GG rs1058427 genotype (Bonferroni corrected $P = 0.018$ and $P = 0,045$, respectively). Lymphocyte levels on admittance provided no any predictive value in a whole cohort and in both sub cohorts differed in AQP4 rs1058427 genotypes. We suggest that single-nucleotide polymorphism of AQP4 may affect neutrophil migration to increase risk for pro-inflammatory reactions and mortality.
Conclusions: In patients in chronic critical illness, an increased neutrophil count on admittance predicts poor outcome due to a sub cohort of patients exhibiting homozygous allele G (genotype GG) of AQP4 rs1058427. We suggest that AQP4 genotyping may assist risk stratification of patients in critical illness as early as on admittance.
Fig. 1. Survival probability based on immune cells concentration and AQP4 rs1058427 genotypes (Kaplan–Meier analysis). Survival plots for groups of patients exhibiting different neutrophil-to-lymphocyte ratios (A,B,C), neutrophil count (D,E,F) and lymphocyte count (G,H,I) are shown. Patients were subdivided to groups according to their AQP4 rs1058427 genotype: GG + GT + TT (A,D,G), GG (B,E,H) and C,F,I (GT + TT)

Topic: Infections and prevention

000824

Impact of sex on the likelihood of trauma center admission for female and male adult patients with traumatic brain injury: a population-based cohort study

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)**:***824***.

Introduction: Specialized trauma care improves outcomes in patients with moderate and severe trauma (1,2). Transfer guidelines recommend referral to a trauma lead centre based on the physiological status and injury severity (3); however, nonclinical factors also affect transfer decisions (4, 5). Although sex-based disparities in trauma lead centre access were described in broader trauma populations (6), their extent among patients with traumatic brain injury (TBI) is poorly understood.
Objectives: To estimate the association between sex and the likelihood of transfer to a trauma lead centre of adult patients with TBI in Ontario.
Methods: We included adult patients with a first hospitalization for TBI of at least 48 h from 2009 to 2020. The main exposure was sex, and the main outcome was trauma lead centre admission. We summarized baseline and hospitalization data by sex groups and compared them with standardized differences (St.Diff). We estimated the association of sex with a trauma lead centre admission using multiple logistic regression adjusted for age, income, rural setting, injury severity score (ISS), and baseline comorbidities. We conducted a stratified analysis by age group (< 65 and ≥ 65 y/o).

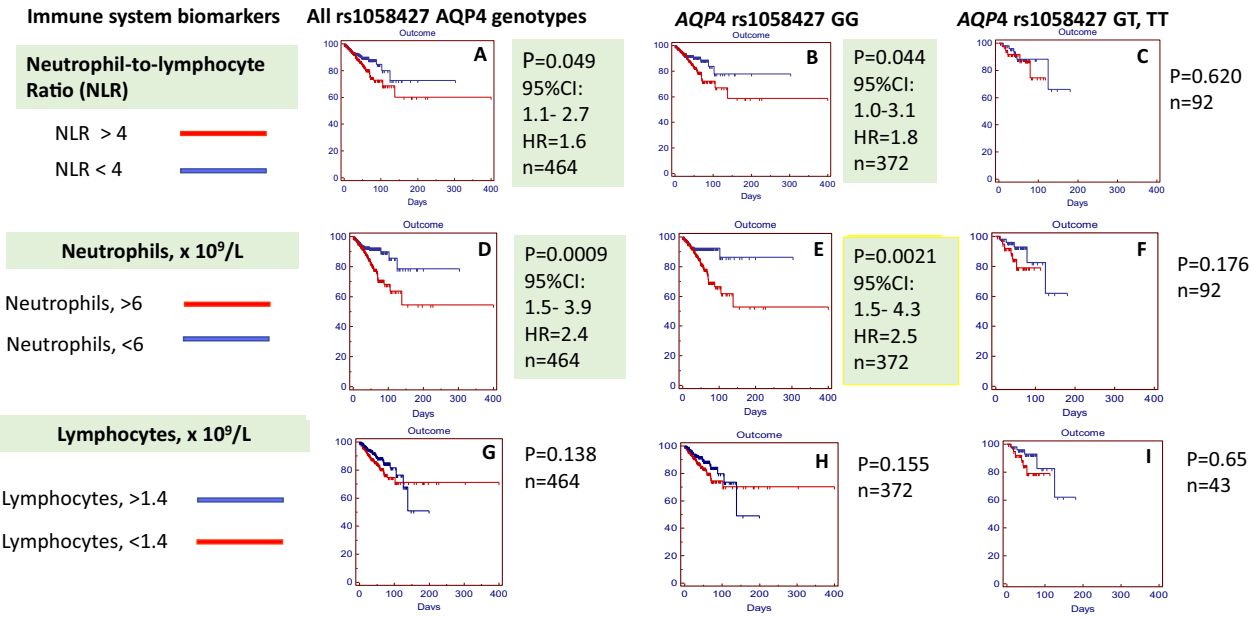
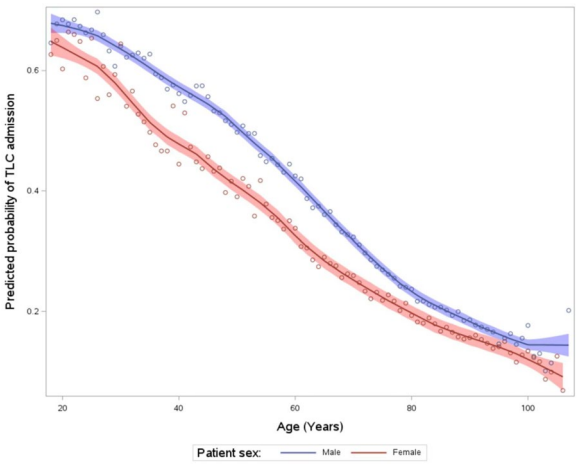


Fig.1. Survival probability based on immune cells concentration and *AQP4* rs1058427 genotypes (Kaplan-Meier analysis)

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1. The study was supported by Ministry of Science and Higher Education of the Russian Federation to Federal Research and Clinical Center of Intensive Care Medicine and Rehabilitology (#075-00784-22-03 and FGWS-2025-0014 to VP). A

Results: We included 61,546 patients, 39% of whom were female. The median age was 72 years (IQR 54-83). Female patients were older (median = 78 years; IQR 63-86) compared to males (median = 68 years; IQR 49-81; St.Diff. 0.48) and were more likely to have comorbidities (84% vs. 74%; St.Diff. 0.27). Males were more likely to have severe trauma (i.e., ISS ≥ 15) (33% vs. 25%; St.Diff. 0.18) and to be admitted to the ICU (36% vs 26%; P < 0.01). The adjusted analysis showed that females had lower odds of admission to a trauma lead centre (OR 0.75; 95% CI 0.72-0.78). This disparity was more pronounced among patients ≥ 65 y/o (OR 0.72; 95% CI 0.68-0.75) compared to younger patients (OR 0.84; 95% CI 0.78-0.90).
Conclusions: Female patients with TBI were older, had more comorbidities, and had less severe injuries. Female patients were less likely to be transferred to a trauma lead centre compared to males after adjusting for age, comorbid burden, severity of injury, and socioeconomic factors.



Adjusted predicted probabilities[†] of TLC admission by age and sex. TLC: trauma lead centre.[†] Adjusted by injury severity score, rural setting, income, and comorbidities

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7. This study was supported by funding from the Kimel-Schatzky Traumatic Brain Injury Research & Innovation Competition, awarded to Dr. F. Angriman

Topic: Health services research and outcome

000825

Severe Mycoplasma pneumoniae infections requiring intensive care unit admission: epidemiology and clinical characteristics

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:825***

Introduction: *Mycoplasma pneumoniae* (MP) is a usual pathogen causing acute community-acquired pneumonia. Its prevalence fell sharply during the Covid-19 pandemic. However, since November 2023, a major surge in MP infections has been observed, with severe cases requiring admission to the intensive care units. We aimed to describe the clinical characteristics, management and outcomes of critically ill patients with severe MP pneumonia.
Methods: This is a multicenter observational analysis of patients admitted with MP pneumonia in 18 French ICUs between July 2023 and September 2024. The diagnosis of infectious pneumonia was made by clinicians in charge of the patients, and the diagnosis of MP infection was made by polymerase chain reaction (PCR) or serology tests. Cases were included either prospectively or retrospectively using ICD-10 codes. Clinical data were collected by extracting information from the patients' electronic records. Statistical analysis consisted mainly of descriptive statistics: medians and interquartile ranges, means and standard deviations, or numbers and percentages. This study was approved by the French Intensive Care Society (FICS/SRLF) Ethics Committee. We present preliminary data from the first participating centers.
Results: We included 155 patients, with a median (IQR) age of 45 years (3;64), 60 (39%) females and 95 (61%) males. Only 25% (n = 39) had an underlying chronic respiratory disease and their main characteristics are presented in the table. Most patients were fit and active, as reflected by a Clinical Frailty Scale < 3 in 73% of cases. The median Sequential Organ Failure Assessment (SOFA) score at admission was 3 (IQR, 2-4), primarily driven by the respiratory component (median 2, IQR 1-3), while all other organ systems had a median score of 0 (IQR, 0-0). In 12% of patients, lower respiratory tract specimens diagnosed MP despite a negative

nasopharyngeal PCR result. Initial co-infections were identified in 23% (n = 36), and bacterial superinfections occurred in 12% of the patients (n = 19) during ICU stay. The maximal respiratory support was conventional oxygen therapy for 32% of the patients (n = 50), high-flow nasal oxygen (HFNO) for 42% of the patients (n = 67) for a median duration of 3 days (IQR, 2-5), non-invasive ventilation (NIV) in 6% (n = 10) for a median of 3 days (IQR, 2-4), and invasive mechanical ventilation for 17% (n = 27), with a median duration of 10 days (IQR, 5-20). Corticosteroids were administered to 34% of patients (n = 52). The overall prognosis was favorable, with a low in-hospital mortality rate of 2% (n = 3).

Conclusions: The post-COVID-19 *Mycoplasma pneumoniae* infection epidemic was marked by low rates of intubation and mortality. Most of the patients admitted to the intensive care unit presented with isolated respiratory failure. However, among those who required intubation, the duration of mechanical ventilation was long, with a median of 10 days.

	N=155
Demographic characteristics	
Chronic respiratory disease	39 (25%)
Chronic heart disease	36 (23%)
History of hematological cancer	20 (13%)
Diabetes mellitus	15 (10%)
History of neurological disease	7 (5%)
Chronic kidney disease	7 (5%)
ICU management and outcomes	
Invasive mechanical ventilation	27 (17%)
ICU survival	152 (98%)
ICU length of stay (days)	5 [3;8]
Hospital length of stay (days)	10 [7;16]

Demographic characteristics and outcomes of the 155 patients included. Data are presented as median [interquartile range] or number (percentage). ICU: intensive care unit

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Topic: Infections and prevention

000826

Outcomes of chronic critical illness in a Portuguese ICU

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:826***

Introduction: Advances in critical care have significantly improved survival rates in the initial phase of critical illness. However, this has led to the emergence of a patient population requiring prolonged intensive care unit (ICU) support due to persistent organ failure—a syndrome known as Chronic Critical Illness (CCI) (1-3). This population accounts for approximately 11% of all ICU patients but consumes up to 40% of ICU resources (2). Despite various therapeutic approaches proposed to address this growing issue, the prevalence of CCI remains high, imposing a substantial burden on patients, their families, healthcare resources, and the economy (4-8). There is a need to understand the variables contributing to good outcomes in this patient population in order to improve decision making and outcomes.

Objectives: To characterize the population of CCI patients admitted to the ICU of Hospital de Faro in 2023 and identify key prognostic factors.

Methods: We undertook a retrospective observational cohort study of all ICU patients admitted for more than 14 days in the level 3 ICU of the Hospital de Faro in 2023. We collected demographic, clinical and outcome data and compared patients who survived their ICU stays with those who did not.

Results: A total of 95 patients had ICU stays exceeding 14 days in 2023. The majority were male (73.7%) and the mean age was 59.6 ± 15.3 years. Most admissions were medical (39%) or urgent surgical (33.7%) cases. Neurocritical care (61.1%) and sepsis (25.3%) were the most common diagnoses. The average ICU stay for the cohort was 26.1 ± 13.6 days and the average duration of mechanical ventilation was 26.9 ± 13.3 days. Mortality was 31.6% at 28 days, 41.1% at 3 months and 52.6% at 6 months. Non-survivors were significantly older, had longer ICU stays, higher severity of illness scores on admission (APACHE II, SAPS II, SAPS III), and were more likely to have an admission diagnosis of sepsis (Fig. 1). Survivors were more often neurocritical care patients. Tracheostomy rates were similar between the two groups. In logistic regression age, ICU length of stay and SAPS II scores were independently associated with higher 3-month and 6-month mortality.

Conclusions: Chronic critical illness was associated with the need for prolonged ventilatory support and high mortality at 3 and 6 months. Age, illness severity scores (APACHE II, SAPS II, SAPS III) and sepsis diagnosis were independent predictors of 3-month mortality. Conversely, neurocritical care patients had higher than expected survival rates. Our findings reinforce the prognostic value of established severity scoring systems and emphasize the heavy resource utilization and poor outcomes of chronic critical illness.

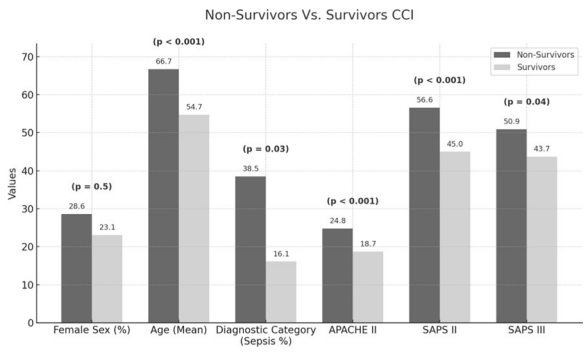


Fig. 1 (abstract 000826) Clinical and demographic variables associated with 3-month mortality in CCI patients. Nonsurvivors had higher age, sepsis prevalence, and severity scores (APACHE II, SAPS, SAPS II) as compared to survivors ($p < 0.05$)

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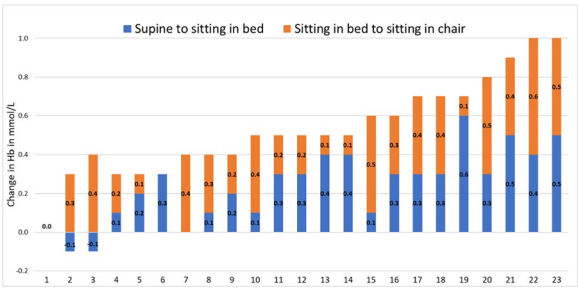
Topic: Health services research and outcome

000828

Effects of postural change and mobilization on hemoglobin levels in patients on the ICU

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:828***

Introduction: Anemia is frequent in ICU patients, primarily due to blood losses and reduced hemoglobin (Hb) synthesis. While posture related Hb changes have been reported, they remain unstudied in ICU patients. Hb increases upon standing have been attributed to plasma volume loss at increased hydrostatic pressure [1,2]. Effects of mobilization on Hb values have not been studied but might occur if pooled erythrocytes are redistributed with increased blood flow. An acute phase response with changes in ESR or CRP could modify these effects by altering vascular permeability and erythrocyte aggregation [3].
Objectives: To study the effects of posture and mobilization on Hb levels in ICU patients sufficiently stable to be mobilized. Secondary objectives included correlations between Hb and albumin (Alb) changes and baseline values of ESR and CRP.
Methods: A prospective, single-center uncontrolled interventional study in ICU patients aged ≥ 18 years. A priori power calculation determined that 23 patients were sufficient to detect relevant Hb changes. Major exclusion criteria included artificial ventilation, high doses of vasopressors, diuretic treatment, significant fluid shifts or transfusions within 24 h of sampling, right heart failure, bleeding and hematological disorders. Baseline arterial Hb, Alb, ESR and CRP were measured after lying supine for ≥ 6 h overnight. Hb and Alb measurements were repeated 30 min after a passive change to a sitting position in bed and again after mobilizing patients to a sitting position in a chair. Hb changes were analyzed using a linear mixed-effects model. Spearman's rank correlation was used to assess relationships between Hb change and Alb change, ESR, and CRP.
Results: 23 patients were included (median age 72 y, 57% male) with an average Hb of 6.9 (95% CI: 6.2-7.6) mmol/L in the supine position. A passive change to sitting in bed resulted in an increase of 0.2 (CI: 0.1-0.3) mmol/L, with a further increase of 0.3 (CI: 0.2-0.4) mmol/L after mobilization to a chair (both $p < 0.001$). The respective increases in Alb were 1.0 (CI: 0.5-1.4) g/L and 0.9 (CI: 0.5-1.4) g/L. There was a positive correlation between changes in Hb and changes in Alb (Spearman = 0.724, $p< 0.001$). No significant correlations were observed between ESR, or CRP and changes in Hb. The measured changes in Hb for individual patients are shown in Fig. 1.
Conclusions: Changes in the posture and mobilization were associated with Hb levels in a cohort of stable ICU patients. Measured changes in our study could affect transfusion decisions in selected patients. Concomitant changes in Alb suggest that plasma volume shifts contribute to the observed changes in Hb. As hydrostatic effects appear to equilibrate at around 30 min [4] a further increase in Hb upon mobilization may point to circulatory changes as another source of variability. These findings highlight the importance of considering both posture and immobility when interpreting Hb levels in ICU patients.



Overview of measured changes in hemoglobin (mmol/L) per individual from supine to sitting in bed, and following mobilization to a chair. Individual patients are ranked from no change to the largest total change in hemoglobin observed.

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Topic: Transfusion and hemostasis disorders

000829

Candida auris candidemia in critically ill patients: epidemiology, predictive factors and prognostic impact

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:829***

Introduction: *Candida auris* is a multidrug-resistant yeast that is being increasingly reported worldwide.
Objectives: To describe the epidemiology of *Candida auris* candidemia, identify its predictive factors and evaluate its prognostic impact.
Methods: Retrospective study conducted in the intensive care units (ICUs) of two tertiary hospitals. All adult patients with candidemia admitted between 01.01.2022 and 31.03.2024 were included. Two groups were compared: *Candida auris* candidemia (CA) and non-candida auris (NCA) candidemia groups.

Results: During the study period, 51 patients developed candidemia including 27 (52.9%) patients with *Candida auris*. The mean age of all included patients was 64.9 ± 17.2 years. Mean SAPSII was 60.9 ± 20.1. there was no significant difference between both groups in terms of invasive venous lines requirement, urinary catheters insertion, and parenteral nutrition administration as risk factors for candidemia. However, the invasive venous access was left in situ for significantly longer time in (CA) group patients at the candidemia onset (21 [12-43.8] versus 9 [6-15] days; ***p* = 0.007**). Moreover, patients with *Candida auris* candidemia had significantly higher rate of colonisation with carbapenem-resistant Enterobacteriales (CRE) (51.9 vs 20.8%; ***p* = 0.022**). All patients received at least one broad spectrum antibiotic during the three months preceding candidemia. However, *Candida auris* candidemia was more frequently associated with previous exposure to ceftazidime–avibactam (40.7% vs 8.3%; $p = 0.008$) and/or tigecycline (44.4% vs 12.5%; $p = 0.012$). Similarly, previous exposure to antifungals was significantly higher in (CA) group (74.1% Vs 33.3%; $p = 0.004$). All *Candida auris* isolates were resistant to fluconazole and sensitive to echinocandins and amphotericin B. In multivariate analysis, only previous exposure to antifungals was identified as an independent factor predicting *Candida auris* candidemia (OR = 6.5 CI95% [1.7-25.3]; ***p* = 0.007**).
Candidemia was associated with higher rate of septic shock (83.3% vs 40.7%; ***p* = 0.002**), and higher requirement of mechanical ventilation (95.8% vs 63%; ***p* = 0.004**) in patients with *non-Candida auris* fungemia. The 28-day mortality was 66.7%. There was no significant difference between (CA) and (NCA) groups in terms of 28-day mortality (OR = 0.3 95% CI [0.1-1.1]; $p = 0.08$).
Conclusions: *Candida auris* became the dominant isolate in our units during the study period. Exposure to broad spectrum antibiotics and antifungals, in addition to colonization with CRE represent the main risk factors for *Candida auris* fungemia. However, the associated 28-day mortality rate was not different in comparison to candidemia caused by other species.

Topic: Sepsis

000830

Microcirculation assessment with hyperspectral imaging as innovative measure for nociception monitoring—results from an exploratory prospective study on awake volunteers

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*830

Introduction: Nociception monitoring remains a relevant challenge for patients in intensive care and during surgery. Awake patients can rate nociceptive stimuli on a numeric rating scale (NRS), which not feasible for deeply sedated patients. Nevertheless, nociception monitoring is crucial, as nociception leads to an activation of the autonomic nervous system (ANS), which has potential negative influence on outcome [1]. At the same time, ANS activation results in changes of microcirculation. Microcirculation can be measured with hyperspectral imaging. Within 20 s a hyperspectral image can be recorded without contact and the use of ionizing radiation. Based on light absorption and reflection tissue parameters are calculated [2].
Objectives: The aim is to explore whether nociception monitoring via hyperspectral imaging of the palm is feasible.
Methods: We included 20 healthy awake volunteers of the Medical Faculty Heidelberg (ethics: S-482/2024, registry: DRKS00034934). A blood pressure cuff which was inflated with 50 mmHg above systolic blood pressure for five minutes was used as a tourniquet on the left leg. The resulting ischaemic pain was rated by the participants on NRS from 0-10 every 30 s. At the same time, hyperspectral images of the right palm were recorded with the MDR certified TIVITA® 2.0 camera (Diaspective Vision GmbH, Germany). Tissue oxygen saturation (O2), near infrared perfusion index (NIR), and tissue haemoglobin index (Hb) were calculated and compared with ten images before stimulation. Normally distributed mean parameters were analysed with a paired t-test.
Results: The volunteers were between 18 and 40 years old, 55% were female, and gave their informed consent. Overall, 199 images were recorded before and 198 during stimulation, of which 104 were rated as painful (NRS > 3) by 16 participants. NRS ratings increased over time starting with a mean of 3.13 (SD = 2.68) and ending with 5.73 (SD = 1.44). Baseline range was 49-75% for tissue O2, 45-67 for NIR, and 18-39 for tissue Hb. During pain a decrease of mean tissue O2 (– 0.41%, SD = 2.23) and an increase of NIR (+ 0.41, SD = 2.07) and tissue Hb (+ 1,6, SD = 3.96) were observed. Similar effects were observed while the stimulation was rated NRS < 3 (Fig. 1). The change was especially noticeable in six participants who rated the beginning of the stimulation painful with a mean tissue O2 -2.83% (SD = 4.07, p = 0.149), NIR – 1.67 (SD = 1.63, p = 0.055), and tissue Hb + 4.67 (SD = 3.93, $p = 0.034$) in the first image (Fig. 2). After an initial decrease, NIR usually went back to the baseline within 90 s.
Conclusions: During nociception small changes in microcirculation occur in the palm which can be measured via hyperspectral imaging. Further studies should evaluate, whether these changes are similar for different body regions and whether they are still detectable during catecholamine infusion in critical patients. NIR and tissue O2 might be indicators for the onset of nociception while tissue Hb stays on a higher level throughout stimulation.

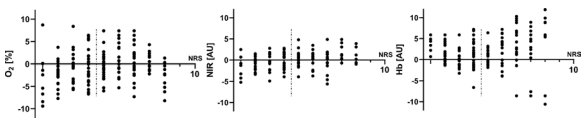


Fig. 1 (abstract 000830) Hyperspectral tissue parameters during stimulation. In comparison to the baseline, tissue oxygen saturation (O2 in percent) decreases and near infrared perfusion index (NIR in arbitrary units) as well as tissue haemoglobin index (Hb in arbitrary units) increase during painful stimulation (NRS > 3, dotted line) ($n = 16$)

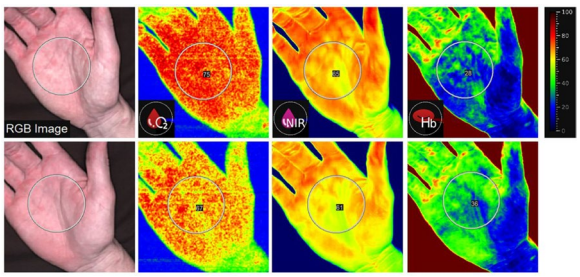


Fig. 2 (abstract 000830) Change of microcirculation in hyperspectral images. In the upper row, the last baseline measurement of one participant is depicted with colour coded images for the tissue parameters from left to right oxygen saturation (O2 in percent), near infrared perfusion index (NIR in arbitrary units) and haemoglobin index (Hb in arbitrary units). In the lower row, changes of the microcirculation after the start of the painful stimulation (NRS = 6) can be observed. Tissue parameters are calculated for a circular region of interest

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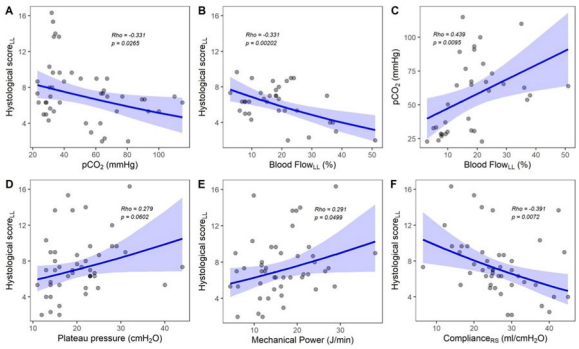
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Topic: Imaging in intensive care

Pathophysiological determinants of lung injury after unilateral pulmonary artery ligation

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Introduction: Unilateral pulmonary artery ligation induces local injury. Mechanisms involved remain mostly unknown and could include regional hypocapnia, worsening mechanics increasing stress, and hypoperfusion [1,2].
Objectives: We conducted a large observational experimental study in 46 pigs undergoing unilateral ligation of the left pulmonary artery and different ventilation strategies, to identify pathophysiological mechanisms and protective factors correlated to lung injury.
Methods: Sedated, paralized and mechanically ventilated healthy pigs underwent left pulmonary artery ligation. Animals were treated with different levels of PEEP (1-5 cmH2O), respiratory rate (15-25 b/min), and tidal volume (Vt, 6-15 ml/kg), and were kept at various arterial pCO2 levels (obtained by low Vt, instrumental dead space or inhaled 5% FiCO2), in the supine or prone position. Physiological (all animals) and EIT ventilation and perfusion data (n = 34) were collected and analyzed at the end of the experiment (24 or 48 h) and the validated [1] lung injury histological score (HS) was assessed after euthanasia.
Results: The left lung with pulmonary artery ligation developed lung injury with median HS of 7 [5;9] and large variability (range 2-16). Lower left lung HS correlated with increasing arterial pCO_2 levels (Fig. 1A), and with higher blood flow reaching the left lung from the bronchial artery (Fig. 1B). We also confirmed that bronchial blood flow was positively correlated to PaCO2 (Fig. 1C) [3]. Left HS was correlated with higher lung stress, as assessed by higher plateau pressure and mechanical power (Fig. 1D-E), likely caused by worsening respiratory system compliance (Fig. 1F). Interestingly, regional index of wasted ventilation (left side Vt, minute ventilation, dead space fraction and ventilatory ratio) were not correlated with left lung HS ($p > 0.05$), questioning the pathological role of alveolar hypocapnia. Adjustment for treatment strategies (PEEP, body position, Vt, respiratory rate, duration) did not alter the abovementioned correlations.
Conclusions: In our large animal model of unilateral pulmonary artery ligation on controlled ventilation, regional hypoperfusion seems to play a key role for the development of injury. Higher arterial pCO2 protects the lung also by increasing regional blood flow, while impaired respiratory mechanics and higher inspiratory stress could be early signs of injury (but also potential triggers of a pathologic vicious circle).



PaCO2 showed negative association with histological score (HS) (**A**) and blood flow in the left lung (**B**). Blood flow and PaCO2 were positively correlated (**C**). Higher left HS was correlated with increased plateau pressure (**D**), mechanical power (**E**), and decreased total compliance (**F**). Rho and *p* values for Pearson correlations are reported in the graphs. LL = left lung, RS = respiratory system

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Topic: Acute respiratory failure and mechanical ventilation

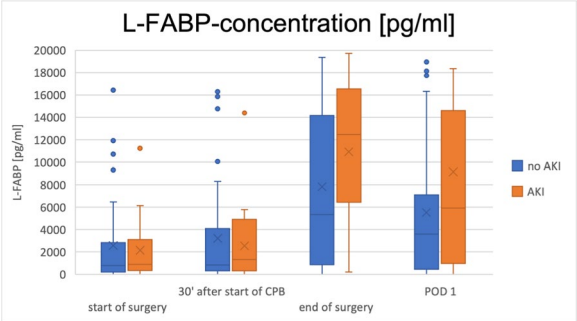
000833

Urinary l-FABP as a predictor for acute kidney injury in patients undergoing cardiac surgery on cardiopulmonary bypass

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***833***

Introduction: Cardiac surgery-associated acute kidney injury (CSA-AKI) is a major complication associated with a high mortality. Its early prediction using biomarkers has become increasingly popular in the recent years. Human liver-type fatty acid-binding protein (l-FABP) is a biomarker which is expressed in proximal tubule cells, amoung others. If a form of tubulointerstitial damage occurs, tubule cells perish and l-FABP is thereby excreted in the urine. It has gained a good predictive and prognostic value in kidney diseases during the last years.
Objectives: Our aim was to investigate if l-FABP can predict as well as diagnose acute kidney injury timely and reliably.
Methods: In this prospective cohort study, we analysed 63 patients who underwent elective cardiac surgery on cardiopulmonary bypass at the Medical University of Vienna.Urine samples were collected at the beginning of the operation, 30 min after start of CPB, at the end of surgery and on postoperative day (POD) 1.Quantitative measurement of l-FABP was performed by an enzyme-linked immunosorbent assay (ELISA) with a 96-well plate human l-FABP-ELISA (R&D-Systems, Minnesota, USA). Patients were grouped in two groups: patients without postoperative CSA-AKI and with CSA-AKI, according to KDIGO-criteria.
Results: We report 63 patients (25 female), with a mean age of 67.1 ± 11.6 years. In 12.7% (*n* = 8) CABG, in 57.1% (n = 36) a valve, in 28.6% (n = 18) a combined procedure and in one case (1.6%) a Bentall was performed. According to the KDIGO-criteria (5), 19 patients (30.2%) of the patients suffered from CSA-AKI, none of them needed renal replacement therapy.
Urinary l-FABP levels increased continuously from start of surgery started until the end of surgery (baseline, 2444 ± 3637 pg/ml; 30 min after initiation of CPB, 3012 ± 4385 pg/ml; end of surgery, 8775 ± 7803 pg/ml) and decreased again on POD1 (6660 ± 7661 pg/

ml). At the end of surgery urinary l-FABP levels were significantly different between non-CSA-AKI and CSA-AKI patients (7827 pg/ml vs. 10918 pg/ml, $p = 0.046$).
Conclusions: Urinary l-FABP has the possibility to predict CSA-AKI at the end of surgery. Furthermore, we found an increase in l-FABP-levels in both, non-CSA-AKI and CSA-AKI patients as sign of subclinical renal impairment in every patient.



l-FABP concentration in patients without AKI and with AKI.

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Topic: Acute kidney injury and hemofiltration

000835

Bloodstream infections in patients with ICU-acquired rectal colonization by MDR pathogens: a retrospective single cohort study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:835***

Introduction: Antimicrobial resistance (AMR) and healthcare-associated infections are growing global threats for public health. High levels of multidrug-resistant organisms (MDROs) is a concerning issue in Hellenic health system especially due to and their frequent transmission to newly admitted patients. ICU patients often acquire intestinal colonization by different MDROs which is associated with increased risk for bloodstream infections (BSI) caused by the same colonizing organism.
Objectives: Aim of the study was to record local epidemiology of intestinal colonization in our cohort of ICU patients, establish the most prevalent strains, assess the rate of subsequent BSIs caused by the same colonizing strain and evaluate BSI resolution.
Methods: A retrospective single cohort study was conducted from 01 January to 31 [32]. Age, sex, APACHE II, SOFA, Charlson Comorbidity Index (CCI) and active COVID19 infection were recorded on admission day. Patients with positive rectal swab on admission as well as those with ICU length of stay (I-LOS) shorter than 72 h were excluded per study protocol. BSI by the same colonizing rectal strain (swab monitored once weekly) during their ICU stay were recorded. Resolution of BSI positivity, I-LOS and survival were also recorded. Linear regression tested associations between variables. Chi-square test examined association between categorical variables and Cramer's V measured their association.
Results: Rectal colonization data are presented in Fig. 1. Among 55 new rectal carriers with median age 75 years, 33 (60%) were men and 30 (55%) were admitted with active COVID19 infection. Mean APACHE_II was 24.48 (± 6.9), SOFA 7.98 (± 2.76), CCI 5.57 (± 2.44) and LOS 29.91 days (± 10). 14 patients (25.45%) developed BSI (11 of which were COVID19 positive), after a mean time of 10 days. 11 patients recovered from BSI successfully (50% mortality vs 40% of the overall mortality). As shown in the Flowchart (Fig. 1), the most common rectal colonizer was Klebsiella pneumoniae (Kp) with metallo-b-lactamase (MBL) enzyme, followed equally by Acinetobacter MBL and Kp_KPC. The presence of BSI was not associated with increased mortality in comparison with patients with no BSI and neither was COVID19 infection itself. The presence of COVID 19 infection was moderately associated with BSI appearance (Cramer's V effect size = 0.26, p=0.05).
Conclusions: In our cohort of patients MBL enzymes were the main enzymes of intestinal colonizing strains. Therefore these patients are at increased risk for BSI from difficult to treat bacteria. We found that COVID19 infection, with its concomitant immunosuppressive and antibiotic therapy, must have contributed to this. In this ongoing work we aim to better understand the mechanisms that contribute to this rapid dissemination of MDROs. The knowledge of AMR status, microbe's virulence and host's specific risk factors may help establish preventive measures, assess risk stratification and finally reduce the risk of ICU-acquired infections.

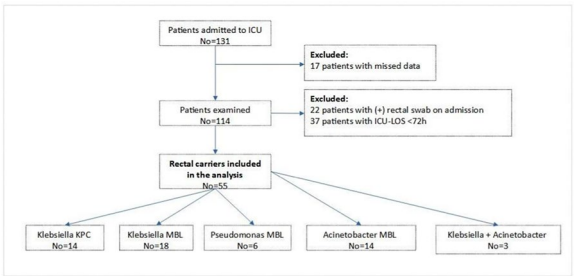


Fig. 1 (abstract 000835) Study flowchart. MBL = Metallo-b-lactamase

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Topic: Infections and prevention

000836

Impact of pre-ECMO mechanical ventilation days and coinfection in mortality: an analysis of the ELSO registry of COVID-19 ARDS patients with extracorporeal respiratory support

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:836***

Introduction: Veno-venous extracorporeal membrane oxygenation (VV-ECMO) is a potentially life-saving intervention for patients with refractory respiratory failure with an increasing use in the recent years. Currently, the only absolute contraindication is futility, but relative contraindications include the duration of mechanical ventilation prior to ECMO—which is often cited as not more than 7 to 10 days (1-4). This was one of the main exclusion criteria during COVID-19 pandemic, potentially denying patients a life-saving intervention (5). The recent studies have questioned the strict application of these cutoffs, with some suggesting no clear relationship between pre-ECMO ventilation duration and mortality (6-8). Other factors, such as pre-ECMO infections, may play a more significant role and act as confounding factor in this association. As prolonged mechanical ventilation increases the risk of infection(9), and ECMO is sometimes initiated due to complications of such infections, it is possible that coinfection, rather than ventilation duration per se, is the primary determinant of outcomes.
Objectives: To evaluate the impact of pre-ECMO mechanical ventilation duration and coinfections on mortality in COVID-19 patients receiving VV-ECMO.
Methods: A retrospective study was conducted including the adult COVID-19 patients with respiratory ECMO support from the ELSO registry data, from January 2020 to May 2022. Data collected included days of mechanical ventilation, pre-ECMO assessment, complications, coinfections at ECMO initiation and outcomes. We excluded patients with cardiac arrest. The relationship between mechanical ventilation duration, coinfection and mortality was studied with a causal mediation analysis. Survival was evaluated using Kaplan–Meier survival function.
Results: 12803 patients were analyzed. Hospital mortality was 44.8% in patients without coinfection and 52.3% in those with coinfection. There was no significant association between duration of mechanical ventilation prior to ECMO and mortality (OR 1.00; 95% CI 0.99-1.01; P = 0.517). However, the presence of coinfection at the time of ECMO initiation was significantly associated with increased mortality (OR 1.35; 95% CI 1.26-1.44; $P < 0.001$). In addition, longer mechanical ventilation was significantly associated with a higher risk of coinfection (OR 1.04; 95% CI 1.03-1.05; $P < 0.001$). When examining the simultaneous effects of both variables on mortality, days of mechanical ventilation were not associated with mortality (OR 1.00; 95% CI 1.00-1.01; $P = 0.884$), whereas coinfection remained significantly associated with increased mortality (OR 1.37; 95% CI 1.26-1.47; $P < 0.001$).
Conclusions: Mortality was unrelated to pre-ECMO ventilation duration but significantly associated with coinfection at ECMO initiation.

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Topic: Acute respiratory failure and mechanical ventilation

000838

Evaluation of the impact of mode of ventilation on the PRE-DELIRIC delirium prediction model in a university teaching hospital general intensive care unit

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Intensive Care Medicine Experimental ***2025*** **13**(**Suppl 1**):***838***

Introduction: Delirium is an acute confusional state, associated with significant functional and cognitive impairment [1,2] and is linked to increased mortality, morbidity, treatment costs and long term cognitive decline and mental ill health [3]. If risk is determined, effective preventative measures may help improve patient outcomes. The PRE-DELIRIC model is the most widely used day of ICU admission delirium prediction tool [4,5]. Up to 80% of mechanically ventilated patients in ICU develop delirium [6], however the impact of mode of ventilation on efficacy of the PRE-DELIRIC model has not been evaluated.
Objectives: Determine how mode of ventilation impacts the performance of the PRE-DELIRIC model.
Methods: We retrospectively analysed data from patients admitted to a teaching hospital mixed ICU between April 2023 and December 2024. Patients were excluded if the 10 data parameters of the PRE-DELIRIC tool were not available or no delirium assessments, using the CAM-ICU, were documented during the ICU stay. Patients were grouped according to mode of ventilation and PRE-DELIRIC scores were calculated. AUROC values were used to evaluate the predictive power of PRE-DELIRIC scores in each group of patients.
Results: Of the 3256 patients admitted into the hospital GICU from April 2023-December 2024, 1254 (38.5%) were included in the analysis. The AUROC of the PRE-DELIRIC model for the total cohort was 0.766 (95% CI 0.739-0.793), suggesting good predictive power. The following characteristics table shows the AUROC values according to highest mode of ventilation patients received:

Table 1 (abstract 000838) xxxx

Characteristics Table	All Patients (*n*=1254)	Invasive Ventilation (*n*=516)	Non-Invasive Ventilation (*n*=174)	No Ventilation (*n*=564)
Sex, male (%)	723 (57.7)	328 (63.6)	92 (52.9)	303 (53.7)
Age (years), mean ± SD	70.0, ±17.3	59.5, ±17.1	64.4, ±13.5	61.3, ±18.6
APACHE-II score, mean ± SD	17.0, ±4.8	17.1, ±4.8	19.0, ±4.4	16.2, ±4.8
Sedative Use (%)	575 (45.9)	503 (97.5)	26 (15.0)	46 (8.2)
Metabolic Acidosis (%)	330 (26.3)	161 (31.2)	31 (17.8)	138 (24.5)
Unplanned/Urgent Admission (%)	1110 (88.6)	458 (88.6)	167 (96.0)	485 (86.0)
Coma: Any(%)	284 (22.6)	282 (54.7)	0 (0)	2 (0.4)
- Drug-Induced (% of *n*)	- 137 (10.9)	- 136 (26.4)	- 0 (0)	1 (0.2)
- Misc. (% of *n*)	- 26 (2.1)	- 26 (5.0)	- 0 (0)	0 (0)
- Mixed (% of *n*)	- 121 (9.6)	- 120 (23.3)	- 0 (0)	1 (0.2)
Admission Category:				
- Surgery (%)	- 308 (24.6)	- 134 (26.0)	- 19 (10.9)	155 (27.5)
- Medical (%)	- 813 (64.8)	- 302 (58.5)	- 144 (82.8)	367 (65.1)
- Trauma (%)	- 131 (10.4)	- 78 (15.1)	- 11 (6.3)	42 (7.4)
- Neurology (%)	- 2 (0.2)	- (0.4)	- 0 (0)	0 (0)
Infection (%)	927 (73.9)	420 (81.4)	136 (78.2)	371 (65.8)
AUROC (95% CI)	**0.766 (0.739-0.793)**	**0.628 (0.579-0.676)**	**0.780 (0.693-0.866)**	**0.670 (0.615-0.724)**

Conclusions: Overall, the PRE-DELIRIC model demonstrates a good predictive value of developing delirium in our ICU patients. The performance of the PRE-DELIRIC tool was better in patients receiving non-invasive ventilation compared to those receiving invasive ventilation or no ventilation.

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Topic: Sedation, analgesia and delirium

000839

Prehospital management of acute heart failure by EMS 03: clinical characteristics and outcomes: an 8-month observational study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***839***

Introduction: Heart failure (HF) is a global health concern, affecting approximately 26 million people according to the European Society of Cardiology (ESC). Its prevalence continues to rise due to population aging and improved cardiovascular disease management. HF remains a major challenge in prehospital medicine.
Objectives: This study aimed to (1) describe epidemiological and clinical characteristics of HF patients transported by EMS 03's mobile intensive care unit (SMUR) over eight months, and (2) analyze therapeutic approaches and medium-term outcomes.
Methods: A longitudinal, exhaustive study of all HF cases managed by EMS 03 at Sahloul University Hospital (Sousse, Tunisia) from October 1, 2023, to May 31, 2024. Data included sociodemographics, clinical features, treatments, and outcomes. Survival analysis was performed using the Kaplan–Meier method.
Results: Among 120 enrolled patients: Demographics: Mean age 69.6 ± 10.2 years, male predominance (62.5%). Comorbidities: Hypertension (60%), diabetes (50%), chronic HF (45.8%). Clinical Presentation: Dyspnea (92.5%), respiratory distress (94.1%), tachypnea (66.6%), accessory muscle use (59.2%). Auscultation: Crackles (86.4%), wheezing (10%). Mean BP: 150.04/83.6 mmHg. ECG repolarization abnormalities (46.7%). Management: CPAP (69.2%), diuretics (84.2%), nitrates (41.7%), antithrombotics (33.3%), antihypertensives (15.8%). Outcomes: Decompensation triggers: ACS (36.5%), infection (25%), hypertensive crisis (21.7%). Initial improvement: 79.2% at 24h, 94.1% at 7 days (5.9% unfavorable). Oxygen dependence persisted in 12.2%. 30-day survival: 96%. Median survival: 24 h (no significant subgroup differences).
Conclusions: Our findings demonstrate the effectiveness of prehospital HF management strategies in this cohort. Multicenter studies are needed to validate these results and optimize protocols.

Topic: Acute respiratory failure and mechanical ventilation

000840

The effectiveness of FOUR Score versus GCS scale in predicting mortality and morbidity in traumatic brain injured patients in intensive care: a systematic review

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***840***

Introduction: Traumatic brain injuries (TBI) is one of the leading causes of death and disability worldwide. In Intensive Care, the Glasgow Coma Scale (GCS) is widely used to assess severity of brain injury. An alternative tool is the Full Outline of UnResponsiveness (FOUR) score which assesses stages of locked-in syndrome and brain herniation.
Objectives: To evaluate the effectiveness of both assessment tools in predicting mortality and morbidity in TBI patients in ICU. Is the FOUR score more effective in predicting mortality and morbidity in critical ill patients with TBI in ICU compared to GCS?
Methods: Systematic review guided by the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis (2021). A comprehensive database search was conducted for the period January 2005—September 2023. Searches repeated in February 2025. Primary research comparing FOUR with GCS, published in English, including adults aged 16 and over and patients with TBIs in ICU were included. Studies were appraised using JBI critical appraisal tools. Data were narratively synthesised.
Results: Eleven studies were included. No study reported significant statistical differences between GCS and FOUR score in predicting mortality. Area under the curve and receiving operating characteristic curve values for both tools were rated good to excellent (Range 0.80-0.96) in predicting mortality. Morbidity was only reported in 6/11 studies. Both assessment tools perform similarly in predicting mortality and morbidity. There was a great variability in which and how morbidity outcomes were assessed.

Conclusions: Further research to determine the additional clinical benefits of FOUR assessment in this population is recommended. The development of core morbidity outcome measures in patients with TBI is required to evaluate if these tools effectively predict morbidity. Effective prognostication may assist healthcare providers in managing resources as well as providing patients and families with realistic expectations of long-term recovery.

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Topic: Neurointensive care

000841

ADELPHA: association between delirium and the presence of alpha band

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Intensive Care Medicine Experimental 2025 13(**Suppl 1**):***841***

Introduction: ADELPHA: Association between delirium and the presence of alpha band
Objectives: Delirium (DEL) is a common complication in critically ill patients who are mechanically ventilated and under sedation. Having predictive and/or predisposing data for DEL occurrence could lead to the implementation of measures in order to minimize or prevent its development. The presence of alpha-band EEG (8-12 Hz) activity in the spectral density matrix (SDM) during general anesthesia monitoring has been associated with lower incidence of postoperative DEL; however, this has been poorly studied in critically ill patients
Methods: The ADELPHA study (Delirium/Alpha Band Association) is a prospective, observational, single-center study analyzing frontal/temporal EEG data collected through unilateral/bilateral BIS® monitoring. Mechanically ventilated patients under deep sedation (RASS − 4, − 5) with GABAergic sedatives (midazolam and/or propofol) throughout the entire period of deep sedation were included. The SDM of each patient, exported daily from the monitor in PDF format, was analyzed by two investigators and visually classified into two groups based on the absence or presence of alpha- band activity. The latter group was further subclassified into three categories based on the color intensity of the alpha- band: high (bright red), medium (sustained yellow), and low (yellow traces). Upon sedation withdrawal, the presence and duration of DEL were assessed
Results: 58 patients were included in the study. The incidence of DEL was 25/39 (64%) in the alpha band group vs. 17/19 (89%) in the non-alpha band group, ($p = 0.042$). Median DEL duration was 1 day in the alpha band group vs. 4 days in the non-alpha band group ($p = 0.113$). Among the different subgroups of the alpha- band, a higher incidence and longer duration of DEL were observed in the low-intensity alpha-band group compared to the other groups ($p = 0.040$ and $p = 0.002$, respectively).
Conclusions: The absence of the alpha- band or its presence with low intensity in the SDM of EEG processed at the bedside is associated with a higher likelihood of DEL development and its longer duration in a group of critically ill patients undergoing deep sedation with GABAergic drugs.

Topic: Neurointensive care

000842

Mortality and functional dependence in ASPECT ≤ 7 patients admitted to the ICU undergoing mechanical thrombectomy

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Intensive Care Medicine Experimental 2025 13(**Suppl 1**):***842***

Introduction: To study mortality in the ICU, in-hospital mortality, and mortality at 6 months (6 M), as well as functional dependence (modified Rankin scale at 6 M), in patients diagnosed with acute ischemic stroke with ASPECTS ≤ 7 on computed tomography and treated with mechanical thrombectomy (MT) versus patients with ASPECT > 7
Methods: Retrospective study (January 2015-May 2024). The study includes all patients who underwent MT and were admitted to the ICU of a tertiary university hospital. Collected variables: age, gender, risk factors (hypertension, diabetes, dyslipidemia, smoking/alcohol consumption, atrial fibrillation, antiplatelet/anticoagulant therapy), Rankin score at admission, NIHSS at diagnosis, time from symptom onset to hospital admission and symptom-to-recanalization time, IV fibrinolysis, ICU and hospital length of stay, and ICU, in-hospital, and 6-month mortality. Functional dependence was defined as a Rankin score > 3 at 6 months. Quantitative variables: mean ± SD, median (IQR 25-75). Qualitative variables: absolute value (%). Statistical analysis: chi-square, Fisher's test, Wilcoxon test, and logistic regression as appropriate. Statistical significance: $p < 0.05$
Results: A total of 395 patients were included, of which 120 (30.4%) had ASPECTS ≤ 7.When comparing ASPECTS ≤ 7 vs. ASPECTS > 7, no differences were found in: age (69 ± 14 vs. 72 ± 13 years), male gender

[57 (48%) vs. 135 (50%)], risk factors, Rankin at admission [0 (0-1) vs. 0 (0-1)], time from symptoms to hospital (3 ± 3 vs. 3 ± 3 h), and time from symptoms to recanalization [5 ± 2 (30% wake-up stroke) vs. 5 ± 2 h (20% wake-up stroke)], IV fibrinolysis [30 (25%) vs. 95 (35%)], and hospital length of stay [12 (6-23.5) vs. 11 (7-19.5) days].Differences were found in: NIHSS at diagnosis (18 ± 5 vs. 15 ± 6 points) and ICU stay [1 (1-4.25) vs. 1 (1-2) days]. ICU mortality: 22 (18.3%) vs. 22 (8%); in-hospital mortality: 39 (32.5%) vs. 49 (17.8%); and 6-month mortality: 48 (40%) vs. 58 (21%). Rankin > 3 at 6 months: 85 (70.8%) vs. 123 (44.7%).After adjusting for NIHSS, ASPECTS ≤ 7 was independently associated with: ICU mortality [OR 2.22 (1.15-4.30)], in-hospital mortality [OR 1.71 (1.02-2.86)], 6-month mortality [OR 1.85 (1.13-3.04)], and Rankin > 3 at 6 months [OR 2.95 (1.19-7.54)].

Conclusions: A careful evaluation of patients with ASPECTS ≤ 7 who are being considered for MT is essential. The use of complementary tests such as perfusion CT in the decision-making algorithm may help in better selection of patients who are most likely to benefit from mechanical thrombectomy, minimizing the associated risks.

Topic: Neurointensive care

000843

Impact of second-line vasopressor on right ventricular function in vasodilatory shock

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*843

Introduction: As second-line vasopressors become increasingly used, non-catecholaminergic agents have gained attention for their distinct organ-specific hemodynamic profiles. Although both agents effectively reduce catecholamine requirements (1), some evidence suggests that angiotensin II (Ang-II) may be associated with increased pulmonary vascular resistance (2), while arginine vasopressin (AVP) appears to exert minimal pulmonary vasoconstrictive effects (3), which could be more favorable to right ventricular (RV) function (4).

Objectives: To evaluate the effects of AVP versus Ang-II on RV function when used as second-line vasopressors in patients with refractory shock.

Methods: Prospective ongoing registry (SEVERE registry, B4062024000091) including all adult patients (≥ 18 years) admitted to the ICU for refractory vasodilatory shock and treated with a second-line vasopressor (AVP or Ang-II). Patients were eligible for analysis if a complete transthoracic echocardiographic assessment was available at baseline (prior to vasopressor initiation) and at 3, 6, and 24 h following administration. The echocardiographic and hemodynamics parameters of interest and their variation in time were analyzed using Fisher's exact test, Mann–Whitney or linear mixed-effects model, as appropriate.

Results: A total of 19 patients were included between May 2024 and April 2025, 9 received AVP and 10 Ang-II. Baseline characteristics in the two groups were comparable, as shown in Table 1.At baseline, RV function assessed by TAPSE, RVS' and RV strain were significantly different in the two groups, showing lower values in patients treated with AVP compared to Ang-II ($p < 0.05$ for all comparison—Table 2). The AVP group showed a significantly greater improvement over time in TAPSE and RVS compared to the Ang-II group, with a significant group-by-time interaction ($p = 0.03$ and $p = 0.02$, respectively), as also depicted in Fig. 1. No significant differences between groups were observed for RV strain and TAPSE/PAPs ratio.

Conclusions: In vasodilatory shock, AVP was associated with greater improvement in RV function compared to Ang-II.

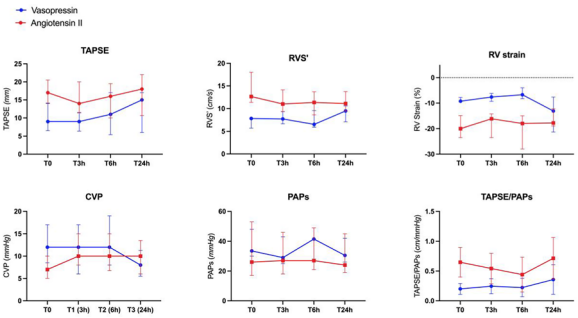


Fig. 1 (abstract 000843) Time course of right ventricular function parameters in patients treated with AVP or Ang-II: evolution of RV parameters over time (T0 = baseline, 3 h, 6 h, 24 h) in patients receiving AVP (blue) or Ang-II (red) as second-line vasopressor therapy

Table 1 (abstract 000843) Baseline characteristics of the two groups

CHARACTERISTICS	All patients (n 19)	Vasopressin (n 9)	Angiotensin II (n 10)	p*
Age (years), median (IQR)	64 (56 – 72)	65 (56 – 72)	63.5 (47 – 70)	0.65
Male, N. (%)	14 (73.7)	8 (88.9)	6 (60)	0.3
BMI (kg/m²), median (IQR)	29.3 (25.9 – 32.8)	32.7 (29.1 – 33.9)	27.6 (23.3 – 30.8)	0.07
Score at admission				
APACHE, median (IQR)	26 (20 – 30)	22 (15 – 29)	28 (25.3 – 30)	0.16
SOFA, median (IQR)	13 (10 – 16)	13 (10 – 13)	13.5 (10.5 – 16)	0.68
Comorbidities, N. (%)				
Hypertension	13 (68.4)	7 (77.8)	6 (60)	0.63
Diabetes	7 (36.8)	2 (22.2)	5 (50)	0.35
Ischemic heart disease	8 (42.1)	5 (55.6)	3 (30)	0.37
Chronic heart failure	8 (42.1)	6 (66.7)	2 (20)	0.07
Chronic pulmonary disease	3 (15.8)	1 (11.1)	2 (20)	1
Type of shock, N. (%)				
Septic	9 (47.4)	3 (33.3)	6 (60)	0.37
Cardiogenic	3 (15.8)	2 (22.2)	1 (10)	0.58
Mixed	6 (31.6)	3 (33.3)	3 (30)	1.00
Other	1 (5.3)	1 (11.1)	0 (0)	0.47
Shock management, median (IQR)				
NA average in the 1st hour from shock (mcg/kg/min)	0.5 (0.22 – 0.81)	0.35 (0.17 – 0.7)	0.52 (0.44 – 0.86)	0.33
NA peak dose (mcg/kg/min)	1 (0.81 – 2.72)	0.9 (0.8 – 3.02)	1.15 (0.84 – 2.54)	0.94
Hemodynamics, median (IQR)				
MAP (mmHg)	67 (62 – 70.5)	66 (61 – 67)	70 (64.5 – 74)	0.18
EF (%)	48 (27.3 – 62.8)	33 (26 – 48.5)	58.5 (39 – 63)	0.25
SV (mL)	42 (33.5 – 54)	43.5 (39 – 54)	39 (30 – 51)	0.64
Respiratory at T0, median (IQR)				
ARDS, N (%)	4 (21.1)	0 (0)	4 (40)	0.09
PEEP (mmHg)	8 (5 – 13)	6 (5 – 9.5)	12 (8 – 13)	0.19
Vt (mL/kg)	6.18 (6 – 6.85)	6.47 (6 – 7.1)	6.18 (6.02 – 6.5)	0.6
Outcome, N (%)				
Death	14 (73.7)	8 (88.9)	6 (60)	0.30

*Significant if p<0.05

Abbreviations: ARDS: Acute Respiratory Distress Syndrome, APACHE: Acute Physiology and Chronic Health Evaluation, BMI: Body Mass Index, EF: Ejection Fraction, IQR: Interquartile Range, MAP: Mean Arterial Pressure, NA: Noradrenaline, PEEP: Positive End Expiratory Pressure, SOFA: Sequential Organ Failure Assessment, SV: Stroke Volume, Vt: tidal volume, WLST: Withdrawal of Life-Sustaining Treatment.

Table 2 (abstract 000843) Evolution of echocardiographic parameters of right ventricular function over time in patients treated with vasopressin or angiotensin II

Parameter	Drug	T0	+3h	+6h	+24h	Group interaction (p*)
TAPSE Median (IQR)	AVP	9 (7.5 – 14)*	9 (7.5 – 9.75)*	11 (7.8 – 14)	15 (9 – 17)	0.03*
	Ang-II	17 (15.6 – 19.5)*	14 (11.8 – 17)*	16 (10.2 – 18.3)	19 (17.5 – 22)	
RVS' Median (IQR)	AVP	7.80 (6.20 – 8.05)*	7.70 (7.13 – 8.80)*	6.5 (6.10 – 8.10)*	9.48 (8 – 9.96)	0.02*
	Ang-II	12.7 (12 – 16.6)*	11 (9.65 – 12.1)*	11.3 (9.23 – 12.7)*	13.2 (10.6 – 13.8)	
RV strain Median (IQR)	AVP	-9.25 (-9.3 – -8.7)*	-7.60 (-9 – -7.30)*	-6.7 (-7.5 – -5.35)*	-13.1 (-17.2 – -10.3)	0.08
	Ang-II	-20 (-22.5 – -16.8)*	-16 (-21.6 – -14.5)*	-18 (-24.8 – -16.5)*	-18.4 (-19 – -16.6)	
PAPs Median (IQR)	AVP	33.5 (31 – 45)	29 (26.5 – 36)	41.5 (35.5 – 46)	31.5 (27.5 – 36.8)	0.64
	Ang-II	26 (22.5 – 32.5)	27 (23.5 – 34.8)	27 (23.5 – 39)	24 (20.8 – 26.8)	
TAPSE/PAPs Median (IQR)	AVP	0.2 (0.14 – 0.29)*	0.27 (0.16 – 0.35)*	0.24 (0.15 – 0.31)	0.4 (0.25 – 0.49)	0.30
	Ang-II	0.59 (0.51 – 0.78)*	0.5 (0.39 – 0.66)*	0.37 (0.25 – 0.59)	0.76 (0.44 – 0.96)	
CVP Median (IQR)	AVP	12 (9 – 15)*	12.5 (10 – 15.5)	12 (8 – 16)	8 (6.25 – 9.65)	0.06
	Ang-II	7 (5 – 10)*	10 (10 – 15)	10 (7.75 – 14.3)	7 (6.50 – 11)	

*Significant if p<0.05

Abbreviations: Ang-II: Angiotensin II, AVP: Vasopressin, CVP: Central Venous Pressure, PAPs: Pulmonary Arterial Systolic Pressure, TAPSE: Tricuspid Annular Plane Systolic Excursion, RV: Right Ventricular, RVS': Right Ventricular Systolic Excursion Velocity.

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Topic: Cardiovascular issues in ICU

000844

Cardiovascular effects of landiolol in intensive care patients: a retrospective safety analysis

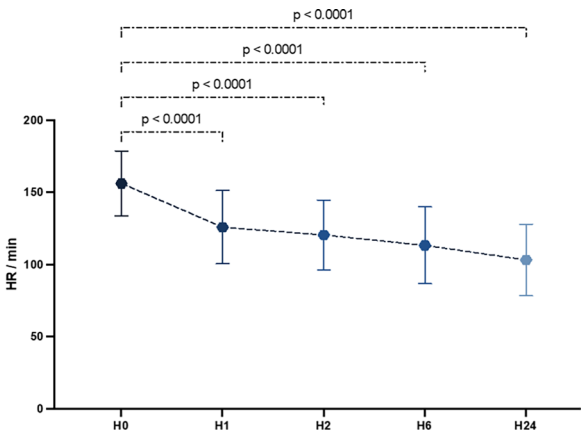
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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***844***

Introduction: Landiolol is a highly β1-selective, ultra-short-acting beta-blocker. This study aimed to analyze the cardiovascular effects and safety profile of landiolol in ICU patients.
Methods: This retrospective, observational study included patients admitted to medical or surgical ICUs in our university hospital who received landiolol. Cardiovascular parameters, including heart rate (HR), systolic, diastolic, and mean blood pressure, vasopressor catecholamine doses, and blood lactate levels, were extracted at baseline, H1, H2, H6, and H24. The primary endpoint was a composite safety outcome, defined as a decrease in mean arterial pressure (MAP) below 64 mmHg, bradycardia (HR < 50 bpm), or an increase in vasopressor catecholamine dose of more than 50%.
Results: Between January 2021 and February 2023, 73 patients treated with landiolol were identified, with a median age of 67 years; 64.3% were male. The mean norepinephrine dose at landiolol initiation was 0.30 µg/kg/min [95% CI 0.15-0.45]. The primary indications for landiolol treatment were atrial fibrillation (87.7%), sinus tachycardia associated with septic shock (8.2%), sinus tachycardia with postoperative vasoplegic shock (1.4%), and atrial flutter (2.7%). The median duration of landiolol treatment was 2 days [0.89-4.88], with a mean landiolol dose of 7.05 µg/kg/min [95% CI 6.30-7.80] over the first 24 h. The primary safety endpoint was met in 9.6%, 4.1%, 6.8%, and 2.7% of patients at H1, H2, H6, and H24, respectively. HR decreased from 156 bpm at baseline to 113 bpm at H6 ($p < 0.0001$) and 103 bpm at H24 ($p < 0.0001$). MAP and vasopressor doses remained stable over time. HR below 110 bpm was achieved in 45.2% of patients at H6 and in 61.6% of patients at H24. Conversion to sinus rhythm at H24 was observed in 35 of 66 patients (53%) initially in atrial fibrillation. ICU mortality was 37% (27/73).
Conclusions: In our experience, landiolol appears to be a safe option for treating supraventricular tachyarrhythmia in ICU patients. Careful dose titration to target HR, as recommended by atrial fibrillation guidelines, can be achieved with relatively low doses of landiolol, with minimal impact on blood pressure and stable vasopressor requirements over time.



Evolution of heart rate (bpm) during the first 24 h of landiolol administration.

Topic: Cardiovascular issues in ICU

000845

Is mechanical power normalization the key to its association with mortality in mechanically ventilated critically ill patients?

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):845

Introduction: Higher mechanical power (MP) has been associated with increased ICU mortality in mechanically ventilated critically ill patients in several studies. However, the lung damage caused by the energy delivered to the lungs may vary depending on lung size. Some studies suggest that normalizing MP by ideal body weight (IBW) or by pulmonary compliance (C) could be a better predictor of mortality.

Objectives: To assess which method of measuring MP shows the strongest association with mortality in mechanically ventilated critically ill patients

Methods: This was a retrospective, single-center observational study conducted in the mixed ICU of Hospital Universitari Joan XXIII in Tarragona. We included patients > 18 years of age admitted to the ICU (April 2022–August 2024) who received invasive mechanical ventilation (IMV) for more than 24 h. Median absolute MP (MPa) over the first 14 days of admission was calculated using the formula: *MP = 0.098 × Vt × RR × (Peak Pressure—Driving Pressure / 2)*, with data automatically recorded every 2 min from the clinical information system while patients were on volume-controlled ventilation. MP normalized by ideal body weight (MPibw) was obtained by dividing MPa by IBW, and MP normalized by compliance (MPc) by dividing MPa by the median compliance over the first 14 days. Univariate and multivariate analyses (adjusted for variables associated with mortality in the univariate analysis) were performed to identify which MP measure was most strongly associated with 14-day ICU mortality.

Results: A total of 491 patients were included. 66% were male, with a median age of 62 years (52-72), a median SOFA score of 5 (3-7), APACHE II of 17 (12-23), and Charlson Index of 3 (1-5). 94% were urgent admissions, and 63% were admitted for medical reasons, 24% due to respiratory conditions. Median MPc during the first 14 days was the only MP metric significantly associated with ICU mortality at day 14, both in the univariate analysis (Table 1) and the multivariate analysis (OR 3.98 [1.28-12.19], AUC 0.76) (Fig. 1). When MPc was categorized into quartiles, only the highest quartile (0.41-1.25 J x min-1 × ml-1 × cmH_2O) remained significantly associated with mortality (OR 2.27 [1.03-5.17], AUC 0.76) (Fig. 2).

Conclusions: MPc seems the only MP measure significantly associated with mortality in mechanically ventilated critically ill patients. These results suggest that normalizing MP by pulmonary compliance may improve its predictive value for mortality.

Table 1 (abstract 000845) Univariate analysis for mortality

Variable	Total population (N= 491)	Survived in the ICU (N=405)	Died in the ICU (N=86)	P values
General characteristics and severity of the illness				
Male, N (%)	325 (66,2)	273 (67,4)	52 (60,5)	0,3
Age (years), median (p25-75)	62 (52-72)	61 (51-71)	64 (54-75)	0,06
BMI, median (p25-75)	27 (24-31)	27 (25-31)	26 (22-29)	0,04
SOFA, median (p25-75)	5 (3-7)	4 (2-7)	6 (4-8)	<0.001
APACHE II, median (p25-75)	17 (12-23)	16 (12-22)	22 (16-27)	<0.001
Reason for admission, N (%)	Medical: 308 (62,7) Surgical: 183 (37,3)	Medical: 241 (59,5) Surgical: 164 (40,5)	Medical: 67 (77,9) Surgical: 19 (22,1)	0,002
Type of admission, N (%)	Urgent : 459 (93,5) Scheduled: 32 (6,5)	Urgent: 376 (92,8) Scheduled: 29 (7,2)	Urgent: 83 (96,5) Scheduled: 3 (3,5)	0,3
SpO2/FiO2 at admission, median (p25-75)	204 (167-251)	210 (173-253)	190 (147-242)	0,01
Comorbidities				
Hypertension, N (%)	233 (47,5)	192 (47,4%)	41 (47,7)	1
Diabetes, N (%)	106 (21,6)	88 (21,7)	18 (20,9)	0,98
Chronic heart failure, N (%)	36 (7,3)	28 (6,9)	8 (9,3)	0,6
Chronic lung disease, N (%)	52 (10,6)	41 (10,1)	11 (12,8)	0,6
Asthma, N (%)	20 (4,1)	17 (4,2)	3 (3,5)	1
Chronic kidney disease, N (%)	43 (8,8)	34 (8,4)	9 (10,5)	0,7
CHARLSON, median (p25-75)	3 (1-5)	3 (1-5)	4 (2-5)	0,1
Ventilatory variables				
Compliance (ml/cmH2O), median (p25-75)	46 (37-59)	47 (38-61)	40 (31,0-47)	<0.001
MPa (J/min), median (p25-75)	13 (10-18)	13 (10-17)	14 (11-17)	0,2
MPpbw (J/min/kgPBW), median (p25-p75)	0,21 (0,16-0,28)	0,2 (0,16-0,27)	0,22 (0,17-0,29)	0,08
MPc (J/min/ml/cmH2O), median (p25-p75)	0.29 (0,04-0,41)	0,28 (0,19-0,39)	0,36 (0,23-0,54)	0,001

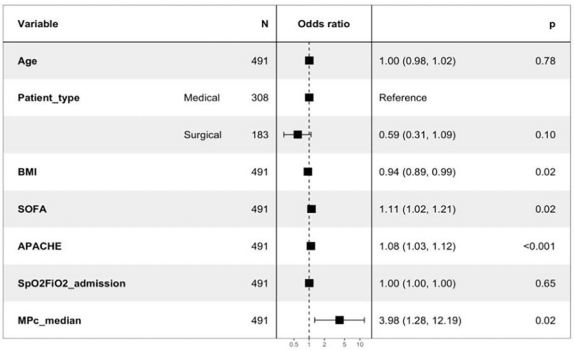


Fig. 1 (abstract 000845) Multivariate analysis of continuos MPc in relation to ICU day-14 mortality

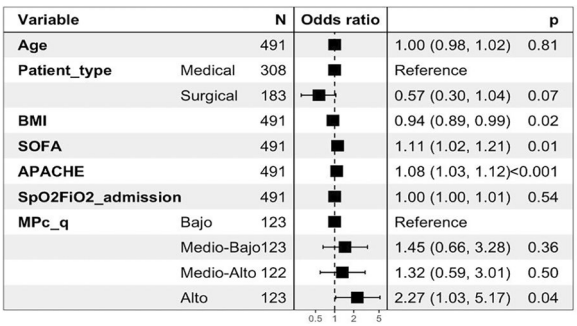


Fig. 2 (abstract 000845) Multivariate analysis of MPc by quartiles in relation to ICU day-14 mortality

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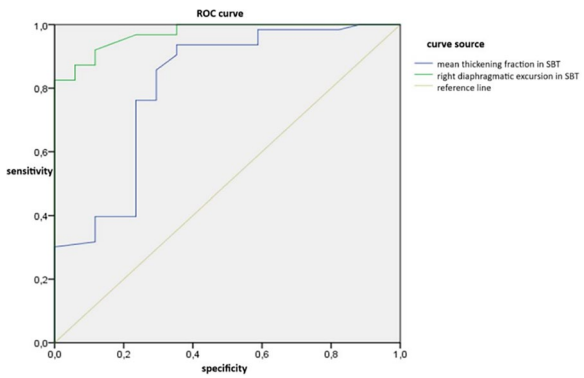
Topic: Acute respiratory failure and mechanical ventilation

000846

Diaphragmatic ultrasound as a predictive tool for weaning success in ICU: insights on excursion and thickening fraction

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Introduction: Weaning failure from mechanical ventilation is a major challenge in intensive care units (ICUs), often leading to prolonged ICU stays, increased morbidity, and higher mortality. Diaphragmatic dysfunction (DD) is a key contributor to extubation failure, but traditional diagnostic tools are invasive and impractical in critically ill patients [1-3]. Diaphragmatic ultrasound (DU) has emerged as a non-invasive, bedside method to assess diaphragmatic function and predict weaning outcomes [4,5].
Objectives: To evaluate the prognostic accuracy of diaphragmatic excursion (DE) and thickening fraction (TF) in predicting extubation success, and to identify clinical risk factors associated with weaning failure.
Methods: We conducted a prospective cohort study over six months in the ICU of Mohammed VI University Hospital. Eighty adult patients intubated > 48 h and undergoing their first weaning attempt were enrolled. Diaphragmatic excursion (M-mode, subcostal approach) and thickening fraction (M-mode, zone of apposition) were measured during spontaneous breathing trials. Extubation failure was defined as reintubation within 48 h due to respiratory or hemodynamic deterioration. Risk factors and clinical characteristics were analyzed, with multivariate assessment of outcomes.
Results: Among the 80 patients (mean age 58.2 ± 17.3 years, 61.2% male), the extubation failure rate was 40% ($n = 32$). Diaphragmatic dysfunction was present in 21.3% ($n = 17$) of patients, and it was significantly more frequent in the failure group (70.6% vs. 38.1%, $p = 0.03$).DE showed excellent predictive performance for extubation failure, with an area under the curve (AUC) of 0.972, sensitivity of 92.1%, specificity of 88.2%, and an optimal cutoff value of < 10 mm. TF was also predictive (AUC = 0.808), but less accurate than DE.Patients who failed extubation had significantly higher rates of shock (75% vs. 43.8%, $p = 0.017$), organ failure (81.3% vs. 40.6%, $p = 0.0003$), and were more likely to have received aminoglycosides (65.6% vs. 25%, $p = 0.001$) or corticosteroids (59.4% vs. 35.9%, $p = 0.043$). Smoking was also strongly associated with extubation failure (68.8% vs. 18.8%, $p < 0.0001$).In-hospital mortality was significantly higher among patients who failed extubation (79.4% vs. 4.7%, $p < 0.001$), underlining the prognostic importance of successful weaning.
Conclusions: Diaphragmatic excursion, as assessed by ultrasound, is a robust and highly reproducible predictor of extubation outcomes. Compared to thickening fraction, it demonstrates superior diagnostic performance and bedside feasibility 6. Routine incorporation of DU into weaning protocols could enable early identification of high-risk patients, individualize extubation strategies, and ultimately improve outcomes [3-5]. These findings support further multicenter validation and integration of DU into standardized weaning algorithms in the ICU.



ROC Curves Comparing Diaphragmatic Excursion and Mean Thickening Fraction for Predicting Extubation Failure

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Topic: Acute respiratory failure and mechanical ventilation

000847

Implication of alpha band loss in the development of delirium during deep sedation

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:847***

Introduction: The presence of the alpha- band EEG (8-12 Hz) in the spectral density matrix (SDM) monitoring during general anesthesia has been associated with a lower incidence of postoperative delirium (DEL). During anesthesia or prolonged sedation, patients often experience variations in the SDM with periods of persistence or loss of the alpha- band. This phenomenon may have implications in DEL development.
Methods: Sub-analysisof the alpha-band patients of the ADELPHA study (Delirium/Alpha Band Association). ADELPHA is a prospective, observational, single-center study that analyzes frontal/temporal EEG data collected through unilateral/bilateral BIS® monitoring from mechanically ventilated patients throughout the entire period of deep sedation (RASS -4, -5) with GABAergic drugs (midazolam and/or propofol) The SDM of each patient, exported daily from the monitor in PDF format, was analyzed by two investigators and visually classified into two groups based on the absence or presence of frontal/temporal alpha- band activity. The latter group was further subclassified into two categories based on the daily evolution of the alpha band: persistence throughout the entire sedation period or loss over time. Other analyzed data included demographic information, sedative doses, opioids, alpha2-agonists, and antipsychotics. Upon withdrawal of sedation, the presence and duration of delirium were assessed.
Results: Fifty-eight patients were included in the ADELPHA study of which 39were classified into the group with alpha band presence, with 25 maintaining it throughout the sedation period analyzed, and 14 losing it. The incidence of DEL was 14 (56%) in the group with persistent alpha band activity vs. 11 (79%) in the group with alpha band loss, ($p = 0.159$). The median duration of DEL was 1 day in the first group vs. 7 days in the group with alpha band loss ($p = 0.013$). The group with persistent alpha band activity required lower doses of alpha2-agonists (dexmedetomidine 6.873 vs. 12.750 mcg, $p = 0.155$), antipsychotics (haloperidol 0 vs. 13 mg, $p = 0.086$), and opioids (morphine equivalent dose 2.160 vs. 9.597 mg, $p = 0.009$).
Conclusions: Patients who exhibit the alpha band and maintain it throughout the majority of the deep sedation period tend to show a non-significant trend towards a lower incidence of DEL, a significant

reduction in its duration, and a trend towards requiring lower doses of antipsychotics and alpha2-agonists, as well as a significant reduction in opioid doses

Topic: Neurointensive care

000849

Prognostic value of hemoglobin levels in prehospital management of acute decompensated heart failure

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:849***

Introduction: Anemia, defined by the WHO as hemoglobin (Hb) levels < 13 g/dL in adult males and < 12 g/dL in adult females, is a highly prevalent comorbidity in heart failure (HF), affecting 4-35% of patients. Its severity correlates with poorer outcomes, including reduced survival, impaired quality of life, and increased hospital readmissions. The etiology is multifactorial (iron deficiency, hemodilution, inflammation, erythropoietin deficiency, medication effects, or bone marrow dysfunction). The optimal Hb target in HF remains undefined.
Objectives: To evaluate the prognostic impact of Hb levels in patients managed by prehospital emergency teams for acute decompensated HF
Methods: A 10-year retrospective study (2011-2021) was conducted in the EMS 03 region (Sousse, Monastir, Kairouan, Mahdia), including adults (> 18 years) with acute HF managed by mobile intensive care units. HF diagnosis was based on clinical, biochemical, and echocardiographic criteria
Results: Among 1,980 patients (mean age 69 ± 11 years; sex ratio 1:1):Comorbidities: Hypertension (63%), diabetes (51%), chronic HF (32%), atrial fibrillation (25%), CAD (24%).Baseline therapy: Diuretics (11%), beta-blockers (5%), nitrates (0.3%). Clinical severity: Killip class 3-4 dyspnea (56%), orthopnea (26.2%), NYHA ≥ 3 (16.4%). Persistent ST-elevation ACS (1.8%). Hb levels: Mean Hb 10.9 ± 1.7 g/dL; hematocrit 34 ± 7.6%. Outcomes:6-month mortality: 27.6% (Hb < 9 g/dL) vs. 20.7% (Hb ≥ 12 g/dL; p = 0.002). 12-month mortality: 32.6% (Hb < 9 g/dL) vs. 25.3% (Hb ≥ 12 g/dL; p < 0.001). No significant effect on readmissions or composite endpoints (mortality + readmission).
Conclusions: Hb levels independently predict mortality in acute HF. Our study confirms higher mortality with Hb < 12 g/dL.

Topic: Acute respiratory failure and mechanical ventilation

000850

Resistance level trends of the most common isolates recovered from wounds from military patients after combat injuries

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:850***

Introduction: Antibiotic resistance is a well recognised threat to public health as well as to ICU patients. In light of ongoing Russian aggression against Ukraine this problem is gaining actuality. Up to 35% of patients after combat injuries develop infection (Tribble et al., 2011). Previous reports from the war in Afghanistan and Iraq point to the prevalence of multidrug-resistant (MDR) isolates from wounds at 25% (Weintrob et al., 2010). However, Ukrainian data from 2014 to 2022 shows a significant increase of MDR up to 80% (Kovalchuk et al., 2016).
Objectives: To estimate actual resistance levels of wound isolates and evaluate its temporal dynamics.
Methods: We conducted a retrospective cohort single center study of patients admitted with combat injuries to Role 4 hospital during study period (Feb 2022—Mar 2024). Inclusion criteria among others were having combat-related injury, admission in < 30 days since date of trauma, wound culture result availability. Exclusion criteria were having injury not directly related to battlefield (e.g., traffic accidents), continuing hospital treatment on cut-off date (Mar 14th 2024), lack of demographic and/or other data. Analysis was performed using R and MS Excel software.
Results: Of 1593 treated military patients 448 patients were included and 1169 wound cultures were performed in the cohort with 1812 results/isolates obtained. The most common isolates were K.pneumoniae (23,23%, 95% CI 21,29%—25,18%), A. baumannii (21,80%, 95% CI 19,90%—23,70%) and P.aeruginosa (13,30%, 95% CI 11,74%—14,86%). The results of antibiotic resistance levels and their trends based on linear regression are summarized in the table below:

Table 1 (abstract 000850) Antibiotic resistance levels and temporal dynamics for most common wound isolates

Isolate	Resistance level	Prevalence of resistance levels, %	k	r2	p
K.pneumoniae	non-MDR	0,24%	0,05	0,06	0,56
	MDR	46,04%	– 2,1	0,08	0,49
	XDR	51,80%	2,21	0,08	0,49
	PDR	1,92%	– 0,16	0,03	0,68
A.baumannii	non-MDR	1,03%	0,31	0,19	0,24
	MDR*	64,60%	9,12	0,76	0,002
	XDR*	33,59%	– 9,42	0,77	0,002
	PDR	0,78%	– 0,01	0,001	0,92
P.aeruginosa	non-MDR*	6,36%	4,98	0,69	0,011
	MDR	30,51%	– 2,93	0,12	0,403
	XDR	58,47%	– 1,09	0,02	0,748
	PDR	4,66%	– 0,95	0,1	0,448

Non-MDR—nonmultidrug resistant, MDR—multidrug resistant, XDR—extensively drug resistant, PDR—pandrug resistant.

* Statistically significant trend

Conclusions: Over a 2-year study period there were no significant trends in *K. pneumoniae* resistance levels. *A. baumannii* exhibited a trend toward decrease in XDR isolates with increase in MDR cases. *P. aeruginosa* have a tendency to increase in more susceptible strains. Such high levels of antimicrobial resistance necessitates extensive surveillance and immediate intervention to tackle the spread of resistant gram-negative isolates.

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Topic: Infections and prevention

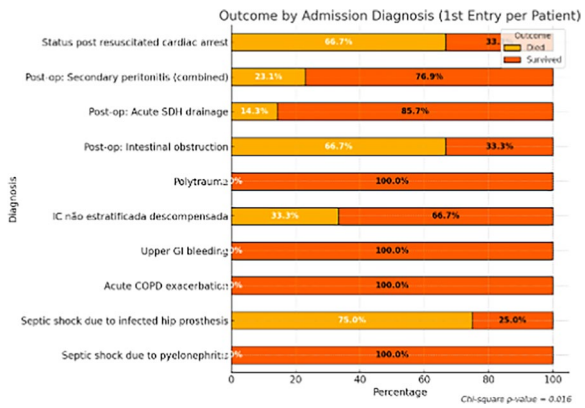
000852

The very elderly in the ICU

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:852***

Introduction: As life expectancy increases, a growing number of patients aged ≥ 85 years are being admitted to intensive care units (ICUs). This age group presents unique challenges due to increased frailty, frequent comorbidities, and atypical presentations of acute illness. Understanding reasons for ICU admission and ICU outcomes in this population are key to optimize care strategies and guiding resource allocation.
Objectives: To characterize the reasons for ICU admission and outcomes amongst patients aged ≥ 85 years in a Portuguese polyvalent ICU.
Methods: We conducted a single-center retrospective observational cohort study of patients admitted to the level 3 and level 2 polyvalent ICUs in a Portuguese hospital in 2023 and 2024. Demographic and clinical data were extracted from the electronic medical record.
Results: Out of 1,760 patients admitted to level 2 and level 3 polyvalent intensive and intermediate care units (ICUs) in a Portuguese hospital between 2023 and 2024, 102 unique patients (5.8%) were aged ≥ 85 years. The mean age was 87.7 years (median: 87 years). The median ICU length of stay was 3 days (interquartile range [IQR]: 1-5 days), with a maximum stay of 22 days. The most frequent locations prior to ICU admission were the operating theatre (23.5%) and the emergency department (22.6%). Postoperative peritonitis (9.8%) and septic shock secondary to pyelonephritis (7.8%) were the leading admission diagnoses, followed by cardiac arrest (5.9%), gastrointestinal hemorrhage (4.9%), and pneumonia (2.9%).The median SAPS II score was 24 (IQR: 18-50), with a mean of 36.9 (range: 18-109). When analyzed by outcome, nonsurvivors ($n = 25$; 24.5%) had a significantly higher mean SAPS II score (54.9) as compared to survivors ($n = 77$; 75.5%), who had a mean score of 30.3 ($p = 0.0003$). At ICU discharge, 75.5% of patients had clinically improved, 24.5% had died. No patients were discharged with unchanged or worsened clinical status in this adjusted cohort.
Conclusions: A substantial proportion of very elderly ICU patients were admitted from high-acuity settings, particularly the operating theatre and emergency department, reflecting the predominance of acute surgical and emergent conditions in this age group. Postoperative peritonitis and urosepsis were key contributors to ICU admission. Despite advanced age, three-quarters of patients demonstrated clinical improvement at discharge, especially those with lower SAPS II scores. The significantly higher SAPS II scores among nonsurvivors emphasize its value in prognostication and triage. These findings support individualized decision-making and suggest that age alone should not preclude ICU admission in this population.

Graphic 1. Outcome by Admission Diagnosis



Chatecteristics	Died	Survived	P-value
Sex			**p = 0.560**
Feminino	15 (14.71%)	39 (38.24%)	
Masculino	10 (9.8%)	38 (37.25%)	
Category			**p = 0.026**
Medical	10 (9,8%)	46 (45,1%)	
Post-operative	11 (10,78%)	29 (28,43%)	
Post-CPR	4 (3,92%)	2 (1,96%)	
SAPS II	25 (24,50%)	77 (75,49%)	**p = 0.00034**

P-value (Chi-square test): p = 0.026

Table 1 (abstract 000852) Outcome acording to Gender and Category of Admissions

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Topic: Health services research and outcome

000855

Initial subjective responses by study subjects enrolled in a pilot trial evaluating the effects of a diet high in fermented foods in patients with post-ICU syndrome

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:855***

Introduction: Survivors of critical illness frequently develop post-intensive care syndrome (PICS). Critical illness and associated therapies disrupt the gut microbiome, leading to loss of gut microbiome diversity or dysbiosis, which may contribute to the development of PICS. High fermented food diet increased gut microbiome diversity in healthy adults. Whether using a similar approach may be feasible in patients with PICS has not been investigated.
Objectives: We report initial response to high fermented food diet intervention among patients with PICS.
Methods: We conducted a single center, prospective, 1:1 randomized trial evaluating incorporation of a high fermented food diet among critical illness survivors at a tertiary medical center. We included adults with at least one PICS-related impairment who were able to document food intake on a smart phone application and come in for in-person assessments. We excluded those with significant cognitive impairment, inability to tolerate oral foods, non-English speaking, or having an active contraindications to a diet high in fermented foods including immunosuppression. Intervention patients received introductory education on the gut microbiome and explanation of what probiotic fermented foods are. Patients were instructed to start with a serving daily, increase to 6 + servings a day over 4 weeks, and continue

6 + servings daily for additional 12 weeks. They were instructed to document all fermented food intake in the diet app. We contacted patients by phone weekly to review any symptoms or challenges with the diet. Responses were thematically categorized by the authors. The study was approved by the institutional review board and registered on clinicaltrials.gov (NCT06020703).
Results: Of the 52 patients enrolled, 25 were randomized to the intervention. 11 intervention and 4 control patients withdrew from the study due to challenges with stool sample collection, diet app use, or ability to find/afford probiotic fermented foods. Intervention patients reported positive gastrointestinal symptoms (less reflux, better bowel movements) in 10 of 15 (67%); better neurocognitive symptoms (higher energy levels and improved concentration) in 9 of 15 (60%); and improved psychiatric symptoms (better mood, less depressive symptoms) in 6 of 15 (40%). Negative themes included mild gastrointestinal symptoms upon starting the diet (bloating, constipation, early satiety) in 14 of 15 patients (93%) that subsequently resolved; difficulties with the diet (cost, flavor, and availability) in 3 of 15 (20%), and tracking fermented foods in the application in 3 of 15 (20%).
Conclusions: Patients with PICS appear to tolerate high fermented food diet overall, with majority reporting improved gastrointestinal and neurocognitive symptoms during the study. Socioeconomic factors appear to represent a major challenge to using this approach.

Topic: Metabolism, endocrinology, liver failure and nutrition

000856
Toxic myocarditis associated with carbon monoxide poisoning: a case series of 13 patients
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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***856***

Introduction: Carbon monoxide (CO) poisoning is a life-threatening emergency with underrecognized cardiovascular complications. This case series investigates the association between CO intoxication and toxic myocarditis, analyzing clinical, biological, and outcome data.
Objectives: Characterize the clinical spectrum of toxic myocarditis in patients with acute carbon monoxide (CO) poisoning, focusing on electrocardiographic (ECG) abnormalities, troponin elevation, and echocardiographic findings.
Methods: Retrospective study of 13 patients admitted for CO poisoning (confirmed by elevated carboxyhemoglobin) with suspected myocarditis (troponin elevation + ECG abnormalities). Data included demographics, hemodynamics, ECG findings, troponin levels, management (normobaric/hyperbaric oxygen therapy), and outcomes.
Results: 1. Demographic and Clinical CharacteristicsThe study included 13 patients (median age: 50 years, range: 15-80) with 77% male predominance. The majority presented with neurological symptoms (headache, altered consciousness), while 46% (6/13) reported chest pain, suggesting cardiac involvement. Notably, one elderly patient (80 years) exhibited severe hemodynamic instability (HR 150 bpm, troponin 1915 ng/L), whereas a 15-year-old female had milder elevation (troponin 450 ng/L) without chest pain. 2. Respiratory and Hemodynamic Status. Respiratory failure requiring ventilatory support occurred in 31% (4/13), including one patient with SpO_2 83% on admission (improving to 99% with 15L O_2).Hypotension (SBP < 100 mmHg) was observed in 23% (3/13), all of whom required vasopressor support. 3. Cardiac Abnormalities. Electrocardiographic (ECG) Findings:100% (13/13) showed abnormalities:ST-segment elevation in lead aVR (23%, 3/13), a marker of global ischemia.Diffuse ST depression (54%, 7/13), often associated with troponin elevation.T-wave inversions (15%, 2/13) in anterolateral leads.Troponin Elevation:Median peak troponin: 840 ng/L (range: 94-25,000).The highest troponin (25,000 ng/L) occurred in a 19-year-old male with ECG showing aVR ST-elevation and diffuse depression, suggesting severe myocardial injury.4. Management and Outcomes. All patients received high-flow oxygen (normobaric or hyperbaric). 85% (11/13) were referred for hyperbaric oxygen therapy (HBO); two cases were deferred due to instability. No fatalities occurred; all patients achieved hemodynamic and neurological stabilization within 72 h
Conclusions: Toxic myocarditis is a severe complication of CO poisoning, warranting systematic screening (ECG, troponin) and prompt management. HBO remains a therapeutic cornerstone, but patient selection requires individualized assessment.

Topic: Health Services Research and Outcome

000857
Can't Beat the Clock: Evaluation of Ten Epigenetic Clocks for the Prediction of Mortality and Length of Stay in Critically Ill ICU Patients
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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***857***

Introduction: Epigenetic clocks use DNA methylation markers to measure biological or "epigenetic" age. Some are designed to predict chronological age while others are designed to predict clinically significant outcomes, such as health status or long-term mortality. Studies have demonstrated associations between epigenetic age and ICU survivorship, disease-specific outcomes, and unplanned readmissions (Sharma-Oates et al. 2024; Binnie et. al 2020). We evaluated ten epigenetic clocks and their predictive value for ICU mortality and ICU-free-days.
Methods: We analyzed whole blood samples from 144 critically ill patients admitted to 4 Canadian ICUs participating in the DYNAMICS trial (NCT01355042). The population was oversampled for non-survivors. Using the *dnaMethyAge* R-package (Wang et al. 2023), we calculated epigenetic age on the day of ICU admission using 10 different epigenetic clocks. In addition, for each clock we calculated epigenetic "age acceleration", meaning the difference between an individual's epigenetic and chronological ages. Our primary outcome was ICU mortality; our secondary outcome was days alive and out of the ICU at day 28 (ICU-free days).
Results: Epigenetic age demonstrated stronger associations with mortality than chronological age and APACHE-II score. PhenoAge showed the strongest correlation between epigenetic age and mortality with PhenoAge acceleration demonstrating an even stronger association (see Table 1). Nine clocks predicted increased epigenetic ages for non-survivors relative to survivors, with PhenoAge demonstrating the largest effect (mean difference = 11.5 years, Cohen's d = 0.77), as shown in Fig. 1. Cross-validated logistic regression performance is shown in Fig. 2, with PhenoAge showing an area-under-curve of 0.72, with good

PPV (0.73), NPV (0.71), and specificity (0.90). For ICU-free-days, eight clocks outperformed chronological age and APACHE-II score, with PhenoAge acceleration (r = -0.38, p < 0.001, CI = [-0.54, -0.22]) and Mortality Risk (Zhang 2017) acceleration (r = -0.31, p < 0.001, CI = [-0.48, -0.15]) showing the strongest associations.

Table 1 (abstract 000857) Spearman Correlation between Epigenetic Age, Age Acceleration, and Mortality

	Epigenetic Age			Epigenetic Age Acceleration		
Clock	Correlation	p	95% CI	Correlation	p	95% CI
PhenoAge	0.308	<0.001	0.15,0.45	0.384	<0.001	0.23,0.52
Multitissue Estimator	0.222	0.010	0.05,0.38	0.273	0.001	0.11,0.42
DNAmTL	-0.286	0.001	-0.43,-0.12	-0.270	0.002	-0.4,-0.11
Mortality Risk	0.274	0.001	0.11,0.42	0.246	0.004	0.08,0.40
Hannum 2013	0.207	0.017	0.04,0.36	0.238	0.006	0.07,0.39
Skin & Blood Clock	0.223	0.010	0.06,0.38	0.216	0.012	0.05,0.37
DunedinPACE	0.229	0.008	0.06,0.38	0.210	0.015	0.04,0.37
Zhang 2019	0.204	0.018	0.04,0.36	0.181	0.036	0.010.34
PC GrimAge	NA	NA	NA	0.151	0.082	-0.02,0.31
APACHE II	0.131	0.132	-0.0,0.30	NA	NA	NA
Chronological Age	0.131	0.133	-0.04,0.29	NA	NA	NA
epiTOC2	-0.032	0.716	-0.20,0.14	-0.059	0.501	-0.23,0.11

Conclusions: Epigenetic clocks, particularly PhenoAge, consistently outperformed chronological age and APACHE-II score in predicting mortality and length of stay amongst critically-ill patients admitted to ICU.

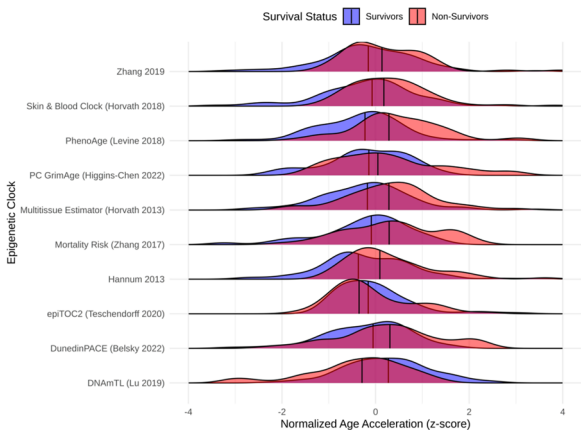


Fig. 1 (abstract 000857) Distribution of Estimated Age Acceleration for Survivors and Non-Survivors. Age acceleration normalized by z-score to account for each varying clock prediction scales. Centreline denotes the median of the distribution

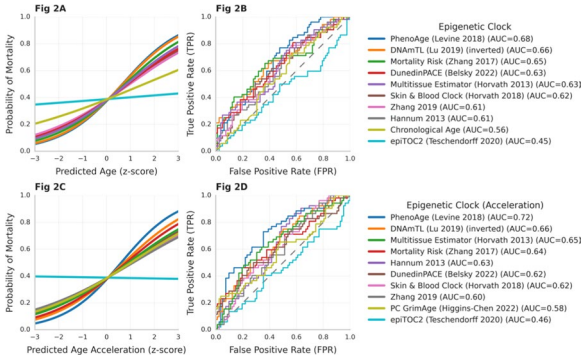


Fig. 2 (abstract 000857) Logistic Regression Curves of Predicted Epigenetic Age (2A) and Age Acceleration (2C) in Predicting Mortality, and the Corresponding Receiver-Operator Characteristic (ROC) Curves of Epigenetic Age (2B) and Age Acceleration (2D). Area Under the Curve (AUC) for each clock is shown on the right side. Note that for clarity DNAmTL (Lu 2019) results are inverted in 2A and 2C

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Topic: Translational biology

000859

From manual work to automation: comparison of manual recorded database with electronic health record data

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Intensive Care Medicine Experimental* 2025 13(Suppl 1):*859

Introduction: The ICU is an environment where large volumes of clinical data, essential for clinical care management and research, are generated. Traditionally, these data are collected manually, despite being entered and stored in electronic health records (EHR). The growth of data science has driven automatic methods of information collection. This study compares automatic and manual extraction, focusing on data accuracy and quality.
Objectives: Three main objectives: (1) to evaluate the concordance between historical records entered through a traditional method (manual paper recording followed by transcription into a database) and a new database obtained through automated data mining; (2) to create the necessary tools for extracting information; and (3) to conduct a statistical analysis of discrepancies and patterns in the clinical data, with the goal of identifying significant relationships between variables and gaining a deeper understanding of the differences between both methods.
Methods: Information was extracted from certain items recorded in the EHR of a general registry of patients admitted to the ICU of a Spanish hospital. The selected items refer to specific techniques used in the ICU, such as MV, tracheostomy, urinary catheter, PN, CVC, use of norepinephrine, use of continuous NMB, CRRT, arterial catheter, and a general item, sex. These variables are recorded in 100% of patients in the old database and are automatically recorded in the EHR, assuming lack of errors in their registration.
Results: As shown in Table 1, the concordance percentages vary between 86.9% and 97.6%, with kappa indices between 0.5 and 97.1%. It is particularly noteworthy to have found gender differences in 1.4% of the patients Kappa 97.1% but not zero, as expected.

Table 1. Concordance results

	Count	% of Concordance	95.0% lower CL	95.0% upper CL	Standard Error	Kappa Index (%)
VM	4258	88,8	87,9	89,7	0,5	67,9
VMNI	4448	92,8	92,0	93,5	0,4	70,2
Confirm I	4278	89,3	88,4	90,1	0,4	1,6
Preventive I	4165	86,9	85,9	87,8	0,5	0,5
Tracheostomy	4454	92,9	92,2	93,6	0,4	34,2
Urinary C	4342	90,6	89,7	91,4	0,4	78,9
Parenteral	4608	96,1	95,6	96,7	0,3	71,6
CVC	4393	91,7	90,8	92,4	0,4	83,3
Peripheral CVC	4678	97,6	97,1	98,0	0,2	3
Noradrenaline	4321	90,2	89,3	91,0	0,4	80
NMB	4793	98,5	98,1	98,8	0,2	75,4
CRRT	4566	95,3	94,6	95,8	0,3	23
Sex	4727	98,6	98,3	98,9	0,2	97,1
AC	4374	91,3	90,4	92,0	0,4	82,5

CRRT: Continuous Renal Replacement Techniques; AC: Arterial Catheter; NMB: Neuromuscular Block; I: Isolation; CVC: central venous catheter.

Conclusions: The results obtained demonstrate that it is possible to extract information that previously consumed significant time from professionals. It shows that manual recording is prone to human error, even generating discrepancies in patient gender. Moreover, it is evident that information positively included in the EHR can be collected reliably. There is also a percentage of cases where information collected in the old database is not present in the EHR, which may correspond to documentation errors. This study has served to enrich the use of our EHR program, coding certain procedures more precisely and enhancing storage of information not previously present. This serves as a starting point to continue improving our information management with real possibilities for clinical management, and research advancement.

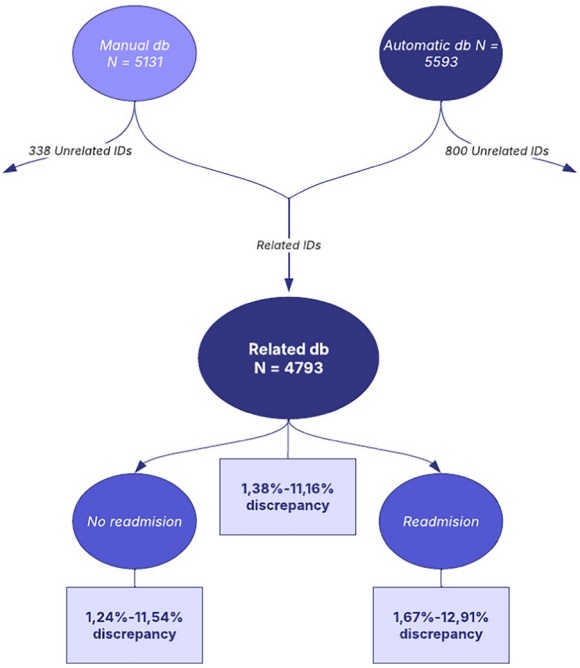


Fig. 1 (abstract 000859) Population data flow. Combined population of related database and subgroup analisys by readmision status

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Topic: Information systems and Data Science

000860

Differences in ICU profiles according to the World Bank Classification: a scoping review

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***Intensive Care Medicine Experimental* 2025 13(Suppl 1):860**

Introduction: ICUs form a major healthcare expense [1], potentially leading to differences in ICU profiles based on national income and health expenditure.

Objectives: This study aimed to provide an overview of ICU profiles according to the World Bank Classification.
Methods: A scoping review was conducted following a PRISMA-based approach (Fig. 1). In addition, a secondary analysis of the 2018 DecubICUs study (NCT03270345) [2] was performed to assess patient demographics (i.e. age, sex, ICU mortality rate, and ICU length of stay). The search (2010-2019) combined terms related to intensive care and geographic regions. Outcomes considered were nationwide bed capacity, level of care, median number of beds, ICU bed-to-hospital bed ratio, bed occupancy, staffing, organizational format, and visitation policy. Countries were classified according to the World Bank Classification based on the reports' year of data collection: High-Income Countries (HIC), Upper-Middle-Income Countries (UMIC), Lower-Middle-Income Countries (LMIC), or Low-Income Countries (LIC).
Results: A total of 7,287 records were screened, with 120 reports included, covering 81 countries (43 HIC, 18 UMIC, 13 LMIC, and 7 LIC). Search results are depicted in Fig. 1. The DecubICUs data included 90 countries (44 HIC, 25 UMIC, 19 LMIC, and 2 LIC). The number of ICU beds per 100,000 inhabitants varied from 0.1 to 1.1 in LIC, 0.3-15.0 in LMIC, 3.2-25.0 in UMIC, and 2.7-29.8 in HIC. The number of beds per ICU varied from 4.0 to 9.0 in LIC, 5.0-16.0 in LMIC, 7.0-18.0 in UMIC, and 6.0-22.0 in HIC. The proportion of 'closed' ICUs ranged from 20.0 to 42.0% in LIC, 25.8%-39.2% in LMIC, 14.8%-87.0% in UMIC, and 9.5-89.0% in HIC. Median patient age in years (interquartile range, IQR) increased with income: 40.3 (5.5) in LIC, 53.0 (11.0) in LMIC, 64.0 (6.3) in UMIC, and 64.0 (6.0) in HIC. The median ICU mortality percentage (IQR) decreased with income: 32.5 (35.0) in LIC, 28.3 (21.3) in LMIC, 23.1 (19.7) in UMIC, and 12.7 (9.0) in HIC. Other considered aspects of ICU profiles showed substantial variability without a clear pattern or were lacking.
Conclusions: The bed capacity was substantially higher in countries with higher income (Fig. 2). Gaps in ICU profiles were further illustrated by differences in the levels of care, number of beds and the percentage of 'closed' units (Fig. 3). Despite older patients in countries with a higher income, mortality rates were lower. Heterogeneous reporting methods and definitions, and the scarcity of data from lower-income regions made a systematic international comparison impossible. This stresses the necessity of standardized databases to record ICU profiles and their changes in time, particularly in lower-income countries.

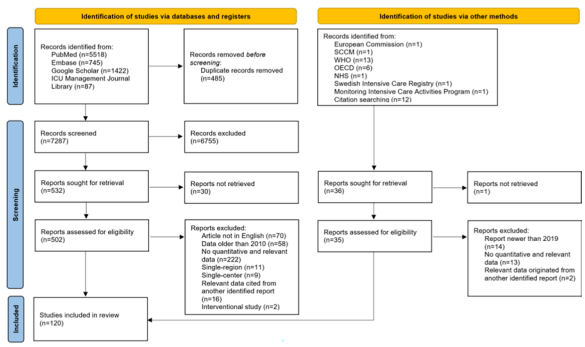


Fig. 1 (abstract 000860) PRISMA Flowchart

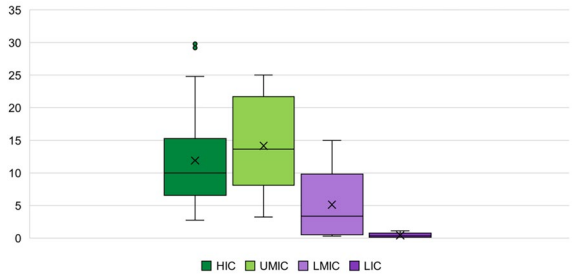


Fig. 2 (abstract 000860) ICU beds per 100,000 inhabitants according to the World Bank Classification

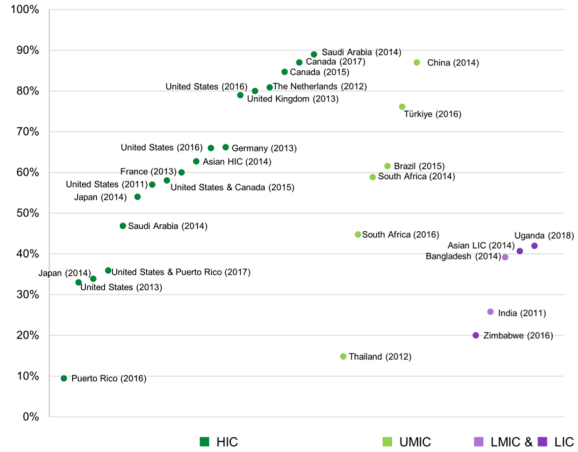


Fig. 3 (abstract 000860) Percentage of 'closed' ICUs according to the World Bank Classification. Country (year of data collection)

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Topic: Health services research and outcome

000861

Frailty assessed by patients ≥ 80 years and their next of kin

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***861***

Introduction: In 2050, the number of people aged 80 years and older (≥ 80 yrs) will more than double worldwide, placing immense pressure on healthcare systems (1). Research shows that frailty is a stronger predictor of vulnerability and rehabilitation potential than age itself, particularly for patients ≥ 80 yrs who are admitted to an intensive

care unit (ICU) (2). In intensive care research and practice, the Clinical Frailty Scale (CFS) has gained increasing popularity. It is recommended to rate frailty on the CFS based on the patients' stauts 14 days prior to acute illness (3). The frailty assessment of critically ill older adults is often restricted to statements of their next of kin acting as the older patient's proxy. These lay CFS assessments are shown to correspond well to those made by health care professionals (4, 5). In contrast, the correlation between proxy's CFS assessment and the older patients self-evaluation has not been explored yet.

Objectives: To examine the agreement between self-assessment and proxy assessment of frailty on the CFS among potential ICU candidates ≥ 80 yrs.

Methods: This study is part of a survey investigating the thoughts and preferences of a purposive sample of older Norwegian adults and their next of kin regarding intensive care treatment in hypothetical scenarios of acute critical illness (6). Only outpatients ≥ 80 yrs, regarded potential ICU candidates in the Norwegian health care context, were approached. The survey participants identified their next of kin who would likely act as proxy in an event of critical illness. These outpatient–proxy pairs independently assessed the older adult's fitness/frailty using a validated Norwegian translation of the Clinical Frailty Scale (CFS) (3). We analyzed the agreement using quadratic weighted kappa and intraclass correlation coefficients (ICC).

Results: This substudy included 140 pairs. The participants ≥ 80 yrs had a mean age of 85.5 (3.95 SD) yrs, and the genders were equally represented (50% female). Among the proxy respondents, the mean age was 68.8 (13.2 SD) and the proportion of females was 75%. The study participants ≥ 80 yrs rated themselves as slightly fitter on the CFS than their proxies (mean 2.93 vs. 3.06). Overall, the agreement between the frailty ratings of the participants ≥ 80 yrs and their proxies was good, with a Quadratic Weighted Kappa of 0.75 (95% CI: 0.58 to 0.92) and an ICC of 0.86 (95% CI: 0.8 to 0.9). Patients' CFS scores and proxies corresponded in 68 cases (52%). In another 46 cases (35%), the difference was ± 1. Only 17 pairs (13%) disagreed on the older participant's frailty by ≥ 2 points on the CFS, see Fig. 1. In 9 of the pairs data were missing from either proxy or the patient ≥ 80 yrs.

Conclusions: The agreement between CFS self-assessment and proxy assessment was good among potential Norwegian ICU candidates ≥ 80 yrs with low to intermediate frailty. Older adults living independently could effectively score their own CFS. Therefore, the CFS self-assessment of older adults may be used to inform communication about treatment goals in cases of acute critical illness and in advance care planning. Further studies on CFS self-assessment among the adults ≥ 80 yrs living with higher degrees of frailty are needed.

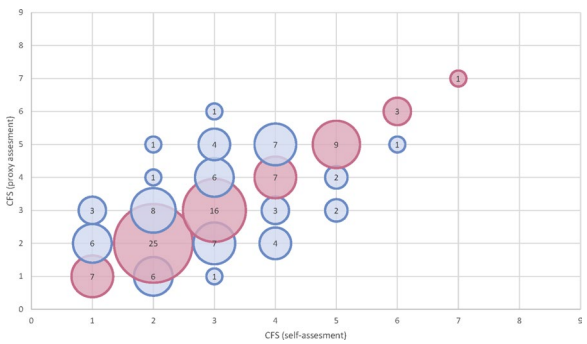


Fig. 1 (abstract 000861) Older (≥ 80 yrs) adults' frailty as rated by themselves and their next of kin on the Clinical Frailty Scale (CFS). Red circles indicate perfect agreement. The area of the circles corresponds to the number of entries

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7. GLS was supported by PhD grant awarded The Western Norwegian Health Trust (2021-2026)

Topic: Health services research and outcome

000862

Nandrolone use in chronic critically ill patients: a retrospective cohort analysis

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:862***

Introduction: Anabolic agents such as nandrolone have been proposed aspotential adjuncts in the management of chronic critically ill patients to mitigate catabolicstates, promote faster recovery times and improve long-term outcomes.

Objectives: To outline baseline characteristics, clinical parameters and outcomes of chronic critically ill patients treated with nandrolone during their ICU stays in a polyvalent intensive care unit (ICU) in Portugal.

Methods: We conducted a single-centre, retrospective cohort study of 26 chronic critically ill ICU patients who received nandrolone during their ICU stay at the discretion of the medical team. Data collected included demographics, admission diagnosis, ICU length of stay, clinical severity scores, duration of ventilatory support, antibiotic therapy and outcomes. The results were compared with a cohort of 84 chronic critically ill patients from the same ICU who did not receive nandrolone.

Results: Amongst 26 patients who received nandrolone, the average age was 63.0 (± 13.3) years and the percentage female was 34.6%. The majority had an admission diagnosis of sepsis (65.4%) (Fig. 1) and the average APACHE II score on admission 20.6 (± 11.7). The average duration of mechanical ventilation was 26.7 (± 13.3) days and the average length of ICU stay was 29.5 (± 11.7) days. Mortality was 19.2% at ICU discharge and 23.1% at 6 months. When compared with chronic critically ill patients from the same ICU who did not receive nandrolone, the nandrolone group had a higher prevalence of sepsis (65.38% vs. 25%, $p < 0.001$), longer ICU admissions (26.5 vs. 20.0 days, $p = 0.016$), and more days of mechanical ventilation (26.4 vs. 21.0 days, $p = 0.028$). At ICU discharge, 19.2% of patients who received Nandrolone and 26.2% of those who did not were deceased, which was not statistically significantly ($p = 0.471$). At 6 months, a nonsignificant trend toward better survival was noted in the nandrolone group (76.9% vs 58.3%, $p = 0.087$).

Conclusions: Nandrolone use in critically ill patients is associated with highseverity of illness, prolonged ventilatory support and prolonged ICU stays. Inspite of these poor prognostic signs, mortality at 6 months was not increasedrelative to other chronic critically ill patients. Further randomized controlledstudies are warranted to define the therapeutic role of nandrolone in chronicalcritical illness care, identify appropriate patient populations, and clarify optimaldosing and timing of administration.

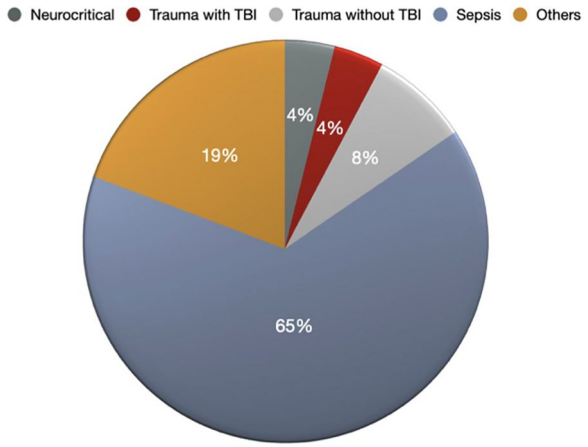


Fig. 1 (abstract 000862) Admission diagnosis category of nandrolone patients (%)

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Topic: Health services research and outcome

000863

Nutritional adequacy in patients receiving noninvasive ventilation: preliminary findings from the PRO-NUTRINIV study

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*863

Introduction: Noninvasive ventilation (NIV) has become a cornerstone in the treatment of acute respiratory failure (ARF). However, it often poses a barrier to adequate nutritional intake (1). As a result, patients receiving NIV are at increased risk of malnutrition, yet data and recommendations regarding nutritional adequacy and management in this population remain limited.
Objectives: The primary objective was to quantify calorie and protein intake and adequacy—defined as intake relative to target—in patients undergoing NIV across different levels of care.
Methods: This preliminary analysis from a prospective observational study was conducted in adult patients who started NIV within 24 h of admission for ARF and received oral nutrition in the intensive care unit (ICU), intermediate care units, and cardiology/internal medicine wards of a tertiary university hospital in Italy between December 23, 2024, and February 2, 2025. Caloric and protein intake were assessed by a hospital dietitian using a daily food diary collected for five days from NIV initiation. Daily nutritional targets were calculated according to ESPEN guidelines (2,3): 25 kcal/kg and 1.3 g/kg of protein, following a stepwise approach—25% of the target on day 1, 50% on day 2, and 70% from day 3 to day 5.
Results: This preliminary analysis included 24 patients, 2 in the ICU, 10 in intermediate care units, 12 in ordinary wards. Eighteen (75%) were males, with a median age of 76 years [IQR 69-84], admitted mainly for pulmonary edema (29%), pneumonia (21%), obstructive disease exacerbation (25%), or multiple diagnoses (13%). The median Nutritional Risk Screening (NRS) 2002 score was 2 [IQR 1-3], and the median calf circumference was 34 cm [IQR 32-37.5]. NIV was initiated in pressure support mode in 13 patients (54%), with a median NIV duration of 20 h [IQR 12-23] on day 1. Thirteen patients remained on NIV by day 4. On day 1, six patients were fasting, primarily due to NIV dependency. Caloric intake increased from a median of 5.6 kcal/kg [IQR 0.3-10.0] on day 1 to 14.3 kcal/kg [IQR 9.5-21.2] on day 5, with a maximum median daily intake of 1050.0 kcal [IQR 575.0-1287.5]. Caloric adequacy was highest on day 2 (median 97% [IQR 69-133]) and reached 82% [IQR 54-121] on day 5. Median protein intake ranged from 0.2 g/kg [IQR 0.0-0.4] on day 1 to a maximum of 0.6 g/kg [IQR 0.4-0.8] on day 4, corresponding to a total daily consumption of 42.0 g [IQR 28.3-55.0]. Median protein adequacy over the five-day period was 67% [IQR 23-107]. Most of the meals (210/280, 75%) were ordered by health care assistances. Caloric intake was higher in the intermediate care and wards compared to ICU patients, though differences were not statistically significant.

Conclusions: Nutritional intake among patients on NIV was inadequate, particularly regarding protein consumption, despite the early initiation of oral feeding. Additional data are required to define optimal nutritional strategies for this population.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000864

The role of Vox30 index in predicting the effect of high-flow oxygen therapy

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***864***

Introduction: High flow nasal oxygen therapy (HFNC) is an important method for the treatment of mild to moderate hypoxic respiratory failure, which can significantly reduce the 28-day all-cause mortality of critically ill patients. However, the rate of HFNC treatment failure and mortality from failure remain high, mainly due to the difficulty in identifying early HFNC treatment failure, which delays the time of mechanical ventilation. VOX index can be used as one of the evaluation tools for the efficacy of HFNC, and the change of tidal volume is more sensitive to respiratory rate, which can well reflect the early increase of respiratory drive, timely identify the early risk to upgrade respiratory support, and improve patient prognosis or treatment outcome. Therefore, the aim of this study is to find the factors that predict the failure of nasal high-flow humidified oxygen therapy equipment (HFNC) through a new VOX30 index, so as to achieve patient safety oxygen therapy in time.
Methods: 1. The differential pressure flow sensor was designed based on the preliminary work of the project, and Vox30 Index was automatically calculated and generated according to the captured tidal volume data to realize the dynamic and real-time evaluation of the safety of HFNC oxygen therapy process. 2. After the equipment is calibrated, the capacity is compared with the standard ATS respiratory waveform. 3. Patients with respiratory failure using HFNC who are willing to participate in this study will be recruited for preliminary clinical testing, and the correlation and consistency analysis will be conducted between the treatment results of HFNC (i.e., intubation or respiratory treatment degradation and discharge) and the Vox30 index obtained by the device for accurate verification in the next step.
Results: 1. In terms of capacity detection, after using the standard 3L calibration barrel for 10 times of fast and slow testing, the error between the measured value and the standard value was controlled within ± 8%, which was within the acceptable error range. 2. The respiratory simulator is used to simulate the standard ATS waveform for testing, and the results show that the detection value of the device is highly consistent with the standard waveform value, and the sensitivity is high. 3. In terms of clinical consistency, we conducted clinical tests on 22 subjects, and the final results showed that the prognosis of the subjects was consistent with the detection data and changing trend of the device, with a strong correlation. The conformance boundary map shows that most of the test data falls within the conformance boundary.
Conclusions: This device has high precision and consistency, accurate numerical collection and calculation, and high consistency with clinical prognosis. The VOX30 index obtained by its monitoring can be used as a factor to predict the success of HFNC oxygen therapy in patients with respiratory failure, and this device can be used for clinical popularization.



The device of vox30 index

Topic: Acute respiratory failure and mechanical ventilation

000865

Training intensive care residents in management tools for real-world prevention of ventilator-associated pneumonia: a PDCA-based intervention

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***865***

Introduction: Ventilator-associated pneumonia (VAP) remains one of the most prevalent and preventable healthcare-associated infections in intensive care units (ICUs), contributing significantly to morbidity, mortality, and hospital costs. Promoting a culture of safety and prevention is critical, and training intensive care residents in the use of management tools is a strategic approach to address these challenges. This project integrated educational strategies with quality improvement tools to reduce VAP incidence through the structured involvement of residents and the multidisciplinary team.

Objectives: The primary objective was to reduce the incidence of VAP in the ICUs of a tertiary hospital in São Paulo, Brazil. Secondary objectives included implementing an electronic prevention bundle, promoting continuous education, fostering a culture of prevention, analyzing the microbiological profile of pathogens, and applying the PDCA (Plan, Do, Check, Act) cycle to assess and refine interventions.
Methods: This prospective, interventional study was conducted from June 2024 Mars 2025 in the ICUs of a terciary hospital ins a Middle income country. All patients on mechanical ventilation for over 48 h were included. Root cause analysis identified factors contributing to increased VAP incidence. Subsequently, a PDCA cycle was implemented. A digital bundle incorporating key VAP risk factors was developed and integrated into the electronic medical record. Periodic training sessions were conducted with the care team, focusing on VAP prevention and bundle adherence. Resident physicians were actively involved in leading the implementation and audit processes.
Results: Before the intervention, VAP incidence ranged from 7.41 to 13.2 cases per 1000 ventilator days. Following implementation, the rate decreased to 0-9.54 cases per 1000 ventilator days, reflecting a 38.46% reduction—exceeding the initial 15% target. The ventilator utilization rate remained unchanged. Of the 9000 bundle forms expected, 3447 (38%) were completed, indicating moderate adherence. Bundle use also highlighted the need for additional protocols, such as sedation management for early weaning and delirium prevention.
Conclusions: The project demonstrated that training intensive care residents in quality improvement methodologies and management tools—specifically the PDCA cycle—can significantly impact clinical outcomes such as VAP incidence. The initiative emphasized the importance of education, continuous auditing, and team engagement. Despite partial adherence to the bundle, the substantial reduction in VAP highlights the potential of integrating structured management tools into resident education for sustainable improvements in ICU safety culture and infection prevention.

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Topic: Health Services Research and Outcome

000866

Monitoring bacterial resistance in critical patients: seven years of active surveillance in a polyvalent ICU

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***866***

Introduction: The Resistance Zero (RZ) program is being implemented in Intensive Care Units (ICU) in Spain with the aim of reducing the selection and/or dissemination of multidrug-resistant bacteria (MDR-B).
Objectives: To evaluate the current situation and evolution over time of risk factors (RF) and MDR-B colonization in patients admitted to our ICU.
Methods: Observational, descriptive, retrospective study of RF and colonization of patients admitted to our ICU in 3 study periods: period 1 (P1) 1/5/2018-28/2/2020, period 2 (P2) 1/11/2021-31/3/2023 and period 3 (P3) year 2024. All patients admitted to the ICU are evaluated for: RF of being MDR-B carriers, according to the RZ program. In case of presenting any RF, oropharyngeal (OP) and rectal exudates are taken for screening for MDR-B. It is a 12-bed multipurpose ICU.
Results: In P1, 912 patients were admitted to our ICU, 701 in P2 and 548 in P3, of whom 147 (16.12%), 146 (20.8%) and 116 (21.7%) had RF, respectively. The most frequent RF in all periods was previous hospitalization [108 (73.47%), 111 (76.02%) and 81 (69.83%)] in P1, P2 and P3 respectively, followed by previous antibiotherapy [91 (61.9%), 65 (44.52%) and 67 (57.76%)]. They were institutionalized 12 (8.16%), 9 (6.16%) and 16 (13.79%), and had had previous MDR-B colonization 13 (8.84%), 14 (9.6%) and 14 (12.07%) in P1, P2 and P3 respectively. MDR-B colonized patients were 30/114 (26.32%) in P1, 32/108 (29.62%) in P2 and 24/110 (21.8%) in P3. Rectal colonization (RC) was 25/114 (21.93%), 27/108 (25%) and 19/110 (17.27%), and OP colonization 8/114 (7%), 12/108 (11.11%) and 12/110 (10.9%), respectively. As for RC, 17/25 (68%) in P1, 26/27 (96.3%) in P2 and 12/19 (63.16%) in P3 were colonized by Gram-negative bacillus (GNB), of which 12/17 (70.6%), 13/26 (50%) and 7/12 (58.33%), respectively had extended-spectrum beta-lactamase (ESBL). In P2 there are 7/26 (26.9%) carriers of KPC and 2/26 (7.7%) of metallobetalactamases (MBL), with 1 case of each in P1 and none in P3. They were colonized by more than one MDR-B 3/17 (17.6%) in P1, 5/26 (19.23%) in P2 and 2/12 (16.66%) in P3. Gram-positive (GP) isolates in RC were methicillin-resistant staphylococcus aureus (MRSA) in 4/8 (50%) in P1, 3/3 (100%) in P2 and 5/9 (55.55%) in P3, and vancomycin-resistant enterococcus faecium (VRE) 4/8 (50%) in P1 and 4/9 (44.4%) in P3. Regarding OP colonization, MDR-B were GP 5/8 (62.5%) in P1, 3/12 (25%) in P2 and 5/12 (41.66%) in P3, being all MRSA. They carried GNB 3/8 (37.5%), 10/12 (83.33%) and 8/12 (66.66%), respectively.
Conclusions: In P3, 21.7% of the patients admitted to our ICU had RF, of which 21.8% were colonized by MDR-B, predominantly RC by GNB, with more than half being ESBL. Over time, there was a progressive increase in RF, the most frequent in all periods being previous hospitalization, followed by previous antibiotherapy, with an increase in previous colonization by MDR-B to 12.07% in P3. As for patients colonized by MDR-B, there was an increase in P2 with a decrease in P3 to lower levels than in the two previous periods. Carbapenemase-producing GNB such as KPC and MBL appeared in P2, which did not appear in P3. The GP isolated in RC were MRSA and VRE. OP colonization remained stable in P3 (10.9%), with a predominance of GP in P1 and P3, all of them MRSA.

Reference

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Topic: Infections and prevention

000867

Association between a bundle checklist on post-intubation care and clinical outcomes: a before-and-after study

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Introduction: Emergent endotracheal intubation is commonly performed in the emergency department (ED) for critically ill patients. Post-intubation care involves complex care processes, and complications frequently occur especially in these patients with reduced physiological reserves. Few studies have demonstrated the positive effects of post-intubation interventions such as lower mortality. We implemented a bundle checklist comprising of 10 post-intubation interventions in November 2022 to improve the quality of care in the post-intubation period in the ED.

Objectives: 1. To assess the effect of a post-intubation bundle checklist on the identification and correction of malpositioned endotracheal tubes (ETT) and gastric tubes (GT)
2. To evaluate the association between post-intubation care bundle checklist and intensive care unit (ICU) length of stay (LOS) and mortality
Methods: We conducted a retrospective observational study of all patients intubated in the ED of an acute district hospital with an annual attendance of 100,000. We included all patients aged 21 and older who were admitted to the ICU. Patients who died in the ED or were transferred to another facility during their stay were excluded. Data were collected during the 12-month period before and after implementation.
Results: A total of 394 patients met the inclusion criteria and 26 were excluded. There were 151 patients before and 243 after the implementation. The mean age of the groups before and after were 61.2 ± 15.4 (75.5% males) and 60.1 ± 16.2 years (66.3% males), while the mean Sequential Organ Failure Assessment (SOFA) scores were 8.2 ± 3.4 and 8.9 ± 4.0, respectively. Overall compliance with completing ≥ 8 interventions was 53% (n = 129/243). The proportion of malpositioned ETT and GT that were identified and corrected improved in the post-implementation period [12/29 (41.4%) vs 29/40 (72.5%)]. Clinical outcomes were adjusted for age, sex and SOFA scores. Patients in the post-implementation period had lower odds of ICU mortality than those in the pre-implementation period [adjusted odds ratio (OR) 0.686, 95% CI 0.325, 1.449, p = 0.324]. Quantile regression analysis showed that post-implementation was associated with reduced median ICU LOS of survivors by 13.2 days (95% CI 9.8, 16.6, p < 0.001). Those who received ≥ 8 interventions in the post-implementation cohort had lower odds of ICU mortality than those with < 8 (adjusted OR 0.856, 95% CI 0.491, 1.495; p = 0.585). This was also associated with a 1.8 day reduction in median ICU LOS (95% CI 0.4, 3.3; p = 0.012).
Conclusions: The implementation of a bundle checklist resulted in moderate improvement in compliance with post-intubation care practices. It demonstrates a potential correlation with increased recognition and correction of tube malposition, as well as a reduction in ICU mortality and a shorter ICU LOS. The study also suggests that greater adherence to the complete bundle may result in more substantial benefits.

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Topic: Health services research and outcome

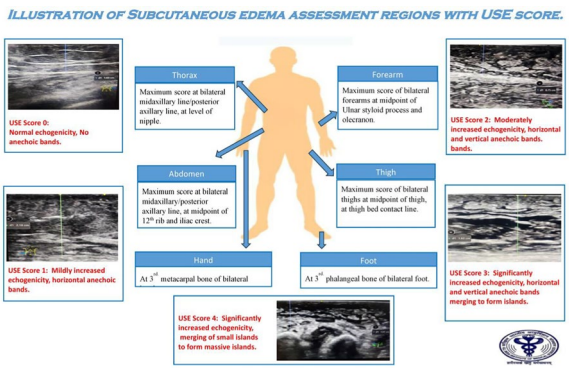
000869

Assessment of cumulative fluid balance and 28 day mortality using ultrasonographic subcutaneous edema (USE) score: a prospective observational study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***869***

Introduction: Maintaining fluid homeostasis is an integral part of caring for critically ill patients. When a critically ill patient has excess fluid in their body, it is associated with organ failure, higher morbidity and mortality. There are multiple shortcomings to the conventional techniques for monitoring changes in fluid status. Subcutaneous edema formation may result from positive cumulative fluid balance, which can be measured objectively with ultrasonography (USG).
Objectives: Ultrasonographic quantification of subcutaneous edema in ICU patients at day-1,3, and 7 of their ICU stay, assessemet of its prognostic utility in predicting 28-day mortality, and correlation with cumulative fluid balance (CFB).
Methods: This study was conducted in AIIMS New Delhi from November 2023 to March 2025. Patients admitted in ICU within 72 h of hospitalization were included in this study after meeting the predefined inclusion-exclusion criteria. Ultrasonography was performed at 12 defined regions, and ultrasonographic subcutaneous edema (USE) scored between 0 and 4 as per the FLUID protocol1. The total CFB, USE score at day-1, 3, 7, along with the change in the USE scores at day3 (day3-day1), and day7 (day7-day1) were calculated. Data analysed using SPSS software version 29.0.
Results: 100 patients (30 surgical, 35 medical, 35 polytrauma) were included in this study. The median age was 30 years (IQR: 23-50), 28-days mortality was 40%. The median CFB at day1,3 and 7 were + 1250 ml (Range: -800 ml to + 4750 ml), + 1800 ml (-1350 ml to + 3750 ml), and + 2800 ml (+ 80 ml to + 4595 ml), respectively.
The total USE score and CFB at day1 did not correlate with each other and the 28-day mortality. The change in USE score at day3 and 7 weakly correlated with CFB at day3 (r = 0.28, p = 0.03) and CFB at day7 (r = 0.34, p = 0.038), respectively. The 28-day mortality exhibited moderate correlation with the change in USE score at day3 (r = 0.58, p = 0.005), but weak correlation with CFB at day3 (r = 0.32, p = 0.03). Likewise, 28-day mortality had a strong correlation with change in USE score at day7 (r = 0.72, p = 0.001), but moderate correlation with CFB at day7 (r = 0.58, p = 0.001). A decreasing trend in the USE score by day3 and day7 showed very high correlation with 28 days ICU mortality (r = 0.84, p = 0.0001). Receiver-operator curve which was plotted for the same showed an area under the curve of 0.90 (CI:0.88-0.92, p = 0.0001). A decrease in USE score by 6 or more showed sensitivity of 100% and specificity of 80% respectively.
Conclusions: The ultrasonographic subcutaneous edema score performed better in predicting the 28-day mortality in ICU patients and had a limited correlation with cumulative fluid balance. One novel and more precise method for determining the cumulative fluid status of ICU patients is subcutaneous ultrasonography.



Iluustration of subcutanious edema assesment regions with USE score.

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Topic: Imaging in intensive care

000871

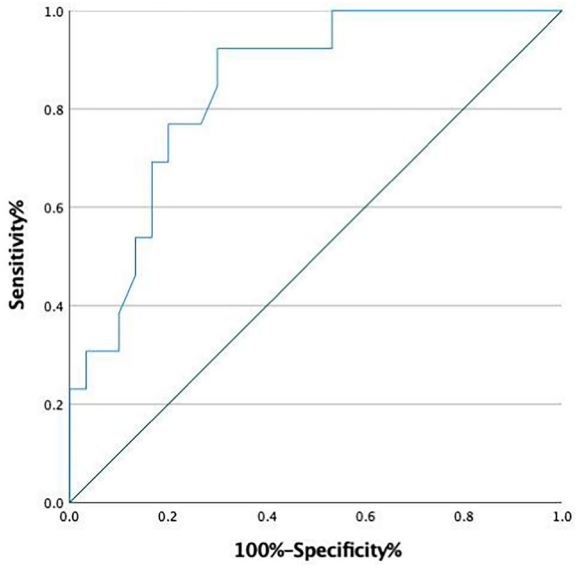
The effect of corrected carotid flow time in predicting short-term clinical efficacy of adult patients after cardiac surgery: a single-center, prospective observation pilot study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:871***

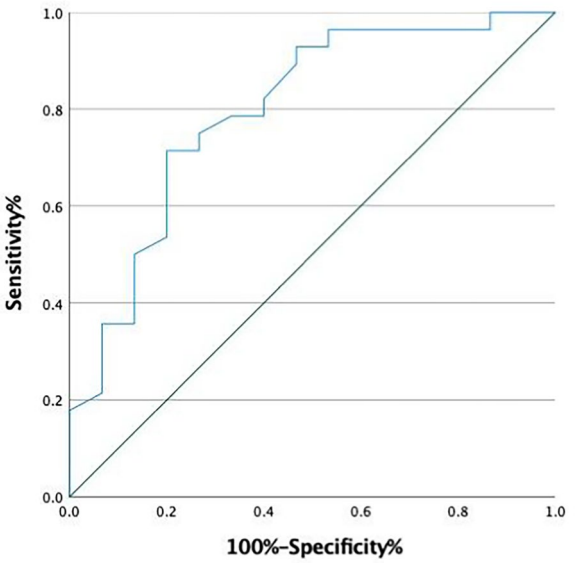
Introduction: Carotid Doppler ultrasound Flow (CADFlow) may be a promising tool for non-invasive hemodynamic monitoring. Carotid corrected flow time (ccFT) measured by CADFlow has been used as an accurate surrogate measure of stroke volume (SV) in critically ill patients.
Objectives: We aimed to use ccFT to predict the short-term clinical efficacy in patients after cardiac surgery.
Methods: This is a single-central, prospective, observational pilot study. Logistic analysis was used to determine whether ccFT could predict the duration of mechanical ventilation (MV) and length of intensive care unit (ICU) stay in patients after cardiac surgery. The predictive value of ccFT was determined using area under receiver operating characteristic (AUROC) curve.
Results: In total 43 patients were included, the multivariate logistic regression analysis revealed that ccFT is an independent risk factor for the length of ICU stay [OR = − 0.502 (95% confidence interval (CI) − 1.73-− 0.524), $P = 0.001$] and duration of MV [OR = − 0.334 (95% CI (− 0.829 to − 0.048), $P = 0.029$]. The AUROC for ccFT to predict the length of ICU stay and duration of MV ≥ 24 h was 0.844 [95% CI (0.726-0.961), $P < 0.001$] and 0.796 [95% CI (0.651-0.942), $P = 0.002$], the optimal cut-off value was 314.5 ms and 309 ms, separately.
Conclusions: We found that ccFT is a protective factor for short-term clinically efficacy in patients after cardiac surgeries, and the longer the ccFT (i.e., the higher the cardiac output), the shorter the duration of MV and ICU LOS. Continuous monitoring with CADFlow may be a potential bedside methodology to assess the hemodynamic status of critically ill patients.



Carotid corrected flow time (ccFT) measured by the wearable carotid Doppler ultrasound flow.



The area under the ROC for ccFT to predict the length of ICU stay ≥ 24 h.



The area under the ROC for ccFT to predict the duration of MV ≥ 24 h.

Table 1 (abstract 000871) Univariate and multivariate logistic regression analysis in the length of ICU stay

	Univariate analysis		Multivariate analysis	
Variables	OR (95% *CI*)	*P* value	OR (95% *CI*)	*P* value
Age (years)	0.257 (-0.178 - 2.115)	0.096		
BMI (kg/m2)	0.085 (-3.521 - 6.153)	0.586		
APACHEII scores	0.233 (-0.661 - 4.839)	0.133		
LVEF (%)	-0.123 (-2.324 - 1.015)	0.433		
HR (beats/minute)	0.083 (-1.059 - 1.819)	0.597		
MAP (mmHg)	-0.166 (-2.350 - 0.713)	0.287		
ccFT (ms)	**-0.718 (-2.106 - -1.12)**	**<0.001**	**-0.502(-1.730 - -0.524)**	**0.001**
PaO2/FiO2 (mmHg)	-0.079 (-0.326 - 0.196)	0.617		
VT (ml)	0.073 (-0.491 - 0.782)	0.647		
PEEP (cmH2O)	0.023 (-7.082 - 8.191)	0.884		
FiO2 (%)	0.205 (-0.983 - 4.874)	0.187		
RR (beats/minute)	0.233 (-3.141-23.048)	0.132		
CVP (mmHg)	0.033 (-5.846 - 7.228)	0.832		
GAP (mmHg)	0.145 (-3.353 - 9.017)	0.360		
ScVO2 (%)	-0.260 (-3.45 - 0.298)	0.097		
Lactic acid (mmol/l)	0.224 (-1.759-11.212)	0.149		
CK-MB (ug/L)	0.206 (-0.131 - 0.597)	0.203		
hscTnI (ng/L)	0.253 (0.000 - 0.002)	0.115		
Duration of CPB (min)	**0.460 (0.124 - 0.509)**	**0.002**	0.162 (-0.051 - 0.274)	0.174
Duration of E (h)	**0.451 (0.279 - 1.204)**	**0.002**	0.162 (-0.164 - 0.739)	0.205
Duration of NE (h)	**0.525 (0.456 - 1.408)**	**<0.001**	0.158 (-0.135 - 0.654)	0.192

Table 2 (abstract 000871) Univariate and multivariate logistic regression analysis in duration of MV (n = 43)

	Univariate analysis		Multivariate analysis	
Variables	OR (95% *CI*)	*P* value	OR (95% *CI*)	*P* value
Age (years)	0.20 (-0.239 - 1.119)	0.198		
BMI (kg/m2)	0.051(-2.371 - 3.291)	0.744		
APACHEII scores	0.136 (-0.925 - 2.347)	0.385		
LVEF (%)	-0.221 (-1.647 - 0.269)	0.154		
HR (beats/minute)	0.059 (-0.685 - 0.998)	0.709		
MAP (mmHg)	-0.159 (-1.354 - 0.437)	0.307		
ccFT (ms)	**-0.582 (-1.1 - -0.427)**	**<0.001**	**-0.334 (-0.829 - -0.048)**	**0.029**
PaO2/FiO2 (mmHg)	-0.142 (-0.22 - 0.083)	0.365		
VT (ml)	0.203 (-0.128 - 0.603)	0.196		
PEEP (cmH2O)	0.091 (-3.162 - 5.723)	0.564		
FiO2 (%)	0.145 (-0.927 - 2.531)	0.355		
RR (beats/minute)	0.195 (-2.858 - 12.568)	0.211		
CVP (mmHg)	0.035 (-3.399 - 4.236)	0.826		
GAP (mmHg)	0.160 (-1.777 - 5.449)	0.311		
ScVO2 (%)	-0.227 (-1.913 - 0.301)	0.149		
Lactic acid (mmol/l)	0.150 (-1.99 - 5.687)	0.338		
CK-MB (ug/L)	0.165 (-0.106 - 0.327)	0.308		
hscTnI (ng/L)	0.162 (0.00 - 0.001)	0.318		
Duration of CPB (min)	**0.488 (0.085 - 0.306)**	**0.001**	0.262 (-0.003 - 0.213)	0.057
Duration of E (h)	0.275 (-0.027 - 0.555)	0.074		
Duration of NE (h)	**0.50 (0.234 - 0.80)**	**0.001**	0.260 (-0.017 - 0.556)	0.065

Topic: Cardiovascular issues in ICU

000874

Nutritional support amongst critically ill patients on non-invasive respiratory support: preliminary results from a multicentre retrospective cohort study

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*874

Introduction: Non-invasive respiratory support, including non-invasive positive pressure ventilation (NIPPV) and high-flow oxygen therapy (HFOT), have become standard for managing several acute cardiopulmonary diseases (1). However, it is challenging to deliver optimum nutritional support to patients receiving prolonged courses of NIPPV or HFOT, and there is little evidence to guide decision-making in this regard (2).

Objectives: To determine the rates of enteral nutrition in patients receiving NIPPV and HFOT.

Methods: This multicentre retrospective cohort at 2 tertiary care hospitals in Hamilton, Canada examined enteral nutrition and non-invasive respiratory support. Patients greater than 18 years of age, admitted to the ICU, and receiving enteral nutrition (EN) for 48 h were included in this preliminary report. These results are from the subgroup of patients who received at least 48 consecutive hours of NIPPV or HFOT between Jan 1, 2023, and Dec 31, 2023. A chart review was conducted to abstract data on demographics, admission characteristics, comorbidities, and enteral intake. Data on respiratory support and nutrition from the first 30 days of the ICU admission were exported directly from the electronic medical record. The proportion of days in which patients received enteral nutrition while receiving HFOT and NIPPV was compared using the Independent T-test and Chi-square tests where appropriate.

Results: A total of 37 patients (9 female, mean age 66.1 years) received at least 48 h of consecutive NIPPV or HFOT; 17 (45.9%) received HFOT, 19 (51.3%) received both NIPPV and HFOT, and 1 patient (2.7%) received only NIPPV. In the first 30 days of their ICU admission, patients received EN on 52.5% (95%CI 40.0-65.5%) of days on HFOT, while those on NIPPV only received this on 23.0% (95%CI 5.4-40.0%; p = 0.017) (Table 1). NIPPV compared with HFOT was associated with more days of NPO prescription (NIPPV (51.4% [95%CI 30.1-72.6] vs HFOT 38.2% [95%CI 25.0-51.4%]). Fewer days of tube feeds were associated with NIPPV (15.5% [95%CI 0.29-30.7] vs HFOT (31.4 [95%CI 18.6-44.7]) although neither difference reached statistical significance (Table 1). Furthermore, only 65.2% (95%CI 44.1-82.3%) of patients admitted on HFOT or NIPPV reached 80% of their predicted nutritional requirement during their admission.

Table 1 (abstract 000874) Nutritional support of patients on non-invasive respiratory support

	High Flow Oxygen Therapy (95% CI) (*N* = 36)	**Non-invasive Positive Pressure Ventilation (95% CI) (*N* = 20)**	***p* value ***
Percent days prescribed NPO (%)	38.2(25.0-51.4)	51.4(30.1-72.6)	0.28
Percent days receiving Tube Feeds** (%)	31.4(18.6-44.1)	15.5(0.2-30.7)	0.10
Percent days receiving Enteral Nutrition*** (%)	52.5(40.0-65.5)	23.0(5.4-40.0)	**0.017**

*Significant differences calculated via Independent *t*-test

**Tube feeds—EN delivered via gastric or jejunal tubes

***Enteral Nutrition—Includes both oral nutrition and tube feeds

Conclusions: Providing enteral nutritional support for those on non-invasive respiratory support is challenging. This study shows that many patients on prolonged courses of both NIPPV and HFOT are underfed, with those on NIPPV at higher risk of receiving no nutrition. Further study is needed to evaluate the most appropriate method for nutritional support in this population, given the increasing use of non-invasive respiratory support in critically ill patients.

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3. This work was supported by the Physicians' Services Incorporated Foundation Resident Research Grant and McMaster University's Dr. Paul O'Bryne Internal Medicine Research Grant and Triangle Canada.

Topic: Metabolism, endocrinology, liver failure and nutrition

000875

Patient–ventilator asynchrony within the First 24-h of ICU admission was associated with prolonged mechanical ventilation in patients with elevated mean airway pressure: a multicenter retrospective study

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*875

Introduction: Patient–ventilator asynchrony (PVA) refers to the phenomenon where the patient's ventilatory demands are mismatched with the support provided by the ventilator. The aim of these studies is to explore the potential value of long duration PVA monitoring with an automatic system in ventilated critically ill patients at risk of ventilator-induced lung injury.
Methods: A retrospective analysis was conducted on patients admitted to the ICUs in four tertiary hospitals from January to November 2023, who were connected to a mechanical ventilation remote monitoring system and had a Pmean over 10 cmH2O within 24 h of mechanical ventilation. Six types of PVA, including double triggering, ineffective triggering, reverse triggering, flow starvation, premature cycling, and delayed cycling, were counted using a rule-based automated PVA recognizing algorithm. The total patient–ventilator asynchrony index was defined as the total number of asynchrony cycles / total respiratory cycles × 100%. Spearman correlation analysis was used to explore the respiratory factors associated with PVA, and Logistic regression analysis was used to assess the impact of total asynchrony index on prolonged mechanical ventilation.
Results: A total of 254 patients were included during the study period, with a median age of 65 years, APACHE II score of 17 (13, 24), primarily due to pulmonary infection and cardiac surgery, Pmean of 11.9 (10.9, 13.7) cmH2O, PaO2/FiO2 ratio of 208 (139, 275) mmHg, and total asynchrony index of 14 (7, 28) %. The overall 28-day mortality rate was 26.8%, and the ventilator-free days within 28 days was 12 (0, 22) days. Lower PaO2/FiO2 ratio and faster respiratory rate were associated with higher asynchrony index. After adjusting for confounding factors, higher asynchrony index was independently associated with mechanical ventilation for more than 7 days or death [per 1% increase of total asynchrony index, OR 1.03 (1.00-1.05, $p = 0.034$)].
Conclusions: PVA is common in patients with elevated Pmean and is associated with longer duration of mechanical ventilation.

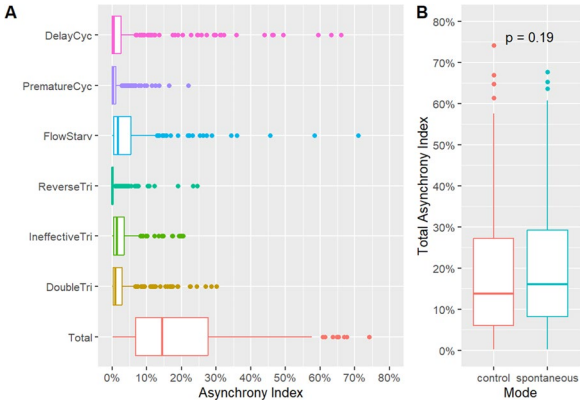


Fig. 1 (abstract 000875) Frequency of different types of patient–ventilator asynchrony (**A**) and total asynchrony index under control and spontaneous modes (**B**)**. DelayCyc: delayed cycling; PrematureCyc: premature cycling; FlowStarv: flow starvation; ReverseTri: reverse triggering; IneffectiveTri: ineffective triggering; DoubleTri: double triggering

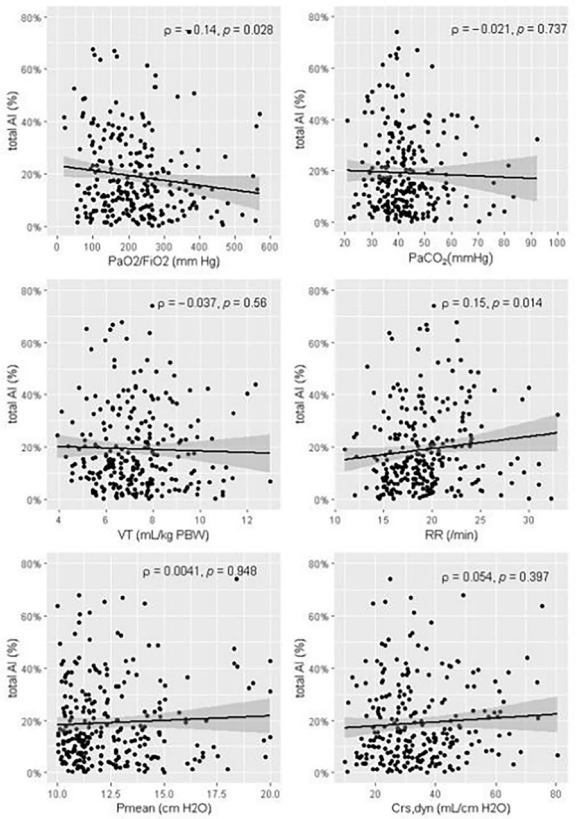


Fig. 2 (abstract 000875) Linear correlation analyses between respiratory parameters and total asynchrony index. DelayCyc: delayed cycling; PrematureCyc: premature cycling; FlowStarv: flow starvation; ReverseTri: reverse triggering; IneffectiveTri: ineffective triggering; DoubleTri: double triggering

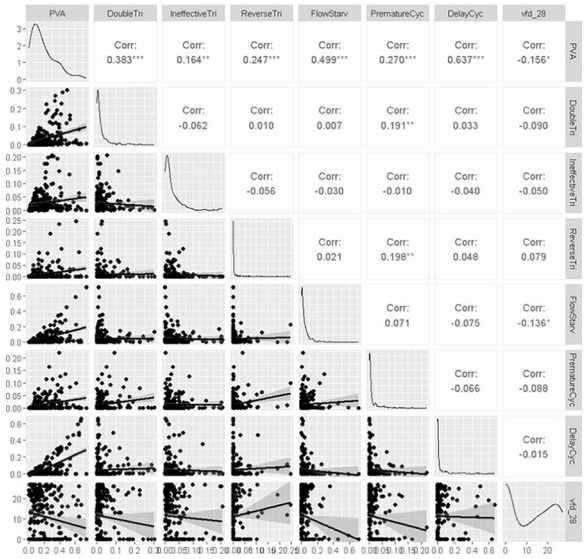


Fig. 3 (abstract 000875) Linear correlation analyses between different types of patient–ventilator asynchrony and 28-Day ventilator-free days (vfd_28)

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20. This work was supported by CAMS Innovation Fund for Medical Sciences (CIFMS) (Funding Number: 2023-I2M-CT-B-031) and National High-Level Hospital Clinical Research Funding (Funding Number: 2022-PUMCH-D-005, 2022-PUMCH-B-115)

Topic: Acute respiratory failure and mechanical ventilation

000876

Flow resistance in two cleared heat and moisture exchangers compared with a novel humidification system

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:876***

Introduction: Heat and moisture exchangers (HMEs) are devices commonly used in respiratory care to warm and humidify inhaled air while reclaiming heat and moisture from exhaled air. One issue with these devices is the potential increase in resistance when the HME becomes saturated and work of breathing is increased.
Objectives: Our aim was to characterise how HMEs affect airflow resistance under different breathing conditions and humidity levels with a novel humidification device (RespirAq™ Active Humidifier (RAH) System) which operates as simply as the HME and performs similarly to a heated humidifier (HH).
Methods: One hundred and eight benchtop tests were conducted using a set-up to simulate human respiratory conditions compliant with ISO 9360-1.
Results: The two HMEs (HME-1 Covidien DAR™ and HME-2 ICU Medical Portex®) showed a significant pressure drop in both dry (0.7-3.0 cmH20) and saturated (0.7-4.1 cmH20) air and at all three flow rates (30, 60 and 90 L/min) compared with the RAH System (0.1-1.0 cmH20, $p < 0.05$). See Fig. 1.
Conclusions: The RAH System offers a simple, effective alternative to traditional HMEs. While HMEs can increase breathing resistance with flow rates and when saturated. These results show that the RAH system's breathing work is significantly lower than that of both of the HMEs tested. Furthermore, no significant difference was seen in dry and saturated conditions on pressure drop with the RAH System.

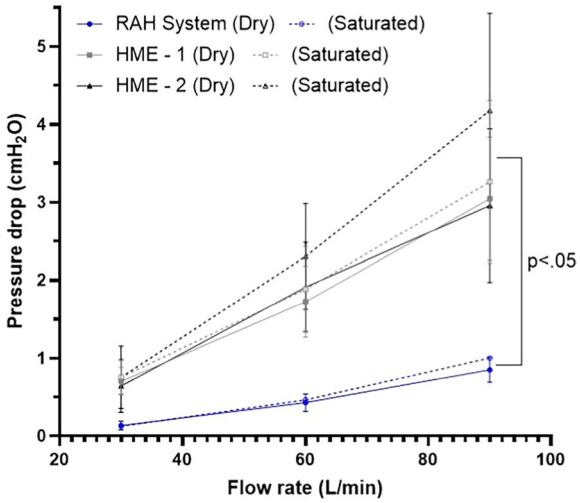


Fig. 1 (abstract 000876) Increase in flow resistance for two heat and moisture exchangers (HMEs) and the RespirAq Active Humidifier (RAH) System at 30, 60 and 90 L/min in dry and saturated air conditions

Topic: Acute respiratory failure and mechanical ventilation

000879

Survival Outcomes Following In-Hospital Cardiopulmonary Resuscitation in ABC Code Patients Treated by the Critical Care Team: A Retrospective Analysis from ABC Medical Center

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:879***

Introduction: In-hospital cardiac arrest remains a significant clinical challenge, with survival outcomes closely tied to the efficiency of resuscitation and post-resuscitation care. The "ABC code" at ABC Medical Center is a rapid response protocol activated for patients with no pulse and no respiration, attended by trained critical care personnel.
Objectives: To determine the survival rate following in-hospital CPR in patients attended by the Critical Care Team under ABC Code activation. Secondary objectives included analyzing factors associated with return of spontaneous circulation (ROSC), long-term survival, and site of code activation.
Methods: We conducted a retrospective, observational study at ABC Medical Center (Santa Fe campus) from January 2022 to September 2024. We included all patients attended by the Critical Care Team following adequate ABC Code activation. The data were extracted from institutional logs, electronic medical records, and post-discharge follow-up calls. Exclusion criteria were mock drills and cases handled by other services. Statistical analysis included descriptive statistics and chi-square tests ($p < 0.05$ was considered significant).
Results: Out of 70 ABC Code activations, 17 (24.2%) were confirmed as true cardiac arrests. Median patient age was 75 years old (IQR 58-83), with 58.8% male. ROSC was achieved in 76.5% ($n = 13$), predominantly within 1–3 cycles of CPR (64.7%). A statistically significant association was found between fewer CPR cycles and higher ROSC rates ($p = 0.008$). Among those admitted to the ICU post-ROSC, 84.6% survived hospitalization and 76.9% remained alive at 6-month follow-up. Of the 11 patients discharged, 90.9% were alive at > 6 months. (See Table 1 and Fig. 1).

CPR cycles	ROSC	No ROSC	*p* value
1-3 cycles	11 (64.7%)	0	0.008
4-6 cycles	1 (5.9%)	1 (5.9%)	
> 6 cycles	1 (5.9%)	2 (11.8%)	

Conclusions: High ROSC and survival rates were observed in patients managed by the Critical Care Team following ABC Code activation. Early, high-quality resuscitation and organized post-cardiac arrest care were likely contributing factors. The results highlight the importance of structured response systems and point to opportunities for improving code activation criteria.

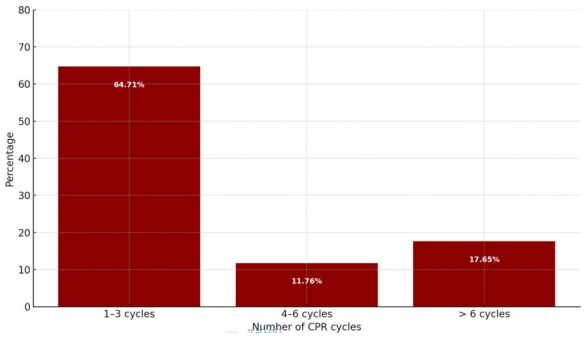


Fig. 1 (abstract 000879) Relationship between CPR cycles and ROSC outcome

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6. None declared

Topic: Cardiac arrest

000880

Bench test comparison of absolute humidity in cleared humidification devices and a novel humidification system

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:880***

Introduction: Humidification during mechanical ventilation is crucial for preventing airway complications such as hypothermia, epithelial damage, and obstruction. A novel system (RespirAq™ Active Humidifier (RAH) System) offers a new approach to humidification, utilising a rapid-switching fabric technology to capture and return moisture, eliminating the need for an external water source.
Objectives: This bench test aimed to compare the absolute humidity (AH) delivered by the RAH System with a cleared heat and moisture exchanger (Covidien DAR™) and a cleared heated humidifier (F&P MR850).
Methods: Thirty bench tests simulating human respiratory conditions were conducted.
Results: Mean AH was 32.2 ± 2.1 mg/L—HME, 39.4 ± 2.4 mg/L—HH, and 39.1 ± 1.1 mg/L—RAH System. A significant difference was observed between HME and both the HH and RAH System. No significant difference was found between HH and RAH System. The RAH System's AH showed no significant difference as compared to AH data from a clinical trial conducted during invasive ventilation therapy (38.8 ± 1.8 mg/L $n = 23$). See Fig. 1.
Conclusions: The RAH System performed comparably to the HH device when delivering AH, suggesting it can provide adequate humidification without a water bolus. This has the potential to mitigate the risk of aerosolising bacteria/viruses without compromising therapeutic efficacy. Eliminating a water source addresses a key infection control concern in respiratory care.

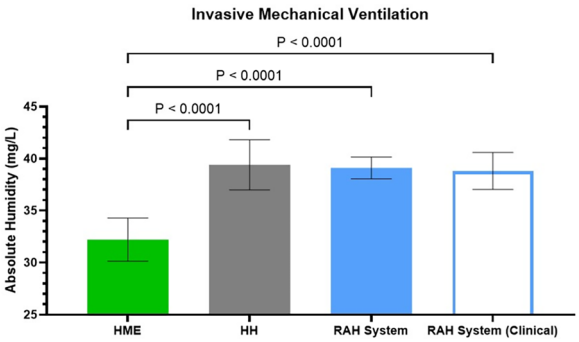


Fig. 1 (abstract 000880) Comparison of mean absolute humidity of the RespirAq Active Humidifier versus a heated humidifier and heat moisture exchanger: bench testing and clinical practice findings

Topic: Acute respiratory failure and mechanical ventilation

000883

Glucose variability in the early stage is associated with acute kidney injury of traumatic brain injury patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:883***

Introduction: Traumatic brain injury (TBI), the leading cause of disability in adults under 35, poses major healthcare and economic burdens [1]. In 2019, 27.16 million TBI cases occurred globally (incidence: 346/100,000) [2]. Acute kidney injury (AKI) has been demonstrated to be prevalent following traumatic brain injury (TBI) and is associated with poorer prognosis in TBI patients [3]. Hyperglycemia and glucose variability (GV) are associated with AKI development in populations undergoing COVID-19, cardiac surgery and liver transplantation, however, their role in TBI-associated AKI remains unexplored [4-6]. Therefore, this study selected patients with AKI secondary to TBI from the MIMIC-III database as the research subjects. The SD and CV of blood glucose levels intermittently measured on the first day after admission were analyzed to examine the relationship between blood glucose levels, glucose variability, and the occurrence of AKI after TBI.
Objectives: This study investigates associations between glycemic fluctuations and AKI pathogenesis, aiming to address critical knowledge gaps and refine risk stratification for TBI-related renal complications.
Methods: 1544 TBI patients from the Medical Information Mart for Intensive Care-III were enrolled (Fig. 1). The main exposure factor of this study was the glucose variability during the first day after admission reflected by the standard deviation (SD) and coefficient of variation (CV) of intermittently measured glucose levels. The primary outcome was the AKI during hospitalizations confirmed based on the KDIGO criteria. The unadjusted and adjusted association between glucose variability and AKI after TBI were visually showed as Fig. 2 using the RCS method. The area under the ROC curve (AUC) value of SD of glucose and CV of glucose for predicting AKI was 0.655 and 0.644, respectively(Fig. 2).
Results: 1544 TBI patients were selected from the MIMIC-III with the AKI incidence of 30.2%. AKI patients had higher level of glucose average ($p < 0.001$), glucose SD ($p < 0.001$), glucose CV ($p < 0.001$), 30-day mortality ($p < 0.001$) than non-AKI patients. The stepwise multivariate logistic regression showed SD of glucose ($p < 0.001$) and CV of glucose ($p < 0.001$) were both significantly related with the AKI after TBI. The area under the ROC curve of SD and CV for predicting AKI was 0.655 and 0.644, respectively.
Conclusions: Increased glucose variability is positively associated with the AKI after TBI. The glucose variability should be alleviated when managing TBI patients especially those with high risks of AKI.

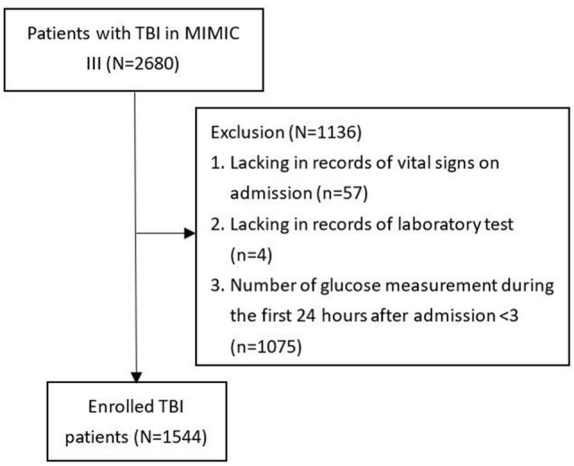


Fig. 1 (abstract 000883) .Flowchart of participant exclusion process in the study

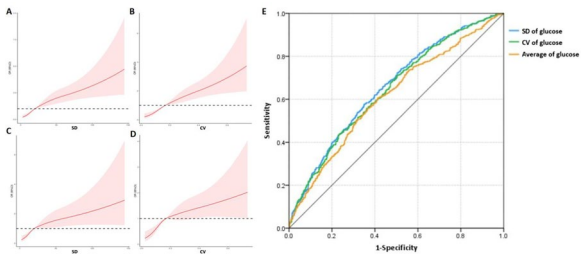


Fig. 2 (abstract 000883) **a** The unadjusted association between SD and AKI after TBI **b** The unadjusted association between CV and AKI after TBI. **c** The adjusted association between SD and AKI after TBI. **d** The adjusted association between CV and AKI after TBI. **e** The area under the ROC curve (AUC) value of SD of glucose and CV of glucose for predicting AKI

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Topic: Metabolism, endocrinology, liver failure and nutrition

000885

Impact of empirical antimicrobial appropriateness on 28-day mortality in critically ill patients with and without septic shock: a sub-analysis of the DIANA study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***885***

Introduction: Inappropriate antimicrobial therapy is associated with increased morbidity and mortality in patients with sepsis. However, in critically ill populations, outcomes are influenced by multiple factors, including the severity of the clinical presentation, particularly the presence of septic shock.
Objectives: We aimed to assess the incidence of appropriate empirical antimicrobial treatment in ICU patients with microbiologically confirmed infection and its impact on 28-day mortality rates, both with and without septic shock.
Methods: We conducted a sub analysis of the DIANA study database, including adult ICU patients who received empirical antimicrobial therapy for a microbiologically confirmed bacterial infection. Antimicrobial treatment was deemed appropriate if the patient received at least one agent with documented in vitro activity against the identified culprit pathogen. Patients were categorized based on the clinical diagnosis of septic shock (using Sepsis 3.0 criteria). Statistical analyses included comparisons of demographic and clinical characteristics, and impact on mortality using Kaplan–Meier 28-day survival analysis and multivariable logistic regression.
Results: A total of 857 patients from 152 ICUs in 28 countries were studied. Empirical antimicrobial therapy was appropriate in 88% (753/857) of patients. Septic shock was present in 29%(222/753) and 13.5% (14/104) of patients receiving appropriate therapy and inappropriate therapy, respectively. Patients with appropriate antimicrobial empirical therapy had significantly more days free of vasopressor, ventilator and renal support (p = 0.001), significantly shorter ICU lengths of stay ($p \leq$ 0.001) and lower mortality rates (17.5% vs. 30.8%) at 28 days. Kaplan–Meier survival analysis showed different survival profiles between these two groups (log-rank test p = 0.004) (Fig. 1). In the multivariable logistic regression model assessing 28-day mortality, appropriate antimicrobial therapy was independently associated with a significantly lower odds of death (odds ratio of 0.52 (95% CI 0.38-0.89), p = 0.011). However, in patients with septic shock, survival was not significantly different (p = 0.13) (Fig. 2).
Conclusions: Appropriate empirical antimicrobial therapy was independently associated with improved 28-day survival in ICU patients; this could not be demonstrated in the subgroup of patients with septic shock.

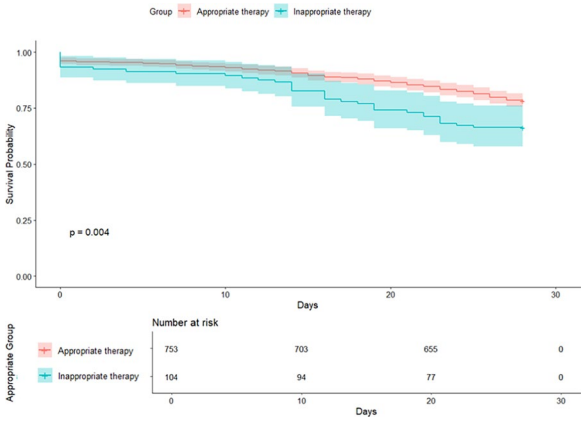


Fig. 1 (abstract 000885) Kaplan–Meier survival curves in ICU patients by empirical antimicrobial therapy appropriateness

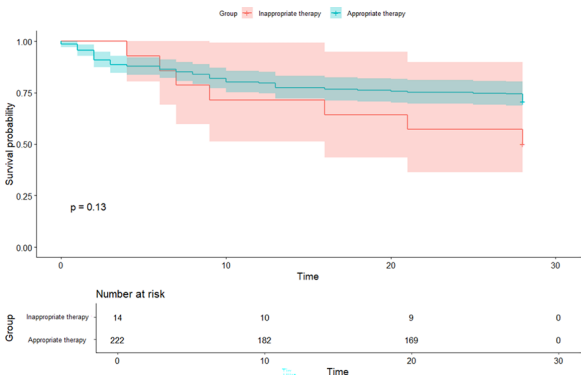


Fig. 2 (abstract 000885) Kaplan–Meier survival curves in ICU patients with septic shock by empirical antimicrobial therapy appropriateness

Topic: Infections and prevention

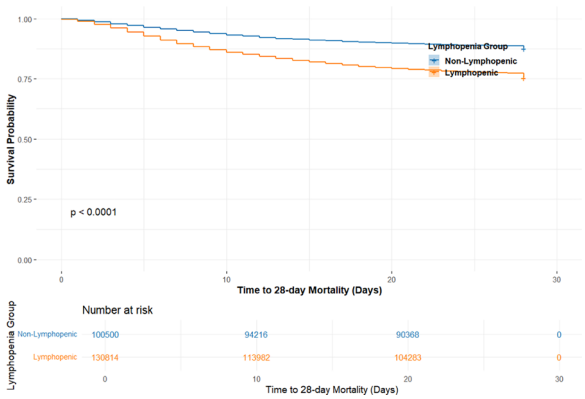
000886

Immune profiling in pandemic response: lymphopenia and mortality in a global COVID-19 cohort

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*886

Introduction: Lymphopenia has consistently emerged as a hallmark immunological signature in critically ill patients with COVID-19, often associated with worse clinical outcomes. While multiple studies have reported its correlation with disease severity, the independent contribution of lymphocyte depletion to mortality remains insufficiently defined. As we move toward more precise immunophenotyping in critical illness, understanding whether lymphopenia functions as a driver or merely a marker of disease burden is key. Clarifying its prognostic value is not only relevant for patient-level risk stratification but also for better understanding immune dysfunction in sepsis.
Objectives: We aimed to assess the incidence of lymphopenia in a large dataset of hospitalised COVID-19 patients and its independent impact on overall patients' survival.
Methods: We conducted a secondary post hoc analysis of the prospectively collected, standardised, global ISARIC dataset, including all adult patients admitted to the hospital due to confirmed COVID19. Patients were analysed according to the occurrence of lymphopenia, defined as an absolute serum count of lymphocytes < 1000/µL in the first 48 h of Hospital admission. Demographic and clinical characteristics were assessed between groups along with Kaplan–Meier survival curve analysis and Cox regression modeling.
Results: Overall, 231,933 patients from more than 60 countries and 1500 centres worldwide were included. 131,235 patients (56.6%) presented lymphopenia. Patients with lymphopenia were older and more frequently male ($p < 0.001$). They required more multiorgan support, including vasopressor, mechanical ventilation or renal replacement therapy, and a longer ICU stay ($p < 0.001$ on all comparisons). Kaplan–Meier survival curve analysis demonstrated significantly higher mortality over time in the lymphopenia group (log-rank test $p < 0.001$) (Fig. 1). Cox regression model results revealed that lymphopenia was independently associated with an increased hazard of 28-day mortality. Each 1,000 cells/µL increase in lymphocyte count was associated with a 25% reduction in the hazard of death (HR = 0.75; 95% CI 0.74-0.76; p < 0.001) (Fig. 2).
Conclusions: In this large, multinational cohort of hospitalised COVID-19 patients, lymphopenia was common and independently associated with worse clinical outcomes. These findings reinforce that lymphocyte count is a robust, accessible biomarker for risk stratification, that needs to be considered in COVID-19 viral sepsis syndrome.



Kaplan–Meier survival curves in hospitalised COVID-19 patients by Lymphopenia groups

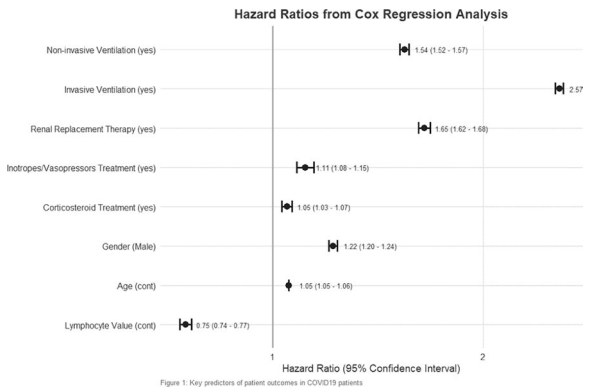


Figure 1: Key predictors of patient outcomes in COVID19 patients

Cox regression model results for mortality

Topic: Sepsis

000888

Evaluating the change and time-to-peak corrected carotid artery flow time during a preload challenge in over 2000 septic emergency department patients

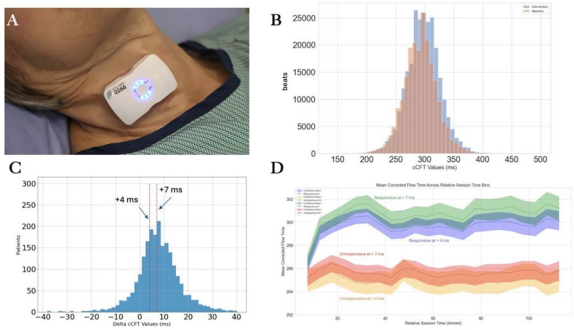
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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*888

Introduction: Change in the corrected flow time of the common carotid artery (ccFTΔ) during preload augmentation is used as a surrogate for stroke volume change (SVΔ). With this, preload responsiveness (PR) is inferred; PR is an important measure in early sepsis care to avoid physiologically ineffective intravenous (IV) fluid. A wireless, wearable Doppler ultrasound that continuously measures ccFT is used in a large, academic, county-owned, government-funded emergency department (ED) as a part of a sepsis resuscitation algorithm. This is a descriptive analysis of this growing dataset.
Objectives: 1.) Describe the median ccFTD as a measure of PR for over 2000 septic ED patients. 2.) Describe the time to peak ccFTD as a measure of PR in the same dataset. 3.) Compare the rate of change of PR in patients with multiple sessions
Methods: This is a retrospective cohort study comprising over 2000 sepsis patients in whom severe sepsis was identified in a large, publicly funded, academic ED in southern California. This dataset includes patients evaluated between September 2023 to March 2025; for this analysis, no patient health information is linked to the Doppler assessments. All patients in the ED or general medical floor in whom changes in vital signs or laboratory values triggered a Best Practice Alert (BPA) in the electronic medical record and are then identified to have severe sepsis are seen by a dedicated nursing-led rapid response team or sepsis emergency response team (SERT). The SERT RN employs bedside ultrasound and a wireless, wearable 4 MHz, continuous wave, Doppler ultrasound (Flosonics Medical, Sudbury, Canada) to assess fluid responsiveness. All patients receive a preload challenge (PC) as either a rapid fluid challenge of 100 mL/min over 2-3 min or Trendelenburg positioning from 20 degrees head up to 10-20 degrees head below the horizontal for at least 90 s; PC type is decided by the treating clinician. To determine PR, carotid Doppler spectrograms are analyzed for ccFTΔ, calculated as the difference between cardiac cycles averaged during 'assessment' (i.e., RFC or head-down) and before assessment (i.e., 'baseline'). Baseline windows are selected based on a minimum

of 15 cardiac cycles, low coefficient of variation, and high density of cardiac cycles. Assessment windows are selected based on a minimum of 20 cardiac cycles, low coefficient of variation, high density of cardiac cycles, and the largest change with baseline. Time-to-peak was assessed by calculating the time-elapsed, binning across 5 s intervals, and calculating the maximum ccFT across time. The start and end times of the peak was compared between ccFTΔ ≥ 7 ms and ccFTΔ ≥ 4 ms cohorts using a Student's *t* test.

Results: A PC with the wearable Doppler ultrasound was attempted in 2292 patients. Of these, an adequate ccFTΔ was completed in 2171 patients. In total, 466,042 cardiac cycles are included. For the first PC, the mean baseline ccFT for all patients was 295 ms (± 29 ms) and the mean ccFT for the intervention was 300 ms (± 29 ms) ($p < 0.01$). The median ccFTΔ was 7.5 ms. 53.4% of patients had a ccFTΔ ≥ 7 ms, while 69.8% had a ccFTΔ ≥ 4 ms. For patients identified as PR based upon either a 4 ms or 7 ms ccFTΔ threshold, the time-to-peak ccFTΔ was 30-40 s, with no difference in start and end times between cohorts ($p > 0.05$). The average number of assessments per patient was 1.6, where 1093 had more than 1 assessment completed. Comparing only the first to last assessment, 23.0% and 20.5% of patients change from PR to preload unresponsive (PUR) based upon 7 ms and 4 ms ccFTΔ thresholds. 19.7% and 18.2% change from PUR to PR based upon 7 ms and 4 ms ccFTΔ thresholds.

Conclusions: This study comprises nearly 500,000 carotid Doppler cardiac cycles obtained from over 2000 ED patients with severe sepsis. In these patients, 53% and 70% are judged to be preload responsive on their first assessment based upon 7 ms and 4 ms ccFTΔ thresholds, respectively. The time-to-peak ccFT is in the first 30-40 s of intervention for all patients, consistent with passive leg raise data and esophageal Doppler data. It is more common to change from preload responsive to unresponsive between first and last assessment than vice versa.



A The wireless, wearable Doppler on a healthy volunteer. **B** The total number of beats and ccFT value in baseline (orange) and intervention (blue). **C** The distribution of ccFTΔ across all first assessments **D** The temporal ccFT change in responders versus non-responders based upon a ccFT change threshold of +7 ms (green – responder; red – non-responder) and + 4 ms (blue – responder; yellow – non-responder).

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Topic: Cardiovascular issues in ICU

000891

Evaluation of family satisfaction in under-age visits to adult patients in the humanized intensive care unit: a focus on safety and well-being

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***891***

Introduction: Intensive Care Units (ICUs) have significantly evolved since their inception, not exclusively in terms of technology and medical management but also in their approach to humanizing care. Traditionally, intensive care has focused on biomedical aspects, overlooking the emotional and psychological well-being of patients and their families. However, the current trend towards more holistic and integrated care has led to the incorporation of strategies that prioritize the dignity and values of individuals. One key area in this effort has been the inclusion of under-age in visits to hospitalized adult family members. This practice aims to improve the patient's experience and the satisfaction of their families subsequently, promoting an environment of safety, well-being, and empathy during a time of high vulnerability. Specific studies that evaluate family satisfaction regarding the inclusion of under-age in adult ICUs are limited; however, some studies have addressed this topic as part of their assessments and have measured overall satisfaction with flexible visiting policies, including those who are under-aged.

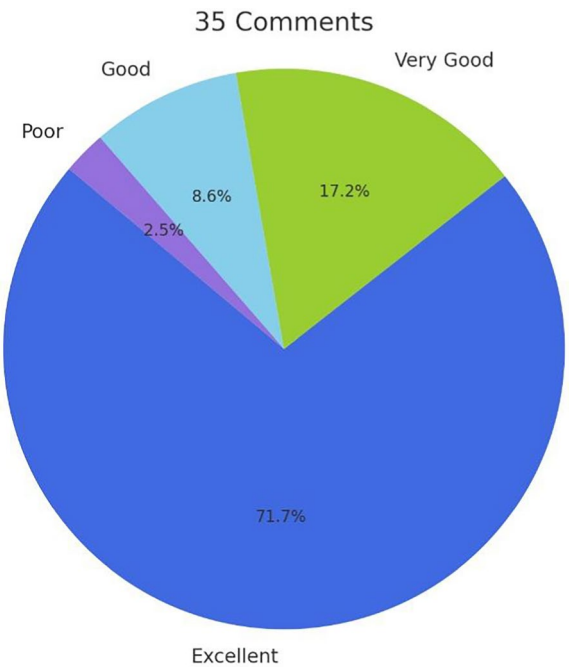
Objectives: To evaluate the level of satisfaction of family members accompanying under-age during visits to adult patients in the ICU, aiming to improve service quality and ensure that the environment remains humanized, centered on emotional well-being and the safety of minors.

Methods: This is a prospective observational cross-sectional study that assessed family satisfaction regarding minor visits to adult patients in the Humanized Intensive Care Unit at ABC Medical Center, Santa Fe campus, from February 2023 to February 2024, involving 224 under-aged admissions. Subsequently, surveys were sent to the emails provided through public attention at ABC Medical Center, Santa Fe campus, to evaluate the visiting experience. A total of thirty-five survey responses were received. For statistical analysis, Excel was used for qualitative, dichotomous, or ordinal variables, which were presented in frequencies and proportions.

Results: 71.4% (25 patients) rated the experience as excellent, 17.1% (6) as "very good", 8.6% (3) indicated a "good experience", and 2.9% (1) considered the experience poor. 88.6% (31) of respondents reported that they were provided with sufficient information about the rules and procedures; 8.6% (3) indicated that they received information "to

some extent," which presents an opportunity for further improvement in the consistency and clarity of information even though 2.9% (1) stated that they did not receive clear information. 85.7% (30) of family members expressed that the ICU staff was fully prepared to assist during the minor visits, 11.4% (4) felt that the staff was "somewhat prepared," and 2.9% (1) responded that they were not adequately prepared. 85.7% (30) of family members reported feeling completely safe and comfortable entering the ICU with underage, 11.4% (4) felt "somewhat safe," and 2.9% (1) responded that they did not feel safe. 85.7% (30) of respondents believe that adequate measures were implemented to ensure the safety and well-being of minors during the visit, 11.4% (4) think those measures were "somewhat sufficient," and 2.9% (1) did not consider that the measures were adequate.

Conclusions: The results obtained in this research demonstrate that the implementation of under-aged visits in the humanized ICU has had a positive impact on both patients and their families. A significant percentage of family members reported important levels of satisfaction. However, it is advisable to improve how information is communicated and reinforce the sense of security for family members.



General experience of under aged visits

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Topic: Health services research and outcome

000892

Vasoactive–ventilation–renal index and its association with the requirement for continuous renal replacement therapy in patients with septic shock

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:892***

Introduction: Sepsis is defined as life-threatening organ dysfunction resulting from a dysregulated host response to infection (1). Many studies, focused on intensive care units (ICUs), report a high incidence of patients diagnosed with sepsis (2,3). The optimal timing of initiation of continuous renal replacement therapy (CRRT) in patients with acute kidney injury (AKI) in the ICU remains undefined. Currently, several predictors of severity exist in patients with septic shock; however, they fail to predict the optimal timing of CRRT initiation. The Vasoactive–Ventilatory–Renal (VVR) score is an index of disease severity that incorporates validated markers of cardiovascular, pulmonary, and renal function. Miletic et al. found the VVR score to be most promising for accurately predicting outcomes after cardiac surgery (4); however, there are no widely validated studies for patients with septic shock.

Objectives: To evaluate the association of the VVR index with the requirement for CRRT in patients with septic shock and AKI.

Methods: Diagnostic capacity was assessed using the area under the ROC curve (AUC), and the association between VVR and CRRT was determined using the chi-square test, with continuity correction.

Results: Of the 35 patients diagnosed with septic shock, 9 (25.7%) received CRRT, of whom 6 (66.6%) died. The overall mortality rate was 31.4% (Tables 1 and 2). The VVR index result was obtained for patients who met the inclusion criteria. ROC analysis was performed with an area under the curve (AUC) of 0.637, indicating moderate discriminatory capacity. The optimal cutoff point, determined using the Youden index, was 39.5 points, with a sensitivity of 66% and a specificity of 72% (Fig. 1). Furthermore, a significant correlation between the VVR and its association with CRRT was demonstrated using the chi-square test with continuity correction ($p < 0.040$) and the Spearman correlation test ($p < 0.015$).

Conclusions: A VVR index greater than 39.5 showed moderate discriminatory ability to predict the need for CRRT, in addition to demonstrating a statistically significant association with its requirement. These findings suggest that the VVR could be a useful parameter in predicting the initiation of CRRT in patients with septic shock.

Table 1 (abstract 000892) Demographic characteristics and comorbidities

Characteristics	Total, n=35
Sex (%)	
Male	14 (40)
Female	21 (60)
Average age in years	50
Comorbidities (%)	
High blood pressure	11 (31.4)
Diabetes	11 (31.4)
COPD	2 (5.7)
Heart disease	2 (5.7)
Liver disease	1 (2.8)
Scales (average) points	
SOFA	13.89
APACHE II	22.29
SAPS II	36.94

Table 2 (abstract 000892) Patients who received CRRT and relationship with mortality

	Alive n= (%)	Death n= (%)	Total, n= (%)
TRRC	3 (33.3)	6 (66.6)	9 (25.7)
Without TRRC	21 (80.7)	5 (19.3)	26 (74)
Total	24 (68.6)	11 (31.4)	35 (100)

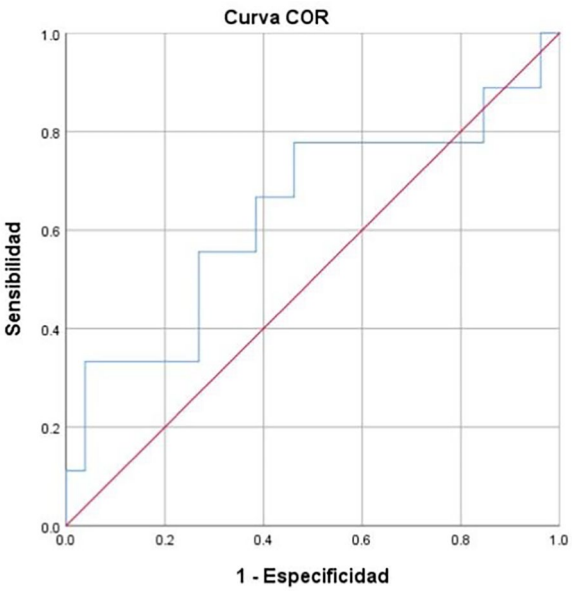


Fig. 1 (abstract 000892) The receiver operating characteristic (ROC) curves of the VVR as a predictor of CRRT requirement

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5. With deep gratitude and respect to my esteemed teachers at the Intensive Care Unit of the Juárez Hospital in Mexico, I offer my sincere thanks for their dedication, guidance, and teaching.

Topic: Sepsis

000893

Risk factors and mortality associated with low cardiac output syndrome in Mexican population

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:893***

Introduction: Low cardiac output syndrome (LCOS) is a condition characterized by insufficient cardiac output to meet metabolic oxygen demands.1 Common after cardiac surgery, it is linked to increased morbidity, mortality, ICU stay, and hospital resource use. Definitions vary, causing wide-ranging incidence reports (1.5%-91%), especially in low-resource settings.2
At our institution, LCOS is defined by cardiac index < 2 L/min/m^2, need for inotropes > 30 min, lactate ≥ 2 mmol/L, or use of ventricular assist devices. No reliable predictive model exists, but known risk factors include female sex, prior cardiac surgery, coronary artery bypass graft, left ventricular systolic dysfunction, urgent surgery, and peripheral artery disease.3
Objectives: To identify LCOS-associated risk factors and evaluate its frequency and mortality in our center.
Methods: A retrospective cohort (Mar 2022–Jan 2025) included ICU patients postcardiac surgery diagnosed with LCOS per international and institutional criteria (cardiac index < 2 L/min/m^2, inotropic support for more than 30 min, or use of ventricular assist devices in the context of hypoperfusion). Clinical history, surgery details, and treatments were collected. Bivariate and multivariable analyses identified associations.
Results: Among 868 patients, 117 developed LCOS. Mean age was 53.3 ± 14.3 years; mortality was 18.3%. Of these, 47.9% had acute kidney injury, 17.9% liver failure, and 24.8% atrial fibrillation. Risk factors included previous cardiac surgery (p < 0.003), higher EUROscore (p < 0.018), NYHA class III-IV (p < 0.03), and hypothyroidism (p < 0.03). Longer bypass time (p < 0.001) and aortic cross-clamp time (p < 0.01) were significant intraoperative predictors, especially in aortic valve replacement.

Table 1 (abstract 000893) Characteristics of patients with and without LCOS

Variable	Without LCOS (n = 712)	LCOS (n = 117)
Age (years)	54.1 ± 14.4	53.3 ± 14.3
In-hospital mortality	4.7%	18.3%
SOFA 24 h	4.57 ± 2.44	6.50 ± 3.02
SOFA 72 h	3.38 ± 2.25	4.87 ± 3.04
Hepatic failure	7.6%	17.9%
Postoperative atrial fibrillation	13.7%	24.8%
Acute kidney injury	27.0%	47.9%

Conclusions: Despite its clinical relevance, there remains no universally accepted definition of LCOS, resulting in substantial heterogeneity regarding its reported incidence, therapeutic approaches, and prognostic implications. In our cohort, it was associated with a 4.5-fold higher in-hospital mortality risk. No significant associations were found with diabetes, pulmonary or chronic kidney disease; hypertension showed a non-significant trend. Higher body weight appeared protective, possibly due to greater physiological reserve. Most common therapy was dual inotropes (47.8%), followed by dobutamine (29.91%) and levosimendan (12.82%), with no mortality difference by treatment type.

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Topic: Cardiovascular issues in ICU

000895

Ventriculo-arterial coupling after vasopressin administration in septic shock patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***895***

Introduction: Vasopressin presents pleiotropic effects on septic shock patients. According to survival sepsis campaign (SSC) guidelines it can be added as a second line vasopressor agent early after the initiation of noradrenaline [1]. At the same time, proper ventriculo-arterial (V–A) coupling results in optimal cardiac output. V–A coupling is defined by the relationship between the elastances of the left ventricle (Ees) and the arterial circuit (Ea) [2]. Decoupling is often in septic shock patients leading to hemodynamic deterioration, and it may be further affected by medications that can alter cardiac contractility or arterial load [3].
Objectives: To define the effect of vasopressin on V–A coupling and other hemodynamic variables in septic shock patients, examining the feasibility of the measurement
Methods: In a prospective, observational study V–A coupling and other hemodynamic variables were measured before and after the initiation of vasopressin. The addition of vasopressin as second line vasopressor was at physician's discretion, and the administration rate was at the standard dose of 0.04 unit/min. Ees was measured by echocardiography using the single-beat method as described by Chen et al. [4]. Ea was calculated as 0.9 × (systolic arterial pressure/stroke volume). The V–A coupling was calculated as the Ea/Ees ratio. Univariate analysis was performed to determine statistically significant changes between the several variables before and after the initiation of vasopressin.
Results: Seven patients were included in the study. V–A coupling was mildly abnormal in concordance with previous studies describing V–A de-coupling in septic shock [3]. After vasopressin initiation V–A coupling was improved but not significantly significant [mean (mean S.E.) 1.5 (0.2) vs 1.1 (0.02) before and after vasopressin use respectively, $p = .10$, 95% confidence interval (CI), − 0.1 to 0.8]. The improvement was due to a trend for increased Ees [1.5 (0.2) vs 2.2 (0.3), $p = .066$, 95% CI − 1.5 to 0.06]. Ea was not statistically different [2.3 (0.2) vs 2.4 (0.3), $p = .789$, 95% CI, − 0.8 to 0.6]. All other hemodynamic variables did not present statistical differences.
Conclusions: The addition of vasopressin as a second line vasopressor in septic shock patients prevented prevented them from further V–A uncoupling with a trend for improvement.

Table 1 (abstract 000895) Baseline characteristics

	Age	Male gender	SOFA	Lac	Days in ICU
All patients	67.7 (5.9)	3 (43%)	12 (1)	2.6 (1.1)	9 (2.8)
Data are presented as mean (mean S.E.) or n (%); SOFA, Sequential Organ Failure Assessment; ICU, intensive care unit.					

Table 2 (abstract 000895) Patients' characteristics before and after vasopressin

	Before vasopressin	After vasopressin	*P*
MAP (mmHg)	69 (3.3)	78 (5)	.176
SBP (mmHg)	123 (4.6)	123 (5.7)	.958
DBP (mmHg)	50 (4.3)	55 (3)	.449
LVEF (%)	37.6 (5.7)	39 (4.6)	.895
$ScVO_2$	67 (2.9)	59 (6.8)	.360
PCO_2gap (mmHg)	7 (1.6)	8 (2.2)	.776
CVP (mmHg)	16 (3.7)	16 (3.6)	.940
PPV(%)	4 (1.7)	5 (2)	.560
CO (l/min)	4.2 (0.5)	3.6 (0.2)	.338
Ea (mHg/ml)	2.3 (0.2)	2.4 (0.3)	.789
Ees (mHg/ml)	1.5 (0.2)	2.2 (0.3)	.066
V-A coupling	1.5 (0.2)	1.1 (0.02)	.100
Noradrenaline dose (μg/kg/min)	0.3 (0.05)	0.25 (0.06)	.578
Data are presented as mean (mean S.E.); MAP, mean arterial pressure; SBP, systolic blood pressure; DBP, diastolic blood pressure; LVEF, left ventricle ejection fraction; CVP, central venous pressure; PPV, pulse pressure variation; CO, cardiac output; Ea, arterial elastance; Ees, end-systolic cardiac elastance; V-A coupling, ventriculo-arterial coupling; *p*, comparison between the two groups. Results by univariate analysis.			

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5. None

Topic: Cardiovascular issues in ICU

000898

Spirituality assessment in intensive care professionals: initial results of a national online evaluation

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*898

Introduction: Spirituality is a fundamental aspect of life that can influence the process of health and illness. In intensive care medicine, spiritual care (SC) has been recognized as an essential component of patient-centered care; however, its systematic implementation is a challenge for ICU's healthcare professionals (HP), due to barriers such as a lack of training and limited selt-awareness of one's own spirituality.

Objectives: To assess the spirituality of ICU's healthcare professionals in Chile.

Methods: We present the initial results of a national study aimed to assess the spirituality of HP working with adult critical care patients in Chile. All HP with at least three months of experience in an ICU were invited to participated, answering 3 evaluation instruments: the Spirituality Questionnaire (SQ), a survey about learning needs in spirituality and SC and a personal information survey. These instruments were widely distributed online with the assistance of the Sociedad Chilena de Medicina Intensiva. The SQ is specific to HP and has been validated in Chile. It consists of 4 components: self-awareness, spiritual beliefs, spiritual practices and spiritual needs, assessed through 29 items using a Likert scale; the maximum score is 116 (higher level of spirituality) and minimum 29. At the end of the SQ, the participants could answer 2 questions about barriers and facilitators for SC implementation at the ICU. The results are described using mean ± standard deviation (SD) and percentages, and compared with Student's *t* test and chi-square. The study was approved by the institutional review board of Pontificia Universidad Católica de Chile.

Results: From February to May 2025,130 participants were included. The majority were single young females that worked directly in patient's care (78.9%). Most HP had postgraduate studies in critical care (70%), and almost a half have worked in ICU for more than 5 years (45,4%). More than a half of the participants practice a religion, mostly Catholicism (70,8%). Table 1 shows the characteristics of the participants.

In the spirituality evaluation, the mean score in the SQ was 87.1 ± 25.7. Previous training in spiritual care and work directly in patient's care were significantly associated with a higher level of spirituality (*p* value 0.045 and 0.002, respectively). No other characteristics of the participants were associated with the level of spirituality, including their religiosity. For each of the SQ components, the results were: self-awareness 33.9 ± 6.28 (maximum score 40), spiritual beliefs 12.57 ± 3.2 (maximum score 16), spiritual practices 17.09 ± 5.3 (maximum score 24), spiritual needs 29.92 ± 5.83 (maximum score 36). The work overload, the lack of protected time, and have a limited self-awareness of one's own spirituality were detected as important barriers for SC implementation at the ICU. Having a developed spirituality and work in an institution that supports spirituality (institutions that had specialized units for spiritual and religious assistance) were identified as facilitators for SC implementation.

Although only a quarter of the participants had previous training in spirituality and SC, 82.3% were interested in participating in a SC training program for critical care professionals. Most prefer a telematic and asynchronous modality (54,2%), that includes topics like spirituality in health and pain and suffering.

Table 1 (abstract 000898) Characteristics of the participants

Characteristic	Mean/frequency	SD/percentage
Age (years)	39	8.8
Women	81	62%
Practice any religion	72	55%
Civil status single	65	50%
Profession nurse	55	42%
Profession physicians	42	32%

Conclusions: In this initial analysis of a national study that assesses the spirituality of ICU's healthcare profesionales, the previous training in spiritual care and work directly in patient's care were associated with a higher spirituality.

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5. We acknowledgment to Sociedad Chilena de Medicina Intensiva for its collaboration in disseminating the study.
6. This study was founded by a grant of Pontificia Universidad Católica de Chile

Topic: Ethics and end of life care

000899

Impact of a hypotension quality indicator on the incidence of intraoperative hypotension and postoperative acute kidney injury—preliminary results from a longitudinal quality implementation project (HypotensionQI study)

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*899

Introduction: Intraoperative hypotension (IOH) is a significant risk factor for postoperative organ dysfunction, particularly postoperative acute kidney injury (PO-AKI) [1]. However, whether implementation of a quality indicator (QI) could effectively decrease rates of IOH and thereby AKI in clinical routine care has not been assessed.
Objectives: To evaluate the association of a hypotension QI on the incidence of IOH and PO-AKI.
Methods: A hypotension QI was implemented as part of a standard operating procedure (SOP) at Charité—Universitätsmedizin Berlin, Campus Benjamin Franklin, a tertiary care center, on Jan 1st, 2021. The QI was defined as ≥ 90% of documented intraoperative mean arterial pressure (MAP) measurements ≥ 60 mmHg. We retrospectively analyzed electronic healthcare records of patients aged ≥ 18 years undergoing non-cardiac surgery from 2019 to 2025. Exclusion criteria included an ASA status ≥ 5 and cardiac or gynecological procedures. PO-AKI was identified based on KDIGO criteria within the first three postoperative days [2]. To assess the effect of the QI, interrupted-time-series analyses (ITSA) were performed, comparing the period before and after the QI's introduction into routine clinical practice. The primary outcome was QI fulfillment. The secondary outcome was PO-AKI. In addition to ITSA, multivariable regression was used to assess the association of QI fulfillment with PO-AKI, after adjusting for age, sex, ASA status, Elixhauser index, procedure duration, baseline creatinine, general anesthesia, surgical service, use of vasopressors, blood products, and propofol. The Ethics Committee approved the protocol (EA4/239/19).
Results: A total of 73,437 patients were included in the ITSA, while 54,290 were included in the adjusted analysis following the complete case approach. The median age was 65 years [51-76], 36,651 (43%) were female, and median Elixhauser index was 4 [0-11]. Upon QI implementation, ITSA revealed a significant immediate increase in QI fulfillment (2.8%, 95%CI 1.3-4.2, $p < 0.001$), with a significantly increased improvement per week post-implementation (0.04% per week, 95%CI 0.03-0.04, $p < 0.001$; Fig. 1a). ITSA of PO-AKI demonstrated a significant decrease post-implementation (0.004% per week, 95%CI 0.001%-0.007%, p = 0.043), whereas pre-implementation rates of PO-AKI were stable (Fig. 1b). Fulfillment of the QI was associated with a decreased risk of PO-AKI (adjOR 0.69, 95%CI 0.62-0.77, p < 0.001). Median intraoperative MAP was stable over time, however, postinduction hypotension is reduced after QI implementation (Fig. 2).
Conclusions: To our knowledge, this is the first study to demonstrate the effectiveness of a QI for IOH implemented in clinical routine, which was associated to significantly reduced rates of IOH and AKI. These findings highlight the potential of standardized QIs in preventing IOH and improving patient outcomes. In addition, these results may point towards a direct pathophysiological link between IOH and PO-AKI.

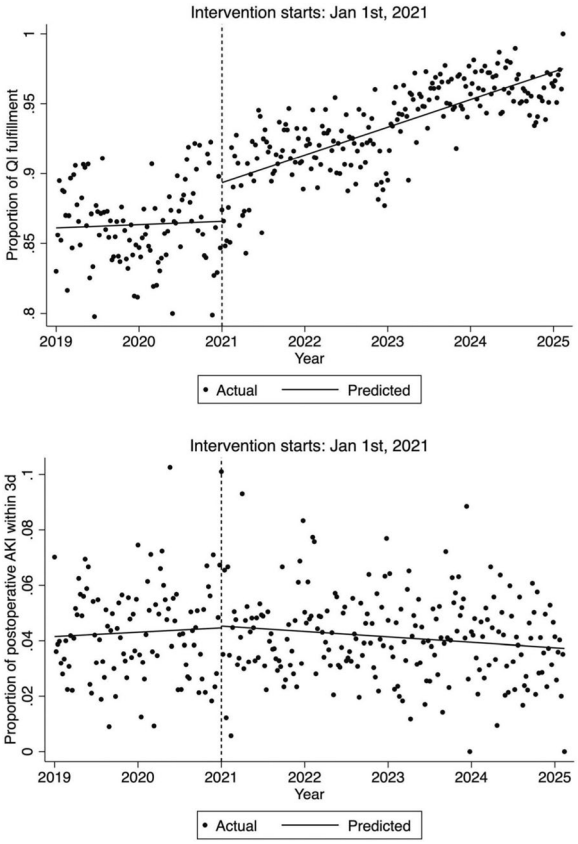


Fig. 1 (abstract 000899) **a** Proportion of fulfillment of the hypotension QI and **b** rate of postoperative AKI within 3 days before and after January 1, 2021. *QI Quality Indicator*

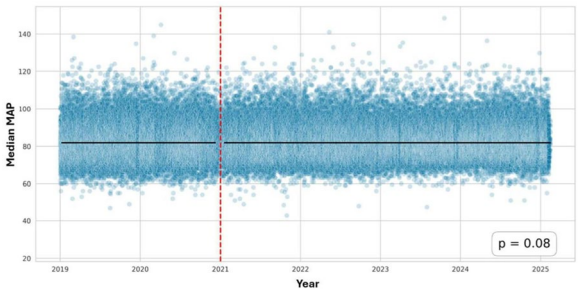


Fig. 2 (abstract 000899) Median MAP values before and after the implementation of the hypotension QI. *MAP mean arterial pressure; QI Quality Indicator*

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Topic: Perioperative care

000900

The impact of nutrition on the outcome of elderly critically ill patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***900***

Introduction: Nutrition is essential for life under all conditions. Previous studies have shown an association between adverse outcomes and inadequate nutritional support in elderly critically ill patients. However, there are conflicting results on nutrition of the elderly.
Objectives: We aimed to evaluate the effects of daily calorie and protein administration on the number of ventilator-free days and changes in muscle thickness in elderly critically ill patients.
Methods: After ethical committee approval, data of 101 patients who were admitted to the ICU between October 15, 2023, and December 1, 2024, were prospectively collected. Patients aged 65 years and older who were expected to require mechanical ventilation for more than 7 days and had no contraindications to enteral nutrition therapy were included. Dimensions of the quadriceps muscle in the right leg were measured by ultrasonography at admission and monitored weekly. Correlation analysis was performed between clinical variables and laboratory variables using the Spearman's test.
Results: Median age was 74, and 61.4% of patients were men. The most common comorbidity was hypertension. Mean APACHE II was 26.6, median SOFA 8, CCI 7 and mNUTRIC was 7. A significant, weak, positive correlation was found between the number of ventilator-free days and daily median calorie intake (rs = + 0.201, $p = 0.044$). In addition, nonsignificant, weak, positive correlations were found between the number of ventilator-free days and daily median calorie per body weight (kcal/kg), daily median protein intake, and daily median protein per body weight (g/kg) values ($p = 0.14$, $p = 0.073$, $p = 0.16$). A significant, weak, positive correlation was found between changes in muscle thickness and median daily calorie and protein intake ($p = 0.003$, $p = 0.007$). A significant, moderate, positive correlation was found between changes in muscle thickness and daily median kcal/kg and gr/kg protein values ($p < 0.001$, $p < 0.001$). Daily median calorie, protein, kcal/kg, and gr/kg protein values were higher in survivors ($p = 0.004$, $p = 0.005$, $p = 0.016$, $p = 0.031$). In univariate logistic regression analysis, we found that patients with a daily average kcal/kg ≤ 17.5 had a significantly higher risk of mortality (OR = 0.43, $p = 0.043$). However, in multivariate analysis, this relationship was not found (OR = 0.91, $p = 0.87$).
Conclusions: We found nutrition therapy positively contributed to changes in muscle thickness and 60-day mortality, although its contribution to the number of ventilator-free days was limited. Further studies may be planned regarding different compositions of nutrition.

Reference

1. This abstract is produced from Ahmet Furkan Dalgalı's thesis in Internal Medicine.

Topic: Metabolism, endocrinology, liver failure and nutrition

000903 **Augmenting object-based visual displays of patient physiologic data with visual icons**

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):903

Introduction: Intensive care unit (ICU) patient monitors generate alarms to alert healthcare providers about potentially life-threatening events. Patient monitoring involves integrating disparate sources of information, including auditory alarms, visual alarms, and multisensory cues from the patient. Object-based visual displays depicting patient vital signs through shapes and symbols, like the rate of a contracting heart, have been shown to aid in integrating information about a patient's current state [1].
Objectives: In previous work we developed a visual display, depicted in Fig. 1, that represented physiologic data about heart rate, blood pressure, and blood oxygen saturation as a ring whose color saturation and symmetry changed according to the severity of these vital signs (e.g., a saturated red, asymmetric ring indicated high blood pressure). In the present modification, shown in Fig. 2, we added visual icons such as rhythmically contracting symbols (i.e. large, quick contractions for high heart rate) and a color legend. In an experiment, we tested the modified display against the original version. We predicted the display innovations would aid the integration of patient emergency information, reducing response time and increasing accuracy compared with the original display.
Methods: Participants (n = 20) identified patient emergencies while performing a distracting task. Displays were presented in a simulated clinical environment via the HTC VIVE Pro Eye virtual reality headset, which recorded participant response time and accuracy. Each participant performed four blocks of monitoring, with a different display configuration for each block. In the first two configurations, each display was presented independently in the participant's central visual field in random order. Next, both displays were presented bilaterally in the participant's peripheral visual field, with the relative position of the displays randomized between blocks.
Results: An one-way ANOVA using display configuration as the factor and accuracy as the dependent variable revealed that participants performed better on the emergency identification task when two displays were presented bilaterally than when one display was presented centrally ($F(3,38) = 10.85$, $p < 0.001$, $\eta^2p = 0.36$). An one-way ANOVA did not reveal differences in reaction time across the different display configurations. These results are represented in Fig. 3.
Conclusions: Future work will examine whether the patient monitoring benefits of having two displays are due to the bilateral presentation of information or the simultaneous presentation of the original and modified displays. By demonstrating significant differences between participants' performance while viewing the original and modified display in distinct visual configurations, this study informs future work to examine whether the patient monitoring benefits of having two displays are due to the bilateral presentation of information or the simultaneous presentation of the original and modified displays.

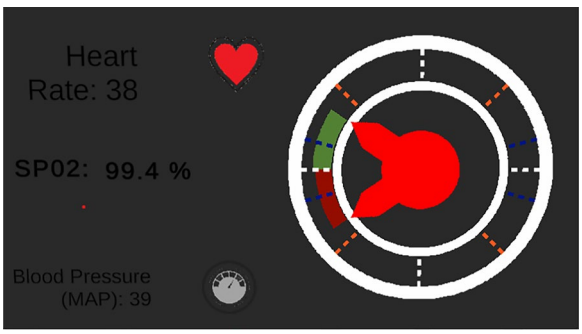


Fig. 1 (abstract 000903) Original object-based visual display

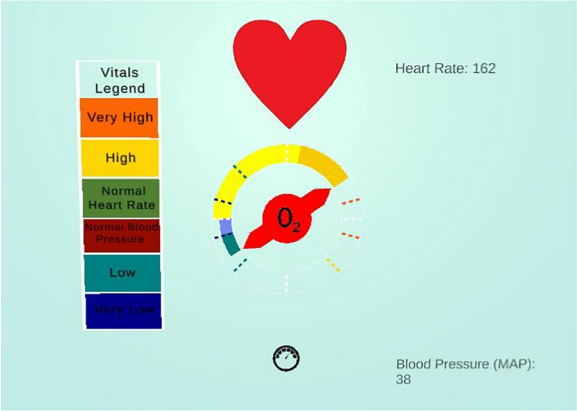


Fig. 2 (abstract 000904) Modified object-based visual display*

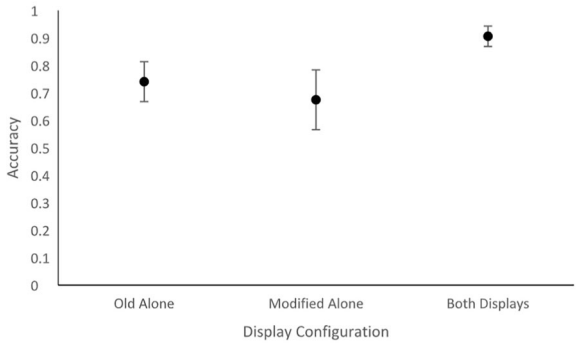


Fig. 3(abstract 000905) Effect of display configuration on accuracy. An one-way ANOVA test showed a significant increase in accuracy when participants viewed both displays while identifying simulated patient emergencies ($p < 0.001$)

Reference

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Topic: Health Services Research and Outcome

000906

Patients with pre-existing mental health disorders treated on the intensive care unit: a complex population at risk

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:906***

Introduction: Psychiatric disorders are common, affecting up to 30% of patients in primary care settings (1). Individuals with mental health disorders have worse physical health than the general population and excess healthcare resource consumption is a problem in this population (2,3). However, this patient collective is neglected and marginalized in somatic medicine: despite the high prevalence of psychiatric diseases, data on epidemiology among critically ill patients and impact on ICU outcome are scarce.

Objectives: The purpose of this study was to find out whether pre-existing psychiatric disorders (PPD) are associated with negative outcomes in critically ill patients.

Methods: This is a retrospective case–control study aiming to compare patients with PPD with the general population admitted to the Intensive Care Unit (ICU) of the Kantonsspital Graubünden in Chur, Switzerland over 10 years. Reviewing our clinical information systems, we collected demographic data, data on primary diagnosis, comorbidities, therapeutic and outcome data. Primary outcomes were ICU and 28-days mortality, length of stay on the ICU and re-admission within 24 h and 1 year. We also analysed the need of mechanical ventilation and vasopressor in both groups. Univariate and multivariate regression analyses were performed. Data are expressed as mean (SD), Median (interquartile range) or n (%).

Results: 11'262 adult patients were included in the study. 2150 (19%) had documented PPD. These patients were admitted from healthcare facilities more often (1.7% vs 0.4% $p < 0.01$), 35% had an affective disorder (mainly depression) and 55% were substance dependent. Patients with PPD were younger (59 ± 16 vs. 64 ± 15 y, $p < 0.01$) and more patients were female (37% vs 30.6%, $p < 0.01$) as compared with patients without PPD. SAPS score did not differe between the two groups. Outcome data are summarized in Table 1. More patients with PPD were in need of mechanical ventilation and vasopressor therapy and they stayed longer in the ICU. Re-admission rates were higher in this group. Within the PPD population, male sex was associated with higher re-admission rates within 24 h (3% vs 1.5% $p < 0.01$) and after 1 year (21% vs 17% $p < 0.01$) compared to female sex. Pre-existing respiratory disease was more common in PPD patients (9.4% vs 6.4% $p < 0.01$). Multivariate regression analysis showed that psychiatric disease was independently associated with lower ICU mortality [OR 0.48 (CI 0.4-0.65), $p < 0.001$] and 28-day mortality [OR 0.65 (CI 0.5-0.8), $p < 0.001$] but with higher risk of re-admission within 24 h and within one year [(OR 1.6 (CI 1.3-1.9) $p < 0.01$]. Age and male sex were independently associated with mortality at 28 days: [(OR 1.02 (CI 1.01-1.02) $p < 0.01$] and [(OR 1.27 (CI 1.07-1.5) $p < 0.01$], respectively.

Conclusions: Our data confirm a high prevalence of PPD (19%) among critically ill patients. Despite higher use of health care resources, PPD is not associated with increased mortality. Patients with PPD are more likely to have a complicated clinical course. In particular, male sex had a higher rate of re-admission over time. Our results might be attributed to vulnerability of this population, but also to lack of awareness among health care professionals. High re-admission rates and sex differences emphasize the need of tailored concepts for this population at risk.

Table 1 (abstract 000906) Outcomes according to presence of psychiatric disorder; data expressed as median (interquartile range) and n (%)

	psychiatric	Non psychiatric	P value
Length of stay (hours)	31 (19-71)	23 (17-44)	< 0.001
ICU mortality	85 (4)	681 (8)	< 0.001
28 days mortality	183 (9)	1156 (13)	< 0.001
Need of mechanical ventilation	819 (38)	2602 (29)	< 0.001
Need of vasopressors	912 (42)	3412 (38)	< 0.001
Re-admission after 24 h	53 (2.5)	129 (1.5)	< 0.01
Re-admission within 1 year	414 (19)	1220 (13)	< 0.001

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Topic: Health services research and outcome

000911

Norepinephrine equivalent dose of vasopressin, phenylephrine and epinephrine in septic shock patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***911***

Introduction: Norepinephrine has been recommended as the first-line vasopressor for management of septic shock [1]. In clinical practice, various vasopressors are being used and norepinephrine equivalence (NEE) doses of vasopressin, phenylephrine and epinephrine are proposed as 0.04 units/min, 1 mcg/kg/min and 0.1 mcg/kg/min respectively, when compared to norepinephrine dose of 0.1 mcg/kg/min [2,3]. However, there is no prospective study to prove the same.
Objectives: To evaluate the NEE doses of vasopressin, phenylephrine and epinephrine in septic shock patients, against the norepinephrine dose of 0.1 mcg/kg/min.
Methods: After ethical approval, this prospective study included septic shock patients on mechanical ventilation receiving norepinephrine at least 0.1 mcg/kg/min for a minimum of six hours, with no dose alteration in the last 2 h before the study was conducted. Patients were excluded if presence of other forms of shock concurrently, arrhythmias, ventilator asynchrony, ongoing fluid resuscitation, diuretics or hemodialysis at the time of study.
The studied drugs were prepared as follow: vasopressin, 20 units in 20 ml of saline, with a concentration of 1 U/ml which delivered drug at 0.04 U/min when run at 2.4 ml/hr; phenylephrine, dose was calculated as body weight × 0.15 drug (in mg) in 25 ml preparation, which delivered 0.1 mcg/kg/min when infused at 1 ml/hr; epinephrine dose was calculated as body weight × 0.03 drug (in mg) in 50 ml preparation; 1 ml/hr of this infusion delivered drug at the rate of 0.01 mcg/kg/min. The transducer was zeroed to the atmospheric pressure at the level of the heart and baseline invasive mean arterial pressure (MAP) were recorded. Studied vasopressor was connected and norepinephrine infusion was reduced over 5-10 min by 0.1 mcg/kg/min with simultaneous titration of the studied vasopressor to achieve the similar baseline MAP. Two readings were recorded 5 min apart and mean of the studied drug was calculated. After withdrawing the first studied drug, the process was repeated for the other studied drugs, with a gap of 2 h.
Results: During the study period (Jul 2024 to Feb 2025) 23 patients were included with median age 36 years (IQR 31-48.5) of which 60.8% were males, Charlson comorbidity index 0 (IQR 0,0.5). On the study day, the median SOFA score was 15 (IQR 12-17) and patients were receiving median norepinephrine dose of 0.22 mcg/kg/min (IQR 0.155-0.275). The NEE dose of vasopressin found to be 0.039 units/min (IQR 0.032-0.042) as against to proposed 0.04 units/min (p = 0.441) (Fig. 1); phenylephrine 0.83 mcg/kg/min (IQR 0.31-0.96) as against to proposed 1 mcg/kg/min (p = 0.001) (Fig. 2); and epinephrine 0.09 mcg/kg/min (IQR 0.043-0.12) as against to proposed 0.1 mcg/kg/min (p = 0.60) (Fig. 3).
Conclusions: In septic shock patients, the NEE dose of phenylephrine was significantly lower than the proposed dose; however, the NEE doses of vasopressin and epinephrine were found similar to the proposed doses.

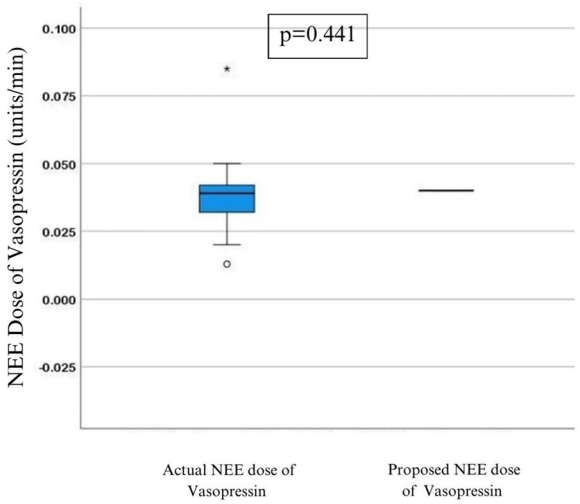


Fig. 1 (abstract 000911) Norepinephrine equivalent (NEE) dose of vasopressin to norepinephrine dose of 0.1 mcg/kg/min

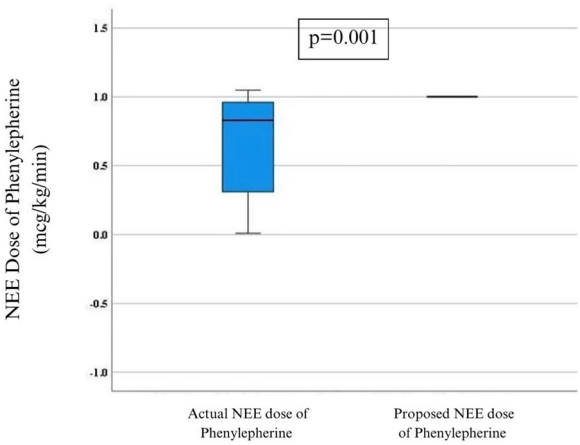


Fig. 2 (abstract 000911) Norepinephrine equivalent (NEE) dose of phenylephrine to norepinephrine dose of 0.1 mcg/kg/min

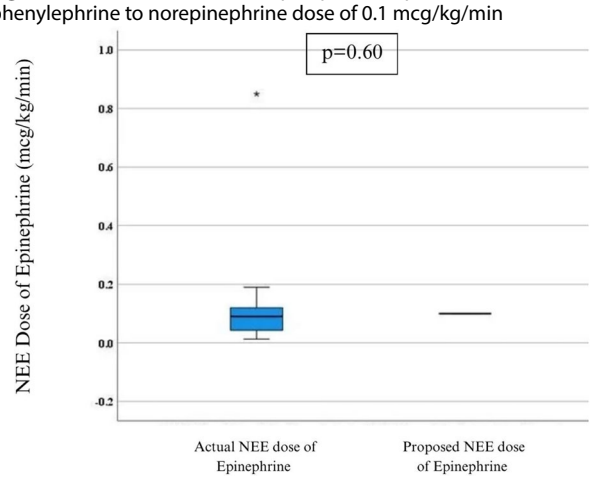


Fig. 3 (abstract 000911) Norepinephrine equivalent (NEE) dose of epinephrine to norepinephrine dose of 0.1 mcg/kg/min

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4. No grants were received during the study

Topic: Pharmacology and toxicology/poisoning

000912

First use of cefiderocol for infections caused by gram-negative multi- and extensively drug-resistant bacteria in a Greek ICU

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:912***

Introduction: Cefiderocol is a novel siderophore cephalosporin, active against multidrug-resistant pathogens such as carbapenemase-producing Enterobacterales, Pseudomonas aeruginosa, Acinetobacter baumanii and Stenotrophomonas maltophilia. However, limited data are available about its use in the ICU setting.
Objectives: Aim of the study was to assess the efficacy and safety of cefiderocol treatment for infections caused by multidrug and extensively drug-resistant Gram-negative microorganisms in ICU patients.
Methods: This is a retrospective, observational study conducted in the ICU of a tertiary Greek hospital. Critically ill patients admitted in the ICU who received treatment with cefiderocol for infections caused by Gram-negative multidrug-resistant microorganisms were included. We recorded patients' demographics and clinical characteristics, site of infection, responsible pathogens and their antimicrobial susceptibility, clinical response, days from therapy initiation to clinical response, relapse, adverse effects, length of stay in the ICU and outcome (ICU discharge or death). Clinical response was considered as fever remission, improved oxygenation, decreased need for catecholamines, resolution of sepsis or shock and recovery of organ dysfunction until 2 days after end of therapy. New infection with the same pathogen after 2 days following end of therapy was defined as a relapse.
Results: We analyzed data from 12 patients admitted in the ICU between April 2023 and December 2024. Nine were males and 3 were females, with mean age 59 years (31-81) and mean APACHE II score 27 (15-37). Mean ICU length of stay was 59 days (3-150). Five patients had undergone emergency surgical procedures, six were immunocompromised (hematological malignancy, history of solid organ transplantation and chronic corticosteroid therapy). A total of 13 episodes of infections were recorded, 11 bacteremias and 2 VAP. Most common pathogen was *Pseudomonas aeruginosa* (5) followed by *Acinetobacter baumanii* (4), *Klebsiella pneumoniae* (3) and *Stenotrophomonas maltophilia* (3). Other pathogens were *Providencia stuartii* and *Proteus sp*. Four cases were multimicrobial (2 pathogens, 30%). Clinical response was observed in 6 episodes (46%), all of them bacteremias. None of the patients with VAP responded. Among the patients who responded 3 were immunocompromised. Mean time from therapy initiation to clinical response was 4 days (range 3-5 days). As of pathogen-related response to treatment we found no difference among different types of Gram-negative bacilli. One patient had a relapse. Urine discoloration was seen in one patient as an adverse effect of cefiderocol treatment. Three patients were discharged from the ICU (25%).
Conclusions: Cefiderocol had better results in bacteremias than in VAP, in our study. Patients who responded to therapy were eventually discharged from ICU while non-responders died during the infection episode. No major adverse effects linked to Cefiderocol therapy were recorded. More data are certainly needed in order to draw better conclusions about the drug efficiency.

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Topic: Sepsis

000913

PVADet: fast patient–ventilator asynchrony detection on waveforms

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:913***

Introduction: Patient–ventilator asynchrony (PVA), usually termed as the patient "fighting" the ventilator, is a common problem with potential bad outcomes for invasive and noninvasive mechanical ventilation. Mechanical ventilation, extensively utilized worldwide, notably at the bedside and tele-ICU, is often a life-saving intervention but carries potential complications. Multiple studies have shown an association between asynchrony and duration of mechanical ventilation, ICU length of stay, mortality, and patient comfort. Asynchronies are often

unrecognized, underestimated, and inappropriately treated. Manual and automated detection of PVA are two fundamental ways to identify PVAs. Manual methods are time-consuming and demand much knowledge. Manual identification is subject to human errors and comprehension of standardized terminology, taxonomy, and practices of PVAs. Most automated approaches take identifying PVAs as a classification task and are constrained to specific ventilator models/modes and patients/hospitals. Furthermore, automatically detecting PVAs is technically challenging. For a segment of waveforms, e.g., 60 s waveforms, PVAs can occur anywhere from zero to dozens of times and in different locations.

Objectives: Detection of PVAs via three basic ventilator waveforms (pressure of airway, flow, and volume) is a more pragmatic approach. This detection job is a multi-class multi-target detecting problem that includes the localization and classification of PVAs. The primary objective of this study is to design and develop such a detector to identify PVAs using only ventilator waveforms for mechanically ventilated patients at the bedside and tele-ICU.

Methods: In this study, we proposed a light, fast, and end-to-end network to realize multitarget multiclass one-stage detection (PVADet) of six PVAs using only ventilator waveforms (Shown in the Fig. 1). Inventively, we converted the challenge of detecting PVAs to a multiclass multitarget detection problem like detection tasks in computer vision. In practice, assessing rich ventilator data is a cumbersome task subject to patient privacy and hospital information security. We distinctively opted to utilize waveforms alone as inputs to evaluate the possibility of detecting PVAs due to their simple and extensive obtainability. Moreover, we created an one-stage model PVADet innovatively integrating causal separable convolutional blocks and recurrent neural networks (shown in Fig. 2) with novel techniques, label striping and stripe–mask encoding (shown in Fig. 3), simplifying input–output mapping and adapting to muticlass multitarget tasks. A one-stage detector with an end-to-end architecture presents a flexible and pragmatic strategy to develop a monitor tool to support better ventilation. To our knowledge, this is the first effort to train, validate, and test the model detecting PVAs on multiple ventilators, modes, and patients from different hospitals.

Results: The performance of overall PVA detection for testing is displayed in **Table 1**. A proper G (G indicates strips, G = 30) surpasses others in model generalization. Our model performs worse on the test dataset due to the significant diversity between it and the training dataset, as well as the complexity of detecting multiple classes and targets of PVAs. Besides, a small G may lead to better PPV based on our experimental results.

The metrics for cross-validation and test are expressed as mean standard deviation.

Table 1 (abstract 000913) Results of test for overall PVA detection. ACC, PPV, TPR, TNR, F1, MCC and mAP denote adopted accuracy (ACC), positive predictive value (PPV) or precision, true positive rate (TPR) or sensitivity, true negative rate (TNR) or specificity, F1 score, Matthews correlation coefficient (MCC), and mean average precision (mAP), respectively

	ACC	PPV	TPR	TNR	F1	MCC	mAP
G = 15	0.946 ± 0.005	**0.604** ± 0.007	0.573 ± 0.007	0.974 ± 0.008	0.551 ± 0.003	0.602 ± 0.005	**0.657** ± 0.003
G = 30	0.968 ± 0.007	0.588 ± 0.009	**0.620** ± 0.009	0.981 ± 0.007	**0.566** ± 0.004	**0.613** ± 0.004	0.650 ± 0.004
G = 60	**0.980** ± 0.006	0.527 ± 0.008	0.523 ± 0.008	**0.990** ± 0.009	0.480 ± 0.006	0.531 ± 0.005	0.520 ± 0.003

Conclusions: The findings prove that automatically recognizing PVAs utilizing only ventilator waveforms is promising, and the performance of the model is decent. PVA is clinically tricky, and identifying it costs a lot. We bring a new insight to the identification of PVAs via ventilator waveforms. This model could be applied as a monitoring tool at the bedside and tele-ICU to improve patient comfort, reduce potential risks, and better outcomes.

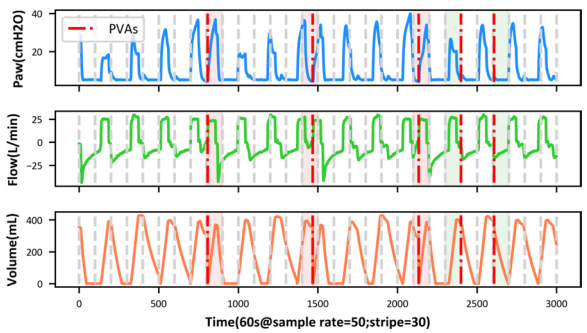


Fig. 1 (abstract 000913) Demonstration of the label striping. The time axis is gridizated to areas (stripes) denoted by grey vertical lines. Red dash-dotted vertical lines indicate raw labels, with light red transparent bars (stripe labels) denoting double triggers and green ones representing ineffective efforts. Paw denotes airway pressure. PVAs denote patient–ventilator asynchronies. In this example, we divide the 60 s waveform into 30 stripes and six classes of PVAs. The sample rate is 50 Hz (samples per second)

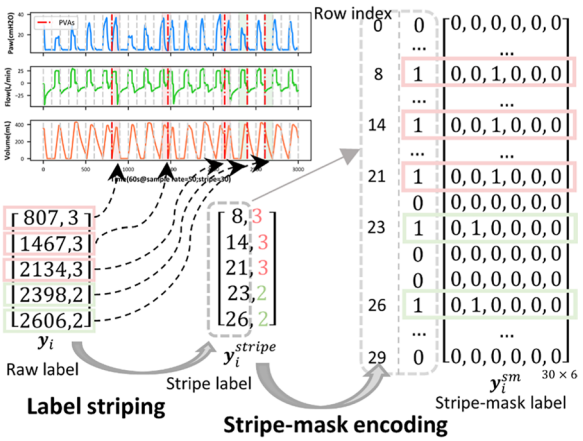


Fig. 2 (abstract 000913) Demonstration of the stripe-masking encoding. The raw labels of a 60-s waveform segment are striped and encoded to stripe-mask labels. In stripe labels, the elements in the first column of stripe labels denote the row indexes in the right matrix. Only these indexes in stripe labels are valid for class representation. Specifically, the corresponding index rows represent category while the others are all zeros. The category representation is the one-hot encoding without a negative category. PVAs represent patient–ventilator asynchronies. Note that we split the 60-s waveform into 30 stripes and six classes of PVAs

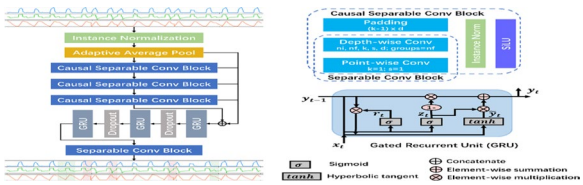


Fig. 3 (abstract 000913) The architecture of the proposed PVADet network

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Topic: Acute respiratory failure and mechanical ventilation

000914

Olink proteomics analysis platform identifies protein biomarkers associated with cardiac arrest and brain injury

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:914***

Introduction: Cardiac arrest, a leading cause of global mortality, often results in post-resuscitation brain injury (PCABI), the primary determinant of adverse outcomes. The existing biomarkers like Tau, NfL, and NSE lack sufficient sensitivity and specificity, necessitating novel markers for improved prognostic accuracy.
Objectives: This study aimed to identify serum protein biomarkers associated with neurological injury following cardiac arrest using the high-sensitivity Olink proteomics platform and machine learning, enhancing early diagnosis and outcome prediction.
Methods: Serum samples from 170 participants (8 healthy controls, 8 acute cerebral infarction patients, and 154 cardiac arrest survivors) were analyzed via Olink's 384-protein panel. Differentially expressed proteins (DEPs) were identified, clustered, and correlated with clinical scores (CPC, GCS). Four machine learning algorithms (LASSO, random forest, Elastic Net, XGBoost) prioritized key biomarkers, validated by ELISA in 120 samples.
Results: Differential analysis revealed 156 upregulated proteins across groups. Hierarchical clustering identified three subtypes (CC1-CC3), with CC1 showing persistent upregulation and strong clinical correlation. Machine learning selected five biomarkers: Tau, NfL, NSE, ANXA10, and IDI2. ELISA confirmed elevated levels in cardiac arrest patients, with ANXA10 demonstrating the highest predictive power (AUC: 0.714). A logistic regression model integrating all five proteins outperformed individual markers (AUC: 0.81) and the conventional three-protein model (AUC: 0.748).
Conclusions: The Olink platform successfully identified ANXA10 and IDI2 as novel serum biomarkers for post-cardiac arrest brain injury. Combined with established markers, these proteins enhance prognostic accuracy, offering a robust tool for clinical management. Further validation in larger cohorts is warranted to confirm their translational potential.

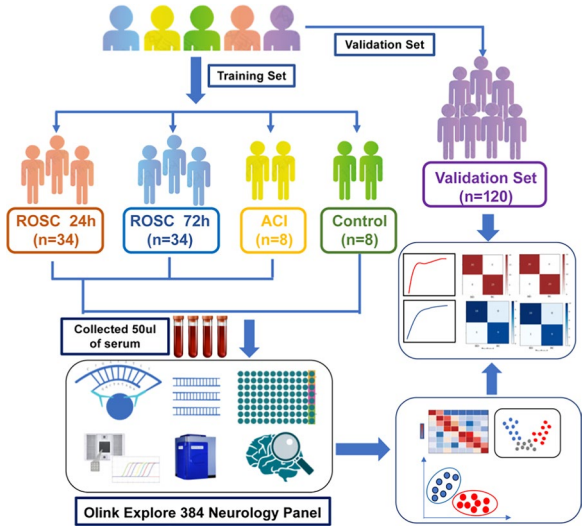


Fig. 1

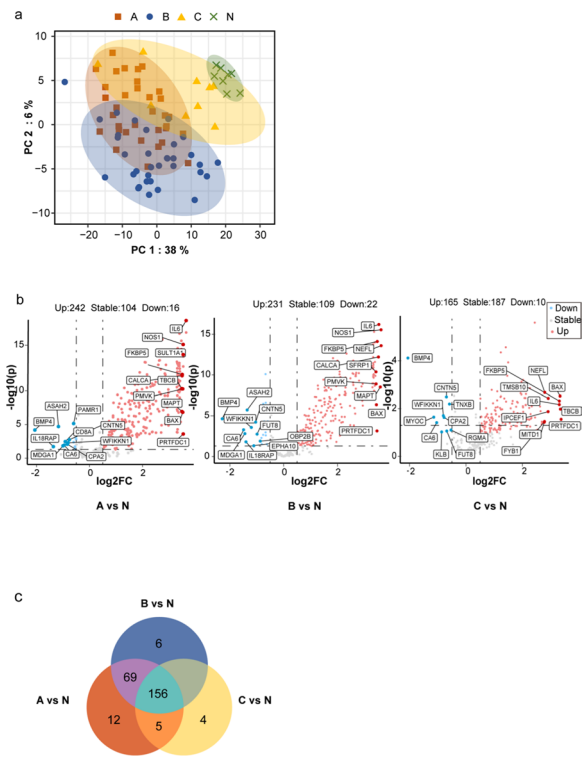


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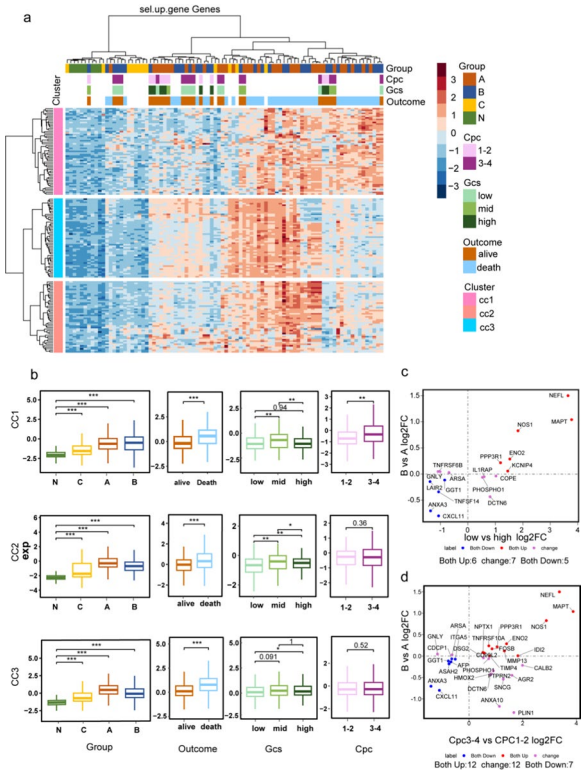


Fig. 3

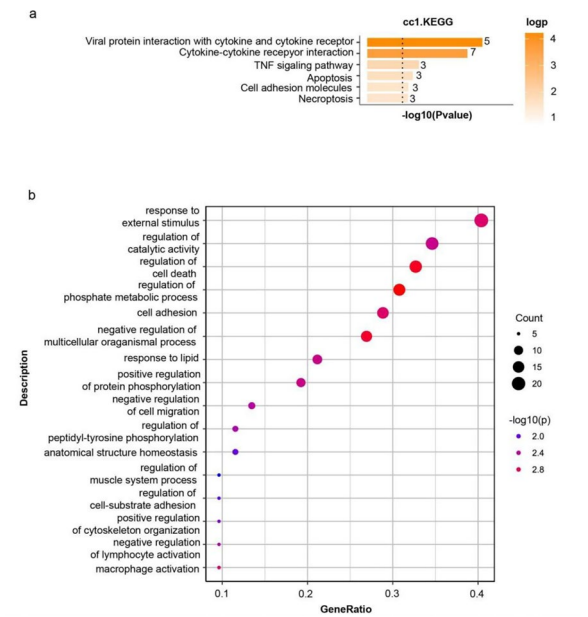


Fig. 4

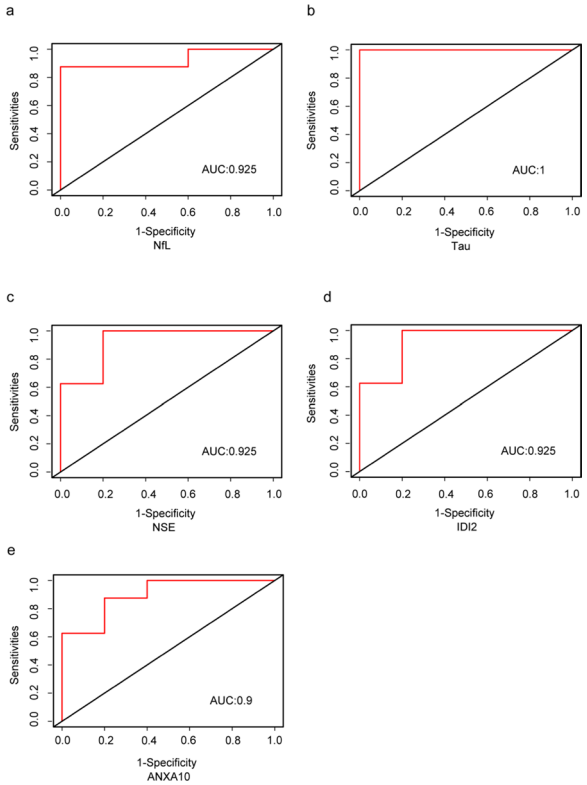


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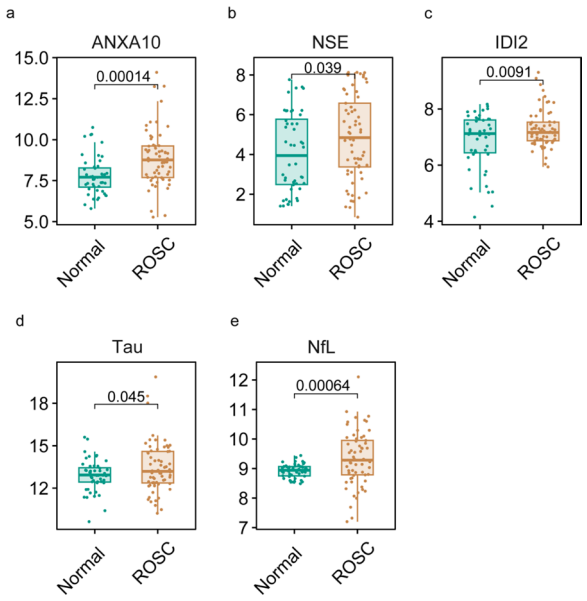


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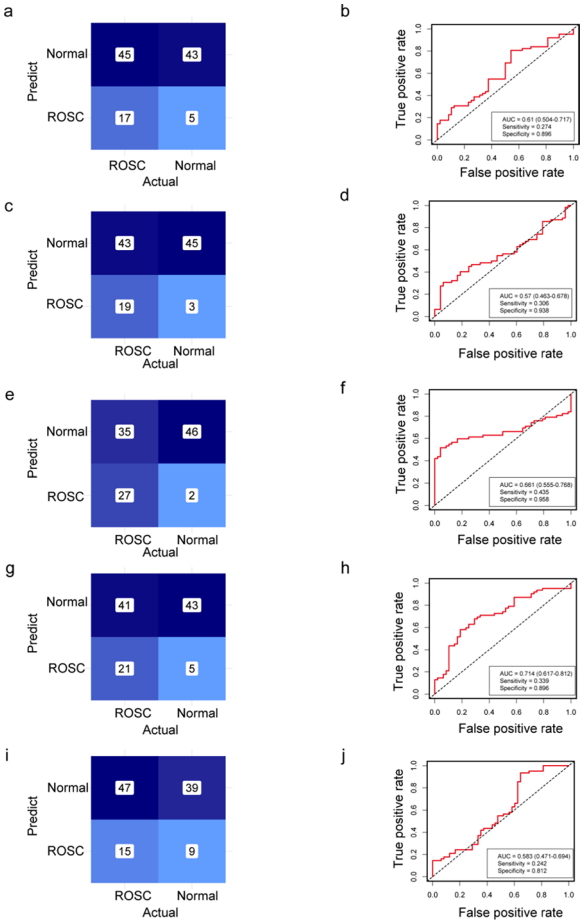


Fig. 7

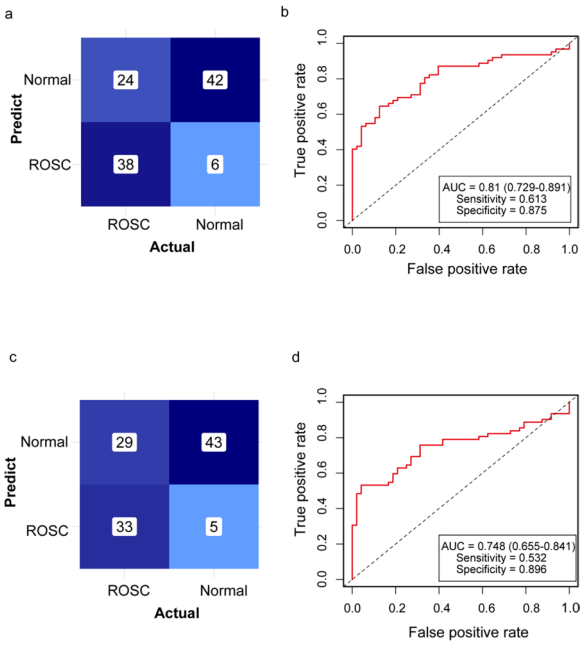


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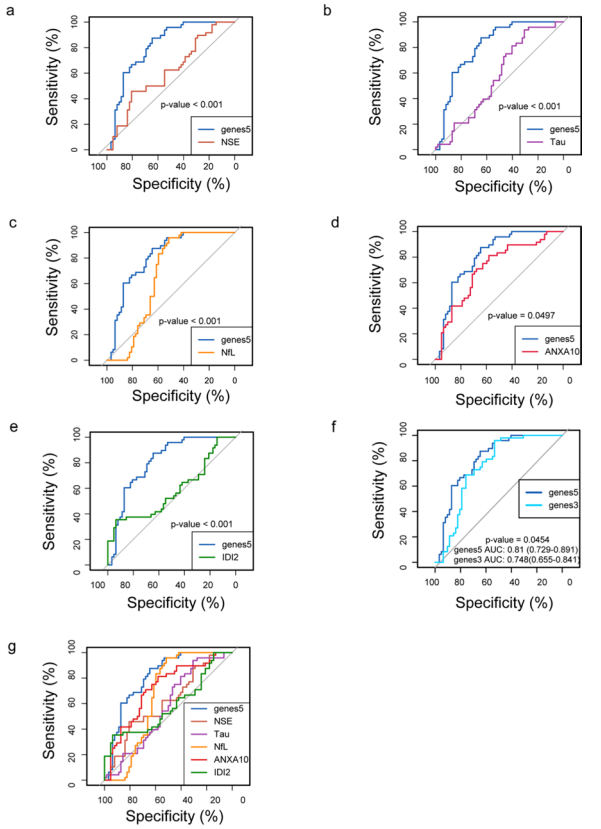


Fig. 9

Topic: Cardiac arrest

000915

Analytical validation of SeptiLoop®: an IVD lateral flow test for detection of immunosuppression induced by bacterial bloodstream infections in early septic patients

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Intensive Care Medicine Experimental 2025 **13(Suppl 1):*915***

Introduction: Sepsis is a leading cause of mortality globally, requiring prompt diagnosis and intervention to improve clinical outcomes. The current diagnostic tools often suffer from low sensitivity and long processing times, delaying effective treatment. SeptiLoop® is a novel in vitro diagnostic (IVD) lateral flow test designed to detect ex vivo tumor necrosis factor-alpha (TNFα) production in whole blood stimulated with lipopolysaccharide (LPS), providing an indication of bloodstream infection related to immune dysregulation in early sepsis.
Objectives: This study aims to evaluate the analytical validity of SeptiLoop® for early detection of immunosuppression induced by bacterial bloodstream infections (including sepsis) through measurement of TNFα production in LPS-stimulated whole blood.
Methods: SeptiLoop® employs an endotoxin (LPS) to stimulate immune cells in whole blood samples. After a 2.5-h incubation at 37 °C, TNFα levels are assessed using a lateral flow strip (Fig. 1). The analytical performance was evaluated based on the sensitivity (Limit of Detection, LoD), specificity (interference and cross-reactivity), precision (repeatability and reproducibility), linearity, accuracy, and stability. Assays were performed using whole blood from healthy volunteers. Stability tests covered blood sample viability, diluted sample stability, reagent stability, and shelf-life.
Results: SeptiLoop® demonstrated a LoD of 250 pg/mL for TNFα, with no observed hook effect. Specificity tests revealed minimal interference from common medications or patient conditions, and no cross-reactivity (Fig. 2). The assay achieved > 95% agreement in both repeatability and reproducibility across varying test conditions. Whole blood samples remained stable for 16 h post-collection, and diluted samples retained integrity for up to 15 min post-incubation. The device functioned reliably under different operational conditions and maintained reagent and strip performance for 6 and 18 months respectively.
Conclusions: SeptiLoop® met all analytical performance criteria, including accuracy, sensitivity, and precision, making it a reliable tool for early sepsis detection. Its rapid time to result and ease of use support its implementation as a frontline diagnostic tool, potentially improving patient outcomes through timely bloodstream infection (including sepsis) diagnosis and intervention.

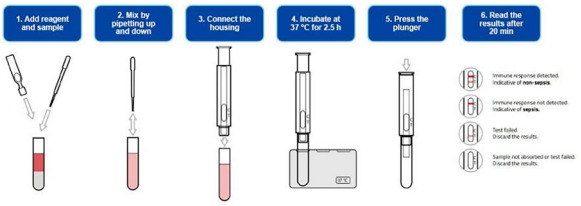


Fig. 1 (abstract 000915) SeptiLoop® Workflow

Endogenous substances	Final Concentration	Interference	Exogenous substances	Concentration	Interference
Haemoglobin	1000 mg/dl	✗	Common Antibiotics- Doxycycline, Cefoxitin, Ampicillin	1.8 mg/dl, 660 mg/dl, 7.6 mg/dl	✗
Lipids - Cholesterol, Triglycerides	200 mg/dl, 1500 mg/dl	✗	Etanercept	3.2 ug/ml	✓
Bilirubin	40 mg/dl	✗	Antihistamines – Loratadine, Cetirizine, Diphenhydramine	15 ng/ml, 300 ng/ml, 75 ng/ml	✗
Rheumatoid Factor	25 IU/ml	✗	Asthma Medication- Salmeterol, Theophylline	85 ug/l, 6 mg/dl	✗
IL-6	5 pg/ml	✗	Acetylsalicylic Acid (Aspirin)	3 mg/dl	✓
Soluble CD14	708 ng/ml	✗	Ibuprofen	21.9 mg/dl	✓
Lipopolysaccharide binding protein (LBP)	35 ug/ml	✗	Paracetamol	15.6 mg/dl	✗
Calcitonin	8 ng/ml	✗	Teriflunomide	ex-vivo test	✗
C-reactive protein (CRP)	10 mg/l	✗	Upadacitinib	ex-vivo test	✗
			Sulfasalazine	ex-vivo test	✓
			Escitalopram	ex-vivo test	✗

Fig. 2 (abstract 000915) Interference and cross-reactivity results

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4. This research was funded by the Ministry of Science, Spain CPP2021-008394.

Topic: Sepsis

000916

Drug use evaluation of human albumin for septic shock patients in intensive care units at a tertiary care hospital in Thailand

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Intensive Care Medicine Experimental 2025 **13(Suppl 1):*916***

Introduction: Human albumin is an expensive therapeutic agent frequently used in the management of septic shock. However, inappropriate prescribing practices may lead to substantial healthcare costs without corresponding clinical benefit. To address this issue, an

institutional policy was implemented to guide human albumin use as part of a Drug Use Evaluation (DUE) program.
Objectives: This study aimed to evaluate the appropriateness of human albumin prescriptions for indications associated with septic shock and to quantify the potential cost savings resulting from reduced inappropriate use following the implementation of a drug use evaluation program.
Methods: A retrospective evaluation study was conducted using data from the Drug Use Evaluation (DUE) based on paper records at the intensive care units of university hospital, Thailand. The study included adult patients (aged > 18 years) who received either 5% or 20% human albumin for the treatment of septic shock. Prescriptions were assessed for appropriateness according to the hospital's DUE criteria. The primary outcomes were the rates of appropriate versus inappropriate use and their corresponding cost implications. The reasons for inappropriate use were categorized and analyzed. The secondary outcome involved estimating the financial loss based on the volume of albumin used and its unit cost.
Results: Of the prescriptions reviewed between June 2024 (after the implementation of the DUE policy) and December 2024, a total of 201 prescriptions were reviewed. The use of 5% and 20% human albumin accounted for 46.8% and 53.2%, respectively. The appropriate use of human albumin was identified in 28.7% of 5% formulations and 26.2% of 20% formulations. The most common reason for inappropriate use was insufficient administration of crystalloid fluids prior to albumin therapy, accounting for 18.4% of 5% and 21.4% of 20% albumin prescriptions. The second most common reason was prescribing without meeting the indication criteria, found in 10.9% of 5% and 17.9% of 20% human albumin prescriptions. A detailed breakdown of the reasons for inappropriate use is illustrated in Fig. 1. The total estimated financial loss due to inappropriate albumin use was 435,180 baht comprising 204,288 baht from 5% albumin and 230,892 baht from 20% albumin. Specifically, 117,072 BAHT was attributed to insufficient crystalloid fluid administration, and 113,820 baht to failure to meet indication criteria.
Conclusions: This study revealed a high proportion of human albumin prescriptions for septic shock in the ICU unit that did not comply with hospital guidelines, leading to significant unnecessary expenditure. Improving adherence to DUE criteria through ongoing education, regular monitoring, and policy enforcement is essential to minimize inappropriate use and promote cost-effective human albumin therapy practices at a tertiary care center in Thailand.

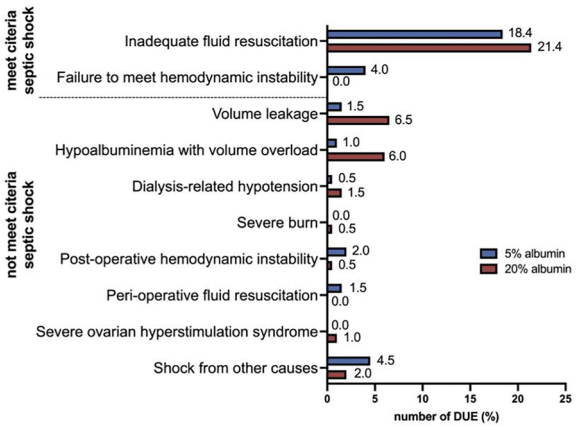


Fig. 1 (abstract 000916) The reasons for the inappropriate use of human albumin

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Topic: Health services research and outcome

000917

Inflammation afterlife: how donor immune signals shape transplant futures

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)*:917*

Introduction: Systemic hyper-inflammation is an established cause of organ dysfunction, evidenced by the multi-organ failure observed in sepsis [1]. Similarly, the process of death invokes a complex set of events leading to profound hyper-inflammation [2]. It is reasonable that in deceased organ donors, death-induced hyperinflammation could have significant consequences for organs being offered for transplant (Tx), hence current donor management guidelines advocating the administration of steroids early in the donor management process (DMP) to modulate donor inflammation and maximise organ utilisation [3]. Notably, disparities in graft quality and Tx success have been identified in organs received from deceased versus living donors [4-5]. It is hypothesised that donor death mechanisms and ensuing inflammation likely contribute to pre-Tx organ quality variations, with lasting effects on graft function.
Objectives: We performed a systematic review which aimed to 1) clarify what is currently known about the sources of inflammation following death, and 2) systematically evaluate the current body of evidence reporting higher levels of inflammation in deceased donors versus living donors and linking donor inflammation with kidney Tx outcome.
Methods: The review was conducted in agreement with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines 8. We searched Medline, Web of Science, Scopus and CINHAL databases from January 2000 to March 2023 for articles relating donor inflammation with kidney Tx outcomes. National Institute of Health 'Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies' was used to assess validity of studies.
Results: From 530 articles screened, 21 studies were analysed, which included a total of 3397 donors and 4596 recipients. There was a very high degree of heterogeneity between studies in terms of the inflammatory markers assessed and the measured Tx outcomes, yet collective evidence showed higher inflammation, complement activation, and tissue injury in deceased donors compared with living donors and strongly suggested associations with less favourable short- and long-term Tx outcomes.
Conclusions: To improve organ viability and Tx outcomes, a paradigm shift toward precision donor therapies is critical. Future efforts should prioritise disrupting specific drivers of inflammation and graft dysfunction, particularly dysregulated complement pathways, rather than relying on nonspecific immunosuppression. This targeted approach may suppress donor-derived inflammation more effectively, preserving organ function and also may expand the pool of transplantable grafts.

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6 This work was jointly funded by Manchester Metropolitan University and the NHSBT Organ Donation Committee in the form of a match-funded PhD studentship.

Topic: Brain death, organ donation and transplantation

000921

Neuromuscular diseases in an Andalusian ICU over the last 10 years: a comparative descriptive study

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:921***

Introduction: Neuromuscular diseases comprise a broad spectrum of disorders that can significantly compromise respiratory function and, in severe cases, require admission to intensive care units. Descriptive studies in patients with Guillain–Barré syndrome have documented that a considerable proportion require prolonged mechanical ventilation and experience associated complications such as sepsis and respiratory failure[23]. However, integrated analyses that include various neuromuscular conditions along with therapeutic variables and the weaning process remain scarce. The present study, based on data collected at our institution and following a methodological protocol inspired by the recent published studies, provides updated information on the critical management of these patients as well as on the distribution of the different neuromuscular diagnoses identified[456].
Objectives: To analyze the demographic and clinical characteristics, as well as the evolution of patients with neuromusculardiseases admitted to an Andalusian ICU over the last decade, including variables related to respiratory support,the immunological treatment used, and the weaning process.
Methods: A retrospective study was conducted in the ICU of the Universitario Clínico San Cecilio (2016–2025), whichincluded 32 patients diagnosed with neuromuscular diseases (such as Guillain–Barré syndrome, myastheniagravis, and others). Demographic variables (age and sex) and clinical variables (need and duration of mechanical ventilation, performance of tracheostomy, respiratory complications, and sepsis), the type ofimmunological treatment (immunoglobulins, plasmapheresis, combined therapies), and the type of weaning(classification of the mechanical ventilation liberation process as successful, difficult, or failed) were analyzed. Descriptive analyses (means, medians, ranges, and percentages) were performed and the findings werecompared with the recent studies published in indexed databases.
Results: The cohort showed a mean age of 60.2 years (range: 24-88 years) and a predominance of males (78%). The meanICU stay was 18.8 days. Approximately 60% of patients required mechanical ventilation, with a mean durationof 29 days; in 50% of these cases, a tracheostomy was performed. Regarding immunological treatment, 65% ofpatients underwent this intervention (45% received immunoglobulins, 15% plasmapheresis, and 5% combinedtherapies). The weaning process was classified as successful in 70% of cases, difficult in 20%, and failed in 10%.Regarding the type of neuromuscular disease, the distribution was as follows: Guillain–Barré syndrome 50%(16/32), myasthenia gravis 25% (8/32), and other entities (including inflammatory neuropathies andmyopathies) 25% (8/32). The incidence of respiratory complications ranged between 30 and 35%, and sepsis was identified inapproximately 40% of cases. These results are consistent with the findings reported in the recent studies2345.
Conclusions: This descriptive study demonstrates that patients with neuromuscular diseases in the ICU exhibit a high needfor ventilatory support and immunological treatment, along with variability in the weaning process. Thesignificant incidence of respiratory complications and sepsis, coupled with the distribution of differentneuromuscular diagnoses—predominantly Guillain–Barré syndrome—highlights the importance of optimizingintensive care management protocols. These findings contribute relevant data for clinical practice and futureresearch in this field.

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Topic: Neurointensive care

000922

Epilepsy in Alzheimer's disease patients

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:922***

Introduction: Previous studies have reported conflicting results about the prevalence of seizures in AD, and few epidemiological studies in the Asia have been found. We examine the demographic, clinical characteristics and the incidence for seizures with AD patients compared with non-AD patients in a prospective, longitudinal, community-based cohort with long follow-up.
Methods: The data were collected from National Health Insurance Service-National Elderly cohort (NHIS-elderly) database to define patients with AD from 2014 to 2016 based on having KCD code G30, F00. We performed a 1:5 case–control-matched analysis using
propensity score matching, which were based on the age, sex and household income. We conducted Cox proportional hazards regression analysis to estimate the risk of epilepsy in AD.
Results: In the cohort study, the patients with AD have higher chances for epilepsy than those without AD The Hazard ratios for epilepsy with AD are 2.773(95% CI: 2.515-3.057). The study also shows that the gender male, comorbidities, such as hypertension, hyperlipidemia, diabetes, and chronic kidney disease increases the risk of developing epilepsy. Patients have 1.527 (95% CI: 1.375-1.695) times higher mortality rate when epilepsy occurred in the AD group than in the control group.
Conclusions: Out data show that AD significantly has higher risk for the development for epilepsy

Topic: Neurointensive care

000923

Role of miRNAs shuttled by LPS-primed mesenchymal stem cell-derived extracellular vesicles in modulating macrophage activation

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***923***

Introduction: Mesenchymal stem cells (MSCs) exhibit significant therapeutic potential due to their regenerative and immunomodulatory properties, largely mediated by the extracellular vesicles (EVs) they secrete [1]. Our previous research demonstrated that priming MSCs with lipopolysaccharide (LPS) boosts the therapeutic efficacy of their EVs, particularly in the context of acute lung injury (ALI) [2].
Objectives: The main objective of this study is to investigate the role of differentially expressed miRNAs between EVs derived from naïve (C-EVs) and LPS-primed MSCs (LPS-EVs) and their immunomodulatory capacity.
Methods: miRNA transcriptomic analysis of C-EVs and LPS-EVs (n = 2) was performed using GeneChip miRNA 4.0 Array. Differential expressed miRNAs between both types of EVs were identified establishing a threshold to fold-change ≥ 1.5. Pathway enrichment was conducted using the pre-ranked GSEA with KEGG, GO, Biocarta, Broad Hallmarks, and PID data. Among the overexpressed miRNAs in LPS-EVs, key miRNAs were selected and their expression was verified by RT-qPCR. Their immunomodulatory effects were evaluated in macrophage-like THP-1 cells infected with Pseudomonas aeruginosa, both individually and in combination (MIMIX).
Results: Microarray analysis revealed 21 differentially expressed miRNAs between C-EVs and LPS-EVs, with 16 up-regulated and 5 down-regulated in LPS-EVs. Pathway enrichment analysis showed that these miRNAs regulate critical pathways involved in inflammation, epithelial regeneration, and endothelial barrier integrity. RT-qPCR confirmed the overexpression of miR-297, let-7b-5p, and miR-93-5p in LPS-EVs, which significantly reduced the expression of pro-inflammatory cytokines—specifically IL1B, IL6, and IL8—in Pseudomonas aeruginosa-infected macrophage-like cells. Interestingly, only the combined administration of these three miRNAs induced a significant upregulation of M2-associated markers CD206 and CD163, as well as increased TGFβ expression, indicating a synergistic effect that promotes the polarization of THP-1 cells towards an M2 phenotype.
Conclusions: Our study reveals that LPS-priming of MSCs could enhance the immunomodulatory potential of their secreted EVs partly through the overexpression of miR-297, miR-93-5p, and let-7b-5p.

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Topic: Translational biology

000925

COVID-19 ICU survivors perception of life three years after hospital discharge

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***925***

Introduction: Social interaction is a core function of health related quality of life and health status can directly impact the fulfilment of roles within society (Yuan et al., 2021). In addition to the presence of PICS many COVID-19 ICU Survivors also report enduring symptoms of pain, dyspnea and fatigue (Wiertz et al., 2022). Understanding COVID-19 ICU survivors experiences will facilitate the development of comprehensive rehabilitation programs.
Objectives: The aim of this study was to explore Covid 19 ICU survivors' experiences and perceptions of their participation in society.
Methods: Qualitative study based on an interpretive paradigm. Purposeful maximum variation sampling of participants enrolled in an umbrella study investigating the physical mental and cognitive outcome of COVID 19 ICU survivors up to three years of hospital discharge HREC S22/02/003_Covid-19. All participants provided written informed consent. In person semi structured interviews were conducted by PI, and transcribed verbatim. Inductive thematic analysis of data.
Results: Twelve participants were interviewed (Table 1) Four themes and nine subthemes emerged (Table 2). Survivors were still affected by their illness and hospitalisation three years after discharge from hospital.
Conclusions: COVID-19 ICU survivors experienced impact on all aspects of life i.e. physical; mental; spiritual; emotional; family; social; work. Moving forward, this data will inform the development of a holistic multi-sectoral approach to address the healthcare needs of Covid 19 ICU survivors.

Table 1 (abstract 000925) Characteristics of participants

AGE				GENDER		SYMPTOMS				IMPAIRMENTS			
21-40	41-59	60-69	70-90	M	F	Pain	Dyspnea	Sleep	Fatigue	Physical	Mental	Cognitive	None
			✓	✓		✓				✓			
			✓		✓	✓	✓	✓	✓				
		✓			✓	✓	✓	✓	✓	✓	✓		
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Table 2 (abstract 000925) Themes and Sub Themes

THEMES	SUB THEMES	QUOTES
Theme 1: Emotional and Psychological Impact	Trauma and Emotional Struggles	"So, it's a major change, so it's actually very scary, but it's the major change in a person's life after Covid. Covid really did make up a drastic change in my life. Its like from being healthy, completely stopped. And now you're sick constantly."
	Family Dynamics and Emotional Strain	Because I was very, you know, independent, but now I became a problem to, I won't say a problem, but I became a responsibility to my family now, because of Covid." . "Ive become a responsibility now to my family. And it's sad because I wasn't like that
	Coping Mechanisms	"Whether he listens or does not listen, it doesn't matter to me. But just the fact that I am able to talk, makes it lighter for me."
Theme 2: Physical Limitations and Changes	Physical Health and Functional Limitations	"Currently I am not the person I used to be. I used to be a lot, you know, socially involved in the community. I used to take daily walks and runs in the morning. I don't do it anymore. There's been a major stop for me."
	Adaptation to New Physical Realities	Most of the time I wear a mask." "I just have it in me since the Covid. And sometimes when there is people coming around and just to feel safe"
Theme 3: Social Participation and Changes in Roles	Social Isolation and Withdrawal	since Covid, I just want to be at home. I don't even go to my family, whatever."
	Family Roles and Support	"Before Covid I could do everything in the house. I did everything. We were helping each other but now he is the one who does everything."
	Changes in Work and Economic Participation	"There were times that I helped him with the finance because of my sewing. But I cannot anymore."
Theme 4: Spirituality and Belief Systems	Religious Coping and Reflection	"I cannot live without my church."

Reference

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Topic: Nursing care and physiotherapy

000926

Combination of respiratory muscle strength, P0.1 and lung ultrasound score to predict weaning failure from mechanical ventilation in critically ill patients: a prospective observational study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***926***

Introduction: Timely discontinuation of mechanical ventilation (MV) is crucial to prevent complications such as diaphragm dysfunction, ventilator-associated pneumonia, and airway trauma(1). About 20% of patients in the intensive care unit face challenges when attempting to be removed from mechanical ventilation(2). We conducted an assessment to evaluate the effectiveness of a protocol that combines lung, diaphragmatic, parasternal intercostal muscle, and respiratory drive to anticipate the risk of extubation failure.
Objectives: The primary objective is to assess the predictive power of the combination of respiratory muscle strength, P0.1, and LUS for weaning failure from MV in critically ill patients. Secondary objectives include assessing extubation failure and the requirement for non-invasive respiratory support after extubation.
Methods: All patients who met the inclusion and exclusion criteria and were successfully extubated after a spontaneous breathing trial were included in the study. At the end of the spontaneous breathing trial, the lung ultrasound score (LUS), diaphragmatic thickness fraction (DTF), parasternal thickness fraction (PIMT), diaphragmatic excursion (DE), and respiratory drive were recorded. The change in LUS from the beginning of the spontaneous breathing trial was also recorded.
Results: An interim analysis of 72 patients out of a total sample size of 149 (Group S: $n = 57$, Group F: n = 15) revealed no significant differences in age, gender, height, weight, BMI, APACHE II, SOFA, and LUS score. However, diaphragm thickening fraction (DTF), diaphragm excursion (DE), parasternal intercostal muscle thickness (PIMTF), and P0.1 showed significant differences ($p < 0.001$) between groups.
Conclusions: Preliminary findings suggest a significant relationship between lower diaphragmatic thickness fraction, diaphragm excursion, parasternal muscle thickness fraction, and high drive associated with more failed weaning and tracheal extubation in mechanically ventilated patients. Further data collection and analysis are essential to confirm these trends and assess their clinical utility.

Table 1 (abstract 000926) xxxx

Characteristics	Group S (n=57)	Group F (n=15)	Total (n=72)	p-value
Age in years (Mean ± SD)	46.01 ± 15.3	45.9 ± 17.8	46.0 ±15.7	0.758
Gender n (%) Male Female	32 (56%) 25 (44%)	11 (73%) 4 (27%)	43 (60%) 29 (40%)	0.227
BMI in kg/m^2 (Mean ± SD)	21.6 ± 3.3	22.4 ± 4.2	21.7 ±3.5	0.288
APACHE II (Mean ± SD)	11.3 ±5.8	14.4 ± 8.2	11.9 ± 6.4	0.244
SOFA (Mean ± SD)	4.1 ± 3.2	4.5 ± 2.5	4.2 ± 3.1	0.446
LUSSCORE (Mean ± SD)	5.8 ± 3.6	8.2 ± 7.8	6.3 ± 4.8	0.385
LUSSCORE at 30 min (Mean ± SD)	6.5 ± 4.3	9.2 ± 8.1	7.1 ±5.5	0.357
DTF (Mean ± SD)	28.5 ± 7.6	23.0 ± 8.7	27.3 ±8.1	**<0.001**
DE (Mean ± SD)	17.4 ± 3.9	14.2 ± 4.4	16.7 ±4.2	**<0.001**
PIMTF (Mean ± SD)	28.2 ± 6.0	16.4 ± 4.2	25.7 ±7.4	**<0.001**
P01 (Mean ± SD)	1.6 ± 0.7	2.9 ± 1.8	1.9 ± 1.1	**<0.001**

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3. None

Topic: Acute respiratory failure and mechanical ventilation

000927

Precise analysis of central venous pressure waveform may help detecting preload responsiveness: preliminary data from a physiologic study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***927***

Introduction: Although central venous pressure (CVP) value and its interpretation could guide fluid resuscitation, it is less and less used in clinical practice (1-3). The potential clinical significance of a more precise analysis of CVP waveform among critically ill patients is still undetermined.
Objectives: We investigated whether changes in continuously monitored CVP waveform during ventilatory pauses and during passive leg raising (PLR) could detect differences between preload responders (R) and nonresponders (NR), as established by means of continuous, calibrated cardiac output (CO) monitoring.
Methods: We included critically ill patients receiving invasive mechanical ventilation, with no spontaneous breathing activity and in whom calibrated hemodynamic monitoring (PICCO2 system) was in place. CVP, intra-abdominal pressure, airway pressure, EKG, and invasive blood pressure were continuously recorded. With this monitoring, we performed three sets of 15-s inspiratory and expiratory pauses in semi-recumbent position (at 40°) and we repeated these measurements during a PLR test. Patients were defined as preload responders if PLR test produced an increase > 10% in CO (4), as established by analysis of PICCO2 data. We analyzed offline the CVP waveform and specifically measured: z-point, the amplitude of the (a-x) wave, and the magnitude of y descent.
Results: Analysis of the CVP waveform was completed in 28 patients (13 R, 15 NR), whose characteristics are reported in the Table. No significant difference in average CVP z-point was found between R and NR. However, CVP variability during the ventilatory pauses was larger in R than in NR (28.2% [20.2-36.2] vs. 16.9% [9.3-24.5], respectively, $p = 0.04$). Moreover, R patients showed a significatively smaller y-descent than NR (2.5 [1.6-3.4] vs. 4.1 [3.0-5.2] mmHg, respectively, $p = 0.02$) and a lower (a-x) amplitude (3.9 [2.7-5.2] vs. 6.5 [5.6-7.4] mmHg, respectively, $p = 0.002$) (Fig. 1). ROC curve analysis showed that (a-x) amplitude had better performance in detecting preload responsiveness than y-descent (AUC 0.86 [0.71-1.0], $p < 0.001$ and AUC 0.79 [0.62-0.96], p 0.01, respectively) (Fig. 2). Moreover, both variables performed better than standard monitoring of CVP value under the same conditions (AUC 0.76 [0.58-0.94], $p = 0.01$). Cutoff value for (a-x) amplitude at 5.47 mmHg detected R patients with 83% sensitivity and 80% specificity, whereas y-descent cutoff at 3.13 mmHg detected FR patients with 84% sensitivity and 67% specificity.

Table 1 (abstract 000927) xxxx

Variable	Mean (95% CI)
F/M ratio	10/18 (35%)
Age (years)	59 (31 – 78)
Body mass index (kg/m2)	28 (18 - 49)
SAPS-II at admission	47 (26 - 83)
ICU stay (days)	16 (4 - 51)
Time to inclusion (days)	4.05 (2.5 – 5.6)
Average ventilation (mL/kg IBW)	5.9 (5.7 – 6.2)
PaO2/FiO2 ratio at inclusion	154 (123.8 – 184.7)
Arterial lactates at inclusion	2.3 (1.5 – 3)
Noradrenaline dosage at inclusion (mcg/kg/min)	0.46 (0.2 – 0.6)
P(a-v)CO2/C(a-v)O2 ratio at inclusion	1.6 (0.9 – 2.3)
Primary diagnosis at admission	
Septic shock, n (%)	11/28 (39.3)
Acute respiratory distress syndrome, n (%)	11/28 (39.3)
Intoxication, n (%)	4/28 (14.3)
Others, n (%)	2/28 (7.1)

Conclusions: Components of the CVP waveform such as the y descent or the (a-x) wave amplitude, when precisely measured, seem to have higher performance in detecting preload responsiveness, than standard monitoring of CVP. Further investigation is ongoing.

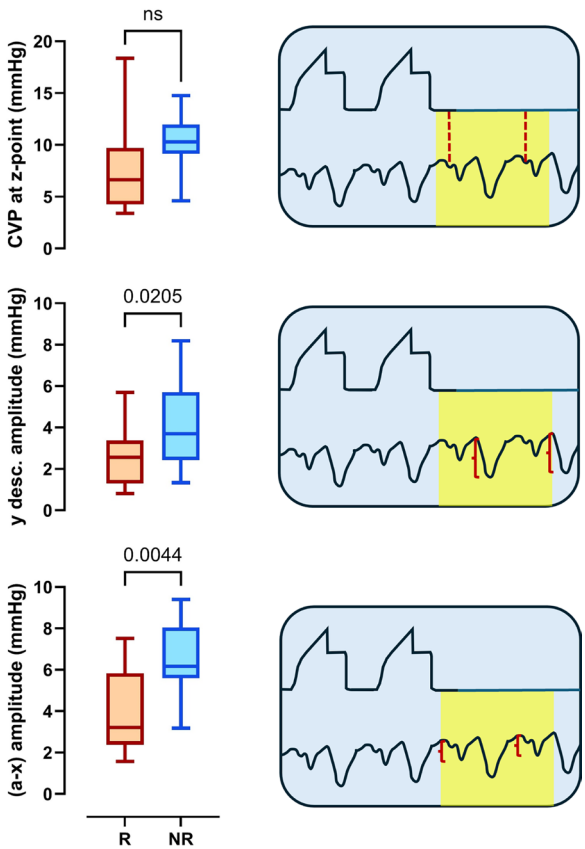


Fig. 1 (abstract 000927) Behaviour of CVP-derived variables between preload responders (R) and non-responders (NR), by averaging the results from three different expiratory pauses made per each patient

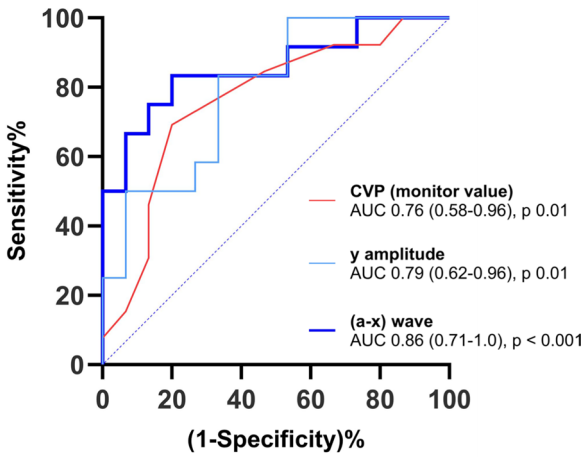


Fig. 2 (abstract 000927) ROC curve analysis of CVP-derived variables for classification of preload responsiveness

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Topic: Cardiovascular issues in ICU

000928

Genome-wide association study of pulmonary embolism in a swedish cohort confirms established risk loci and suggests novel associations

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*928

Introduction: Pulmonary embolism (PE) is a major thrombotic complication with high morbidity and mortality, especially in intensive care unit (ICU) patients. Its presentation is often nonspecific, complicating timely diagnosis. Although clinical risk factors are well known, genetic predisposition remains incompletely understood. Genome-wide association studies (GWAS) offer a means to identify common genetic variants contributing to PE susceptibility.
Objectives: To identify genetic variants associated with PE in a Swedish population and assess concordance with previous GWAS findings. We also performed exploratory GWAS restricted to ICU and postoperative subgroups to evaluate genetic determinants of PE in these high-risk settings.
Methods: We performed a GWAS using data from the Merged Anaesthesia and Intensive Care cohorts from Sweden (MAICS), including 57,423 individuals (2,277 PE cases and 55,146 controls). Logistic mixed-effect regression models were adjusted for age, sex, and population

structure. Median age was 70 years (IQR 14), and 63% of PE cases were male.

Results: Five loci with known roles in hemostasis and thrombosis reached genome-wide significance. On chromosome 1, a lead SNP in F5 (Factor V), a procoagulant in the coagulation cascade, was strongly associated with PE (β = -0.762 [ln(OR)], $P = 3.71 \times 10^{-}21$). An adjacent signal was detected near SELP, encoding P-selectin. On chromosome 4, two independent loci were found: one in FGA (fibrinogen alpha chain; $\beta = 0.289$ [ln(OR)], $P = 2.65 \times 10^{-}1^{6}$), linked to SELP expression in platelets; and another in F11 (Factor XI; $\beta = 0.238$ [ln(OR)], $P = 5.30 \times 10^{-}14$), near KLKB1. On chromosome 9, the lead SNP mapped to ABO ($\beta = 0.263$ [ln(OR)], $P = 3.00 \times 10^{-}1^{7}$), known to influence von Willebrand factor levels, with adjacent ADAMTS13 involved in clot degradation. On chromosome 11, associations were found at F2 (prothrombin; $\beta = 0.885$ [ln(OR)], $P = 1.24 \times 10^{-8}$), and at C11orf49 ($\beta = 0.894$ [ln(OR)], $P = 3.92 \times 10^{-8}$), a locus not previously linked to PE (Fig. 1). These loci highlight the roles of thrombin generation, fibrin polymerization, and platelet adhesion in PE pathophysiology (Fig. 2). No genome-wide significant variants were found in the ICU- or postoperative-specific analyses, likely due to limited power.

Conclusions: This study replicates known genetic associations with PE and identifies novel loci, including SELP and C11orf49. These findings advance understanding of PE risk and may inform future risk prediction strategies. This GWAS is ongoing, and the data presented are preliminary and unpublished.

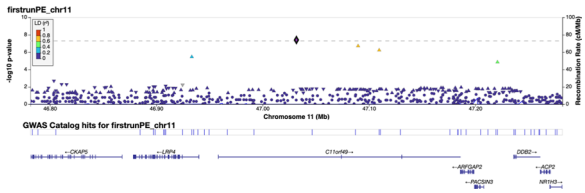


Fig. 1 (abstract 000928) Regional association plot of the C11orf49 locus, illustrating the lead SNP and surrounding linkage disequilibrium structure

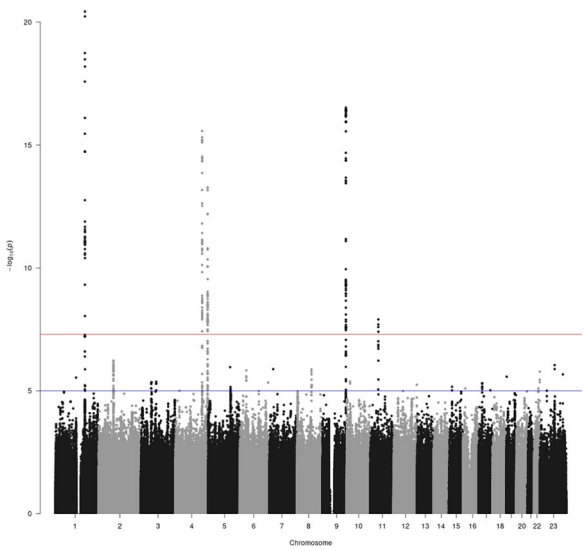


Fig. 2 (abstract 000928) Manhattan plot showing genome-wide association results for pulmonary embolism in the MAICS cohort. Five genome-wide significant loci are highlighted

Topic: Transfusion and hemostasis disorders

000929

Prognostic value of various shock indices in patients with sepsis presenting to emergency: a prospective observational study

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*929

Introduction: Sepsis remains a leading cause of hospital admissions globally, characterized by life-threatening organ dysfunction due to a dysregulated host response to infection. This prospective observational study aimed to evaluate the prognostic value of various shock indices in adult patients with sepsis presenting to the emergency department.

Objectives: To study the role of various shock indices as a prognostic marker in the mortality of patients with sepsis within 28 days. The shock indices analyzed were: Shock Index (SI = HR/SBP), Modified Shock Index (MSI = HR/MAP), Reverse Shock Index (RSI = SBP/HR), Diastolic Shock Index (DSI = HR/DBP), Reverse Shock Index GCS (RSIG = SBP/HR × GCS), and Age Shock Index (ASI = HR/SBP × Age).

Methods: In this prospective observational study, 354 patients with clinical signs and symptoms consistent with sepsis were recruited from the emergency department from August 2023 to December 2024. The calculation of various shock indices was done at the time of presentation and at the 4th hour within the hospital. These patients were followed till 28th day for the clinical outcome.

Results: In the present study, the mean age was 47.2 years. Males were predominant (60.8%). Comorbidities included hypertension (20%), diabetes (20.5%), and COPD (3.8%). Intubation was required in 32.4%, while 19.7% underwent renal replacement therapy (RRT). Overall mortality was 20.3%. Significant predictors of mortality included low GCS, MAP, and SPO2, and elevated SI, SOFA, and RSIG scores. RRT, intubation, and comorbid conditions were significantly associated with higher mortality. The ideal RSIG cutoff for predicting survival was ≥ 11.18, with 81.4% sensitivity and 80.0% specificity.

Conclusions: The study supports the clinical utility of shock indices—especially RSIG—as early, non-invasive prognostic tools in emergency settings. These findings highlight the importance of early recognition and aggressive intervention based on hemodynamic markers to improve sepsis outcomes.

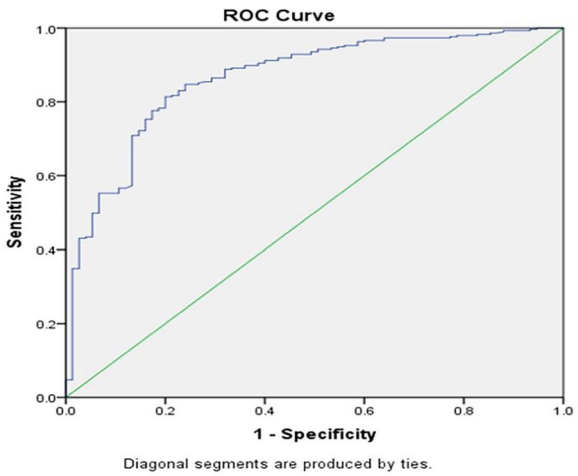


Fig. 1 (abstract 000929) ROC curve for reverse shock index GCS (RSIG) to predict survival

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Topic: Sepsis

000930

Fluid challenge effects on left ventricular myocardial performance index assessed by transthoracic echocardiography with tissue Doppler imaging in critically ill patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***930***

Introduction: Fluid challenge (FC) is essential in critically ill patients' resuscitation, with transthoracic echocardiography (TTE) as a key bedside tool for assessing hemodynamic effects. However, most Doppler-derived indices, including cardiac index (CI), evaluate systolic or diastolic function separately and are preload-dependent. In contrast, the myocardial performance index (MPI), derived from tissue Doppler imaging (TDI-MPI), is minimally preload-dependent and integrates both phases within a single cardiac cycle, reflecting the ratio of energy-consuming isovolumic periods to effective ejection time. Elevated TDI-MPI denotes impaired global cardiac function. We hypothesize that TDI-MPI offers a practical and integrated approach to assess the hemodynamic effects of FC in critically ill patients.
Objectives: To evaluate the effects of FC on TDI-MPI in critically ill patients and to assess whether MPI normalization correlates with fluid responsiveness. In addition, we compared TDI-MPI changes between patients with and without diastolic dysfunction.
Methods: We conducted a prospective observational study involving ICU patients who received a 4 mL/kg FC of crystalloids. TDI-MPI was calculated as the ratio of isovolumic relaxation (IVRT) and contraction time (IVCT) divided by ejection time (ET), assessed using TTE before and after the FC within a single cardiac cycle. Fluid responsiveness was defined as a ≥ 15% CI increase. TDI-MPI normalization was defined as a reduction from abnormal (≥ 0.42) to normal (< 0.42) or the maintenance of normal values. Diastolic dysfunction was defined by an early diastolic mitral inflow velocity to early diastolic mitral annulus velocity (E/E') ratio of > 8 before the FC.
Results: Among 59 patients, 24 (41%) were fluid responders. TDI-MPI significantly decreased in responders (0.48 [0.43-0.58] to 0.42 [0.33-0.54], p < 0.01) but remained unchanged in non-responders (p = 0.28). MPI normalization was associated with fluid responsiveness (OR 3.37, 95% CI 1.12-10.78, p = 0.03). Responders exhibited a greater decrease in IVRT compared to IVCT, while nonresponders showed negligible changes in these two variables. The ET was elevated in both groups after FC. Patients with diastolic dysfunction displayed more dynamic TDI-MPI changes. Responders in this subgroup experienced a marked reduction in TDI-MPI, whereas nonresponders exhibited a more pronounced increase in MPI as compared to those without diastolic dysfunction, with these changes driven by substantial IVRT shortening or prolongation, respectively.
Conclusions: TDI-MPI provides an integrated, beat-to-beat assessment of FC response by capturing both systolic and diastolic adaptations, particularly in those with baseline diastolic dysfunction. These findings support the incorporation of TDI-MPI into routine bedside TTE to guide fluid management, offering a more physiologically meaningful evaluation than CI alone.

Topic: Cardiovascular issues in ICU

000931

Clinical implications of chronic critical illness and persistent inflammatory, immunosuppression, and catabolism syndrome in septic medical ICU patients from a tertiary hospital

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***931***

Introduction: Some septic patients recover, while others develop chronic critical illness (CCI) and persistent inflammatory, immunosuppression, and catabolism syndrome (PICS), characterized by prolonged organ dysfunction, protein catabolism, sarcopenia and increased vulnerability to secondary infections. This in turn leads to poor functional outcomes and indolent death1.
Objectives: To evaluate predictive and prognostic factors for CCI and PICS phenotype in Medical ICU septic patients.
Methods: Prospective observational study. Septic patients who developed CCI (and PICS) were compared to non-CCI, based on the previously published definitions[1]. CCI: at least 2 clinical criteria on 7thday of ICU (prolonged mechanical ventilation, tracheostomy, recurrent infections, severe wounds, MOF, malnutrition, weakness, and cognitive impairment). PICS: subset of CCI persisting beyond day 14 in ICU or hospital ward plus at least 1 analytical criterion (CRP > 1.5 mg/L, albumin < 3 g/dl, prealbumin < 10 mg/dl, or lymphocyte count < 800). Clinical and analytical variables, including circulating histones[2], were assessed at ICU admission as well as outcomes. Univariate analysis was performed. A p value < 0.05 was considered statistically significant.
Results: 94 patients were included over a 4-year period; 36% with S and 63.8% SS. 35p. (37.2%) met criteria for CCI, representing 8% of all septic ICU admissions during the study period. Of these, 29 developed PICS, while the remaining 6 non-PICS died during the 2nd week of ICU stay. 59 patients comprised the non-CCI, of whom 54 (91.5%) were discharged from ICU within the 1st week. Baseline clinical and analytical variables are shown in Table 1. Early follow-up revealed significantly higher 28-day mortality in the CCI group compared to non-CCI [9 (25.7%) vs. 6 (10.2%); OR = 2.52 [0.98-6.50]; p = 0.04], as well as longer ICU length of stay (17.34 ± 12.1 vs. 4.19 ± 2.79 days; p = 0.001) and hospital stay (34.2 ± 25.53 vs. 14.83 ± 25.1 days; p = 0.001). Six-month mortality was also higher in the CCI group [12 (34.3%) vs. 10 (16.9%); OR = 2.02 [0.97-4.18]; p = 0.049] (Fig. 1). No differences were observed in long-term functional outcomes, as assessed by the SF-36 questionnaire (558.59 ± 152.51 vs. 571.95 ± 146.67 points, P = NS). (Table 1).

	CCI (*N* = 35)	**Non-CCI (*N* = 59)**	***P* value**
Age (years)	57.31 ± 10.69	64.57 ± 13.73	***p* = 0.009**
APACHE II score	20.79 ± 6.08	16.7 ± 7.3	***p* = 0.01**
SOFA score 1st day	8.29 ± 3.59	6.2 ± 2.88	***p* = 0.004**
Septic Shock	23 (68.6%)	36 (61%)	NS
ISTH overt DIC	3 (8.8%)	6 (10.2%)	NS
Lactate Clearance	13 (37.1%)	41 (69.5%)	***p* = 0.002**
Charlson Index	2.86 ± 2.01	3.37 ± 2.2	NS

	CCI (*N* = 35)	Non-CCI (*N* = 59)	*P* value
C. Clinical Frailty Scale	2.55 ± 1.27	2.57 ± 1.3	NS
Analytical serum data 1st day:			
White blood cells	17,386 ± 11,463	17,584 ± 10,993	NS
CRP (mg/l)	262.78 ± 133.45	290.05 ± 132.29	NS
Procalcitonin (ng/mL)	56.33 ± 4.39	53.58 ± 3.23	NS
H2B (ng/ml)	1161,69 ± 414,03	16,185,69 ± 12,891,36	NS
H3 (ng/ml)	235,33 ± 59,52	1792,43 ± 1380,39	NS
Creatinine (mg/dl)	1,94 ± 0.28	1.90 ± 0.20	NS

Conclusions: We confirmed the previous data regarding the bad prognosis of CCI including PICS in a specific septic medical population although age and frailty conditions did not contribute to this phenotype. CCI appears to come from a lower level of circulating histones. Wide studies are necessary to help predicting this ominous entity.

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Topic: Sepsis

000932

The international, prospective COSMOS (CytOSorb TreatMent Of Critically Ill PatientS) registry: interim results from the first 280 patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:932***

Introduction: The International COSMOS Registry prospectively collects real-world data on the use of CytoSorb (CS) hemoadsorption in critically ill patients.

Methods: Following informed consent, critically ill patients treated with CS as part of routine clinical care were enrolled in the registry. Data collection timepoints included: 24 h prior, during and 24 h after CS treatment, at discharge from both ICU and hospital, and again at the 90-day follow-up. Data are presented as either mean ± standard deviation or as median with interquartile range [Q1 — Q3].

Results: A total of 280 consecutive eligible patients (31% female, mean age 58 ± 17 years, mean APACHE II and SOFA scores on admission of 24 [18 — 30] and 12 [9 — 15], respectively) from 20 centers across Germany, Italy, Spain and Portugal were enrolled. The indications for CS (with some patients having multiple indications) included septic shock (54%), rhabdomyolysis (14%), cardiogenic shock (13%), acute or acute-on-chronic liver failure (13%), ARDS (6%) and other (12%). On average, each patient received 3.3 ± 3.4 adsorbers, with 27% receiving four or more. CS was applied in conjunction with renal replacement therapy (88%), standalone hemoperfusion (7%) or ECMO (5%). After CS application, IL-6 was significantly lowered (from 574 [187 — 20,358] pg/mL to 100 [49 — 1,299]; $p < 0.0001$), as norepinephrine doses (from 0.20 [0.09 — 0.39] to 0.08 [0.02 — 0.20] µg/kg/min; $p < 0.0001$, Fig. 1), while daily fluid balance was reduced (from + 1400 [+ 84 — + 3,197] mL to + 180 [− 840 — + 1,500] mL; $p < 0.0001$). The PaO2/FiO2 ratio also significantly increased (from 132 [72 — 217] to 178 [115 — 254] mmHg; $p < 0.0001$). Platelet count dropped significantly after CS compared to baseline (from 123/nL [74, 181] to 75/nL [42, 121]; $p < 0.0001$), in particularly among septic patients. In patients with rhabdomyolysis ($n = 36$), median myoglobin levels were significantly reduced (from 11,799 [2,877 — 34,275] to 2959 [1252 — 7,008] µg/L; $p < 0.0001$), as bilirubin in patients with liver failure (n = 34) from 15.0 [7.3 — 22.2] to 8.1 [5.6 — 11.9] mg/dL; $p = 0.0015$). ICU mortality was 31.9% (32.4% in the septic shock group).

Conclusions: In this international, multi-center, prospective real-world registry, CS was associated with significant clinical improvements in hemodynamics, fluid balance and oxygenation. Significant reductions were seen in inflammatory markers, platelets, as well as myoglobin in rhabdomyolysis and bilirubin in liver failure cases.

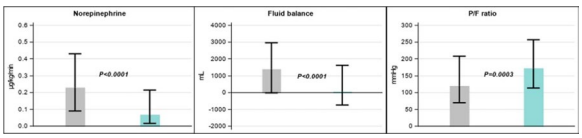


Fig. 1 (abstract 000932) Changes in norepinephrine, fluid balance and P/F ratio in 24 h periods before (grey) versus after CytoSorb® treatment (blue), data are presented as median and interquartile range

Topic: Acute kidney injury and hemofiltration

000933

What is the role of "Gasdermin D" level in the immunologic mechanism of sepsis and the development of disseminated intravascular coagulation in sepsis patients?

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***933***

Introduction: Sepsis is a life-threatening organ dysfunction caused by a dysregulated host response to infection (1). In cases of endotoxemia or Gram-negative sepsis, excessive activation of the coagulation cascade leads to disseminated intravascular coagulation (DIC)—a life-threatening coagulopathy that promotes multiple organ dysfunction. The occurrence of DIC significantly increases mortality in sepsis, which remains one of the leading causes of death in hospitals (3).
A study on sepsis-associated DIC demonstrated that bacterial endotoxin activates the extrinsic coagulation pathway through tissue factor, which is triggered by caspase-11. This process promotes the formation of gasdermin pores and exposure of phosphatidylserine, thereby activating the coagulation cascade (3). In sepsis patients, activation of the pyroptosis pathway amplifies inflammatory responses in tissues and contributes to the development of organ failure (1-2). However, there is limited information on the interaction between pyroptosis and gasdermin D in the pathology of sepsis and DIC. Our aim is to reveal the clinical impact of this pathway, specifically the role of pyroptosis, and to determine the predictive and prognostic value of Gasdermin D levels in DIC development in patients with sepsis.
Methods: The study was prospective, observational and conducted between March 2024 and May 2024 at two centers. Ethical approval was obtained (approval number:TBAEK-72). Patients diagnosed with sepsis based on the Surviving Sepsis Campaign Guidelines 2021 and those who scored ≥ 5 according to the International Society of Thrombosis and Hemostasis (ISTH) DIC scoring system were included in the study. Patients with the following diagnoses were excluded: bone marrow transplantation, dysfibrinogenemia, hemolytic uremic syndrome, immune thrombocytopenia, thrombotic thrombocytopenic purpura, heparin-induced thrombocytopenia, catastrophic antiphospholipid syndrome, and liver cirrhosis. Patients with sepsis (n = 20) and DIC (n = 17) were included in the study and blood samples were taken. Plasma IL-1β (BT LAB Shanghai, China), IL-6 (Invitrogen, USA), IL-18 (Elabscience, USA), Toll-Like Receptor 4 (TLR4) (Elabscience, USA), Tumor Necrosis Factor α (TNFα) (Quantikine, USA), Transforming growth factor β TGF-β (Elabscience, USA) and Gasdermin D (Sun Red, Shanghai, China) ELISA kits were used. Readings and evaluations were made using Thermo Microplate Spectrophotometer.
Results: The mean age of the study population was 65.4 ± 15.3 (between 30.0 and 89.0) years, and 29.7% (11 patients) of whole group was female. There was no difference between groups regarding age, sex, multimorbidity, history of malignancy and hospitalization in ICU (p > 0.05) The main clinical and demographic characteristics of the study population is shown in Picture 1. The levels of inflammatory markers measured on the day of diagnosis in sepsis and DIC patients are presented in Picture 2. Inflammatory markers related to IL-6, IL-1B, TNF-A, TLR-4, IL-18 and TGF-B were significantly higher in the DIC group. The ROC curve and analysis are presented in Fig. 1-2. The predictive effect of gasdermin-D on DIC was analyzed and the AUC was found 0.774 (95% CI. 618-0.929) indicating that Gasdermin-D has good discriminatory ability for DIC. The cutoff value for the prediction of DIC was determined as 1.058 with 88.2% sensitivity and 65.0% specifity.
Conclusions: In our study, we observed that Gasdermin D levels, which play a role in the activation of inflammatory pathways in sepsis, were significantly and markedly elevated in patients with DIC. These findings suggest that Gasdermin D may serve as a valuable predictive marker for the development of DIC in sepsis patients, a condition associated with high mortality in intensive care units.

	Sepsis (n=20)	DIC (n=17)	p
Age, years	69.6±13.8	66.8±16.6	0.58
Sex, female	4 (20.0)	7 (41.2)	0.28
Multimorbidity	12 (60.0)	11 (64.7)	0.77
Malignancy	5 (25.0)	3 (17.6)	0.70
ICU Indication			
Acute Respiratory Failure	15 (75.0)	5 (29.4)	0.009
Acute Kidney Failure	1 (5.0)	3 (17.6)	0.32
Cerebrovascular Incident	1 (5.0)	3 (17.6)	0.32
Others	4 (20.0)	8 (47.1)	0.16
Cultural Growth	7 (53.8)	13 (86.7)	0.096
Vasopressor Support	10 (50.0)	14 (82.4)	0.082
Steroid	14 (70.0)	10 (58.8)	0.48
Beta blockers	6 (30.0)	7 (41.2)	0.48
Anticoagulation	12 (60.0)	7(41.2)	0.35
Mechanical Ventilation	10 (50.0)	15 (88.2)	0.017
ICU hospitalization, days	13.8±21.8	18.8±15.3	0.43
Exitus	9 (45.0)	15(88.2)	0.014
Exitus, days	9.4±8.5	18.8±15.7	0.11

Picture 1

Marker	Sepsis (n=20)	DIC (n=17)	p
IL-6	0.405±0.085	0.865±0.248	<0.001
IL-1B	1.558±0.050	1.770±0.091	<0.001
TNF-A	2.00±0.080	2.264±0.185	<0.001
TLR-4	0.060±0.025	0.081±0.032	0.019
IL-18	0.022±0.019	0.046±0.017	<0.001
TGF-B	0.171±0.003	0.177±0.005	<0.001
Gasdermin-D	0.991 [0.334]	1.164 [0.425]	0.005

Picture 2

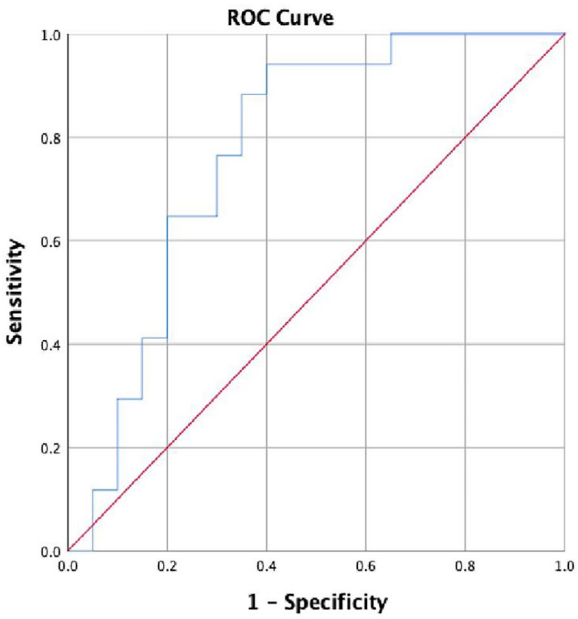


Fig. 1

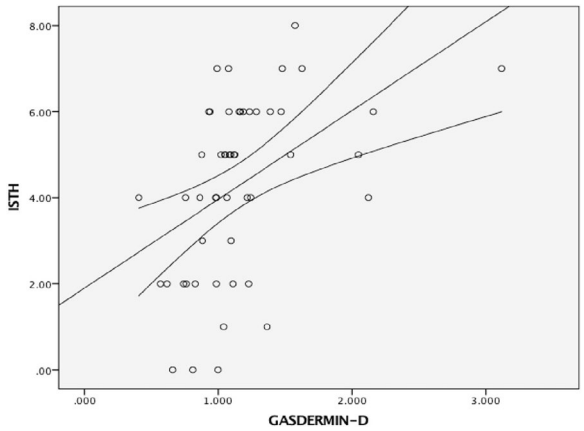


Fig. 2

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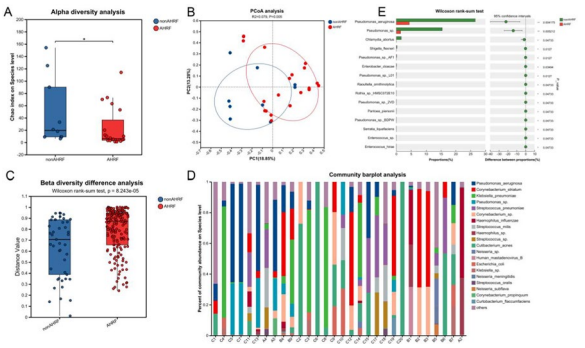
Topic: Sepsis

000934

Alterations of lung microbiota in sepsis-induced acute respiratory failure

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***934***

Introduction: Patients with sepsis-induced acute hypoxic failure (ARF) are hallmarked by high mortality rates. Different initial sites of infection are likely to affect the composition and diversity of the pulmonary microbiome in patients with septic ARDS. The clinical significance of altered lung bacteria in extrapulmonary sepsis-induced ARF is unknown.
Methods: We performed a prospective, observational cohort study of patients after surgery for gastrointestinal perforation in an ICU at a university hospital. The bronchoalveolar lavage fluid of mechanically ventilated patients was collected within 48 h of intubation. We sequenced the DNA in the bronchoalveolar lavage fluid collected from patients using metagenomic next-generation sequencing to analyze the changes in the lung microbiome.
Results: A total of 30 patients with gastrointestinal perforation were enrolled in the study, 20 patients who develop ARF after surgery and 10 patients who does not.
The alpha diversity was significantly decreased in ARF patients compared with that of the patients without ARF. The lower airway bacteriobiota and mycobiota compositions (β-diversity) were dissimilar between patients with ARF and without ARF.
Conclusions: Extrapulmonary sepsis-induced ARF is associated with a significant dysbiosis of patients' pulmonary-microbiom.



Bioinformatic analysis of metagenomic sequencing data in the exploratory cohort.

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4. Thank Prof. Yan Kang for his guidance on my research

Topic: Acute respiratory failure and mechanical ventilation

000936

The role of *Klebsiella pneumoniae* outer membrane vesicles in modulating dendritic cell phenotypes and immune imbalance in acute respiratory distress syndrome

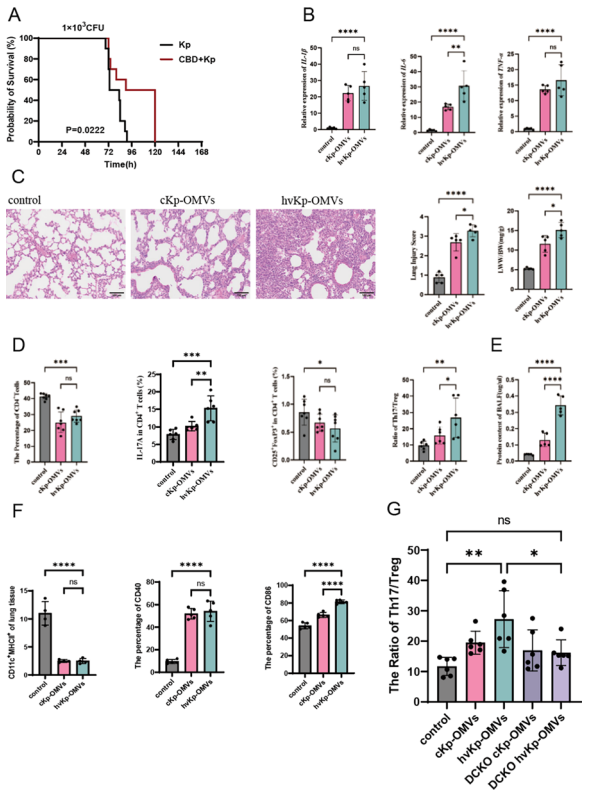
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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***936***

Introduction: Acute respiratory distress syndrome (ARDS) is a critical condition characterized by severe pulmonary inflammation and immune dysregulation. *Klebsiella pneumoniae* (Kp) is a major bacterial pathogen associated with ARDS, especially in immunocompromised individuals. The recent studies highlight the immunomodulatory role of outer membrane vesicles (OMVs) derived from Kp, yet their effects on dendritic cells (DCs) and downstream T cell responses remain unclear. OMVs are nanoscale vesicles released by Gram-negative bacteria that carry bioactive molecules capable of influencing host immunity. In this study, we explored how Kp-derived OMVs affect DC phenotype and function, and how these changes contribute to the imbalance between Th17 and regulatory T (Treg) cells during ARDS. Using both wild type and DC-depleted mouse models, we demonstrate that Kp-OMVs promote DC maturation and skew $CD4^+$ T cell differentiation toward a Th17-dominant profile, contributing to immune imbalance in ARDS,
Objectives: This study aimed to investigate the role of outer membrane vesicles (OMVs) derived from Klebsiella pneumoniae (Kp) in modulating dendritic cell (DC) phenotypes and their impact on the Th17/Treg balance during the development of acute respiratory distress syndrome (ARDS).
Methods: Kp was cultured overnight in Luria-Bertani (LB) broth to isolate OMVs, which were subsequently characterized by transmission electron microscopy (TEM) and nanoparticle tracking analysis

(NTA). Wild-type (WT) and diphtheria toxin receptor transgenic (DTR) mice were administered Kp-OMVs intratracheally to establish an ARDS model, while control mice received an equal volume of PBS. After 48 h, the following assessments were conducted: (1) histopathological analysis of lung tissue using hematoxylin and eosin (H&E) staining to quantify lung injury scores; (2) quantification of inflammatory cytokines by real-time quantitative reverse transcription PCR (RT-qPCR); (3) flow cytometric analysis of naïve $CD4^+$ T cell differentiation in bronchial lymph nodes; (4) evaluation of OMV uptake by immune cells following intratracheal administration of DiD-labeled Kp-OMVs. Bone marrow-derived dendritic cells (BMDCs) were generated from WT mice and stimulated with OMVs for 24 h. Flow cytometry was used to assess changes in DC phenotype and function, including cytokine expression.

Results: TEM and NTA confirmed that purified Kp-OMVs were spherical or ovoid with an average diameter of approximately 120 nm, and sterility was verified via plate assays. Compared to the control group, mice in the disease model group exhibited pronounced inflammatory cell infiltration, tissue edema, and alveolar destruction, with significantly increased lung injury scores, lung wet-to-dry weight ratios, pro-inflammatory cytokine levels, and protein content in bronchoalveolar lavage fluid. Flow cytometry revealed that Kp-OMVs promoted naïve $CD4^+$ T cell differentiation into Th17 cells while suppressing Treg differentiation, leading to Th17/Treg imbalance. Uptake of Kp-OMVs by T cells was markedly lower than by DCs, suggesting that OMVs modulate immune responses primarily through DCs. Kp-OMVs significantly upregulated MHC II, CD86, and CD40 expression on DCs. Selective depletion of DCs in DTR mice via intraperitoneal injection of diphtheria toxin (150 ng/mouse) reversed the Th17/Treg imbalance observed in the ARDS model.

Conclusions: This study demonstrates that Kp-OMVs promote DC maturation and drive naïve $CD4^+$ T cell differentiation toward the Th17 lineage, contributing to immune imbalance in ARDS. These findings provide novel insights into the immunopathogenesis of Kp-induced ARDS and suggest potential targets for therapeutic intervention.



Klebsiella pneumoniae outer membrane vesicles drive dendritic cell polarization and immune dysregulation in acute respiratory distress syndrome

A Kaplan–Meier survival analysis revealed a significant difference between groups, with the Gehan–Breslow–Wilcoxon test showing improved survival in the CBD + Kp group compared to Kp alone ($p = 0.0222$).CBD, Cannabidiol, Inhibit vesicle secretion.

B mRNA expression levels of pro-inflammatory cytokines (IL-1β,IL-6, and TNF-a) in lung tissue, quantified by quantitative real-time PCR (qRT-PCR).

C Representative images of hematoxylin and eosin (HE)-stained lung tissue sections and corresponding lung Inury scores, assessed based on alveolar wall thickness, hemorrhage, and inflammatory cell infiltration.

D Total protein content in bronchoalveolar lavage fluid (BALF).

E Flow cytometry was performed to assess naïve $CD4^+$ T cell differentiation in mouse bronchial lymph nodes 48 h post-modeling. The proportions of intracellular IFN-γ, IL-17A, and CD25 + FoxP3 + within $CD4^+$ T cells were analyzed. Data are presented as mean ± SD from triplicate assays and were analyzed by one-way ANOVA (*$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$ vs. control). Group abbreviations: cKp-OMVs, classical *Klebsiella pneumoniae* outer membrane vesicles; hvKp-OMVs, hypervirulent *K. pneumoniae* OMVs.

F Single-cell suspensions from lung tissue were prepared 48 h post-ARDS induction. Expression levels of $CD11c^+MHCII^+$ dendritic cells, CD86, and CD40 on DCs were assessed by flow cytometry. Data are presented as mean ± SD from triplicate experiments and analyzed using one-way ANOVA. **** $p < 0.0001$ vs. Control.

G Selective depletion of dendritic cells (DCs) in DTR mice via intraperitoneal injection of diphtheria toxin effectively reversed the Th17/Treg imbalance observed in the ARDS model. Data are expressed as mean ± SD from triplicate experiments and were analyzed using one-way ANOVA ($p < 0.05$, $p < 0.01$). Group abbreviations are as follows: NODT cKp-OMVs, non-depleted classical *Klebsiella pneumoniae* outer membrane vesicles; NODT hvKp-OMVs, non-depleted hypervirulent *K. pneumoniae* OMVs; DCKO cKp-OMVs, DC-depleted classical *K. pneumoniae* OMVs; DCKO hvKp-OMVs, DC-depleted hypervirulent *K. pneumoniae* OMVs.

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Topic: Acute respiratory failure and mechanical ventilation

000938

Analysis of acid–base status of cardiosurgical patients during ICU admission using the Stewart approach and correlation with time to extubation

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***938***

Introduction: Acid–base is commonly deranged during open-heart surgeries, but there is limited data of how this influences the outcome.
Objectives: The aim of the present study was to analyze the acid–base status of cardiac surgical patients who were admitted to the Intensive Care Unit (ICU) and investigate whether acid–base disorders are correlated with extubation time.

Methods: This is a retrospective study conducted in the ICU of a tertiary University Hospital between August 2023 and January 2025. Acid–base, demographic, clinical and biochemical data from cardiac surgical patients admitted to the ICU for postoperative care were collected at admission. Time to extubation and ICU length of stay were included. Quantitative acid–base analysis was based on the principles of physicochemical (Stewart) approach.
Results: The results are expressed as median values (1st, 3rd quartiles). 118 patients aged 65.5 (59.3, 72) years old were included. Coronary artery bypass surgery was the primary indication for ICU admission. Acid–base analysis indicated pH 7.31 (7.31, 7.36), partial pressure of carbon dioxide (PaCO2) 44 (40, 47) mmHg, strong ion difference effective (SIDe) 34.35 (32.15, 36.18), strong ion difference apparent (SIDa) 46.5 (44.7, 48.35) and strong ion gap (SIG) 12.4 (10.1, 14.95). Laboratory tests revealed an albumin concentration of 3.3 (2.8-3.5) g/dl and a phosphate concentration of 3.9 (3.4-4.7) mg/dl. Patients had a median time to extubation of 12 (5-22) hours and a median ICU stay of 2 (2,3) days. In the multivariable Cox proportional hazards regression analysis higher values of noradrenaline (NA) (mcg/kg/min), transfused red blood cells (RBCs) and SIG were the only factors independently associated with prolonged time to extubation (Table 1).

Table 1 (abstract 000938) Multivariable regression analysis on factors associated with time to extubation. Values are expressed as mean (standard deviation)

Time to extubation	all	HR (univariable)	HR (multivariable)
NA dose	0.2 (0.1)	0.01 (0.00-0.07, $p < 0.001$)	0.02 (0.00-0.19, $p = 0.001$)
age (years)	65 (9.0)	1.02 (0.99-1.04, $p = 0.173$)	1.02 (0.99-1.06, $p = 0.128$)
BMI (kg/m2)	29.1 (4.8)	1.01 (0.96-1.05, $p = 0.783$)	0.97 (0.92-1.02, $p = 0.272$)
Extracorporeal duration (hrs)	122.6 (43.0)	0.99 (0.99-1.00, $p = 0.041$)	1.00 (0.99-1.00, $p = 0.395$)
RBCs	0.4 (1.0)	0.73 (0.58-0.91, $p = 0.006$)	0.60 (0.45-0.81, $p = 0.001$)
PaO2/FiO2	294 (114)	1.00 (1.00-1.00, $p = 0.055$)	1.00 (1.00-1.01, $p = 0.054$)
PH	7.3 (0.0)	7.8 (0.09-671.9, $p = 0.365$)	3.38 (0.01-1641.7, $p = 0.7$)
PCO2 (mmHg)	44.9 (9.6)	1.01 (0.98-1.03, $p = 0.593$)	1.01 (0.99-1.04, $p = 0.32$)
SIDe	34.3 (2.7)	1.09 (1.01-1.18, $p = 0.026$)	0.98 (0.87-1.1, $p = 0.688$)
SIG	11.9 (3.6)	0.87 (0.81-0.93, $p < 0.001$)	0.88 (0.82-0.95, $p = 0.002$)

BMI = body mass index

Conclusions: Acid–base status of cardiac surgical patients on ICU admission is characterized by mild acidemia and multiple acid–base disorders. SIG along with other factors is significantly associated with extubation time.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000939

The effects of plasma versus balanced crystalloids on inflammation and endotheliopathy: a randomized trial in a human endotoxemia model

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)**:***939***

Introduction: During a hyper-inflammatory state, such as sepsis, glycocalyx degradation can lead to exposure of the procoagulant endothelial surface, which is associated with worse outcomes. Resuscitation using crystalloids may worsen endotheliopathy. There is increasing evidence showing plasma transfusion might preserve glycocalyx health. We hypothesized that resuscitation with plasma reduces glycocalyx degradation and inflammation in a controlled human endotoxemia model.
Objectives: To investigate the effects of plasma versus crystalloid infusion on the development of glycocalyx degradation, endotheliopathy, and inflammation in a human volunteer lipopolysaccharide (LPS) induced endotoxemia model.
Methods: This study was a human volunteer, open-label, randomized study. Volunteers were injected with 2.0 ng/kg lipopolysaccharide to induce endotoxemia, which is a controlled systemic inflammatory response, similar to that observed in sepsis. Thirty minutes following LPS administration, participants received either 10 mL/kg balanced salt solution (BSS) or 10 mL/kg solvent detergent plasma (SDP). The primary outcome was the difference in syndecan-1, as a reflection of glycocalyx degradation, between groups. Neutrophil count and plasma levels ICAM-1 and MMP-9 were measured as markers of endotheliopathy and inflammation. Plasma levels of myeloperoxidase (MPO) were measured to assess neutrophil extracellular trap (NET)-formation. All measurements were performed at 2-h intervals.
Results: LPS induced an inflammatory response with tachycardia (Fig. 1), fever, a decrease in monocyte count and an increase in inflammatory cytokine levels and cardiac output but did not elevate lactate or prolonged capillary refill time. Subjects developed mild endothelial injury with increased levels of syndecan-1 ($p < 0.05$) and ICAM-1 ($p < 0.001$) (Fig. 1). Over the duration of the experiment, participants receiving SDP had lower levels of neutrophils ($p < 0.05$) and matrix metalloproteinase-9 (MMP-9) ($p < 0.01$) when compared with those receiving BSS (Fig. 1). However, markers of glycocalyx degradation (syndecan-1) and markers of NET formation did not differ between groups (Fig. 1).
Conclusions: In human endotoxemia, as plasma compared to crystalloid resuscitation reduced inflammation with decreased neutrophil counts, with a concomitant reduction of MMP-9, while not affecting endothelial injury and glycocalyx degradation.

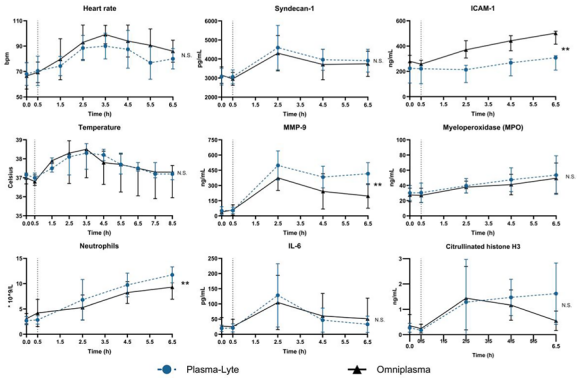


Fig. 1 (abstract 000939) Lipopolysaccharide was given to all volunteers at $T = 0$, the vertical dashed line represents the timepoint resuscitation was started. N.S = not significant, *$p < 0.05$, **$p < 0.01$, ICAM-1 = Intercellular Adhesion Molecule 1, MMP-9 = matrix metalloproteinase 9

Topic: Sepsis

000940

Association between PIEZO2 SNP genotypes and clinical outcomes in COVID-19 Patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***940***

Introduction: COVID-19, caused by SARS-CoV-2 infection, has created devastating worldwide consequences for both public health systems and economic stability [1]. Emerging evidence indicates that COVID-19 with acute respiratory distress syndrome (ARDS) often presents high respiratory drive and excessive inspiratory efforts and that this could lead to a relapse of respiratory failure [2]. Mechanical signals transduced by airway-innervating sensory neurons control respiratory drive. Specifically, PIEZO2 in sensory neurons is essential for the Hering–Breuer mechanoreflex, and its ablation results in an increased tidal volume under normal conditions [3]. It is noteworthy that our previous whole exome sequencing, which aimed to explore the relationship between genetic variants and ARDS, identified four single nucleotide polymorphisms (SNPs) of PIEZO2 (rs73943314, rs9954308, rs875956 and rs2277858) associated with ARDS outcomes [4]. However, whether these PIEZO2 SNPs are associated with COVID-19 outcomes remains unclear.
Objectives: To investigate the association between SNPs of PIEZO2 and clinical outcomes in COVID-19 patients.
Methods: This observational, single-center cohort study was conducted at Zhongda Hospital, Southeast University, China, between December 1, 2022, and January 31, 2023. Inclusion criteria were adult patients (aged ≥ 18 years) with confirmed SARS-CoV-2 infection, defined by at least one positive real-time reverse transcription polymerase chain reaction (RT-PCR) test result. Exclusion criteria were inability to provide informed consent, death within 24 h of admission, pregnancy or lactation. PIEZO2 single nucleotide polymorphisms (SNPs) rs73943314, rs9954308, rs875956, and rs2277858 were genotyped using Sanger sequencing. The primary outcome was overall 28-day mortality. Genotype distributions at individual SNP loci were compared using χ^2 tests. We employed univariate logistic regression followed by multiple logistic regression to evaluate associations between PIEZO2 minor allele genotypes and 28-day mortality.
Results: A total of 348 patients were screened, and we enrolled 313 patients in the study. Including 270 survivors, median age was 76 years (IQR 64.0-83.0). For non-survivors (n = 43), median age was 78, and more patients transferred ICU for further management (10.4% vs. 48.8%, $p < 0.001$). Non-survivors had a significantly higher SOFA score (2.0 vs. 7.0, $p < 0.001$), neutrophil-to-lymphocyte ratio (6.6 vs. 9.7, $p < 0.001$). The genotype frequencies observed in this study did not deviate from the expected frequencies under Hardy–Weinberg Equilibrium ($p > 0.05$). For these SNPs, we calculated linkage disequilibrium (LD) with PIEZO2 variants. rs73943314 and rs9954308 (LD, $r2 = 1$), rs875956 and rs2277858 (LD, $r2 = 1$) are complete linkage disequilibrium. The PCR products containing SNPs were TA cloned, and positive clones were sequenced, which also confirmed that they are completely linked. rs73943314 and rs875956 (LD, r2 = 0.26) are incomplete linkage disequilibrium. The minor allele frequency (MAF) was greater for the four SNPs of PIEZO2 (rs73943314 and rs9954308, 18.6% vs. 8.0%, $p < 0.001$; rs875956 and rs2277858, 34.9% vs. 12.4%, $p < 0.001$) in non-survivors than in survivors. To determine whether PIEZO2 SNPs are independently associated with a poor prognosis in COVID-19, we conducted multiple logistic regression analysis, including both variant pairs in the same model. We found that PIEZO2 rs875956 CT/TT genotype and rs2277858 TC/CC genotype were independent prognostic risk factors (OR = 5.42, 95%CI 1.79-17.97, $p = 0.004$).
Conclusions: In this study, we found that PIEZO2 SNPs (rs875956, rs2277858) genotypes serve as novel genetic factors that significantly influence the 28-day mortality in COVID-19 patients.

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5. This research was supported by National Natural Science Foundation of China (No. 82202390), National Science and Technology Major Project (2022YFC2304600), Natural science foundation of Jiangsu province (Youth project, BK20220833), Jiangsu Province Science and Technology Plan Project 'Provincial Frontier Technology R&D Program' (BF2024054)

Topic: Acute respiratory failure and mechanical ventilation

000943

Mechanisms of neurofunctional recovery post-liver transplantation: a comprehensive analysis based on electroencephalography and metabolomics

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***943***

Introduction: Liver transplantation is a key therapeutic approach for patients with end-stage liver disease, but the changes in neurological function and the mechanisms of recovery postsurgery are not fully understood, and there is a lack of systematic neurological monitoring and comprehensive evaluation [1-3]. Mounting evidence suggests that metabolites substantially influence brain physiology and pathophysiology [4].
Objectives: This study aims to assess the neurological damage and repair mechanisms in patients before and after liver transplantation by integrating electroencephalogram (EEG) data and metabolomics data, providing strong biomarkers and technical support for early diagnosis and intervention.
Methods: We included 18 patients who underwent liver transplantation and recorded their resting-state EEG data both preoperatively and three weeks postoperatively. Plasma samples were also collected preoperatively and three weeks postoperatively for nontargeted metabolomics analysis to identify key metabolic products and pathway changes.
Results: The results show that compared with presurgery, the EEG power spectral density of these patients post-transplantation showed a significant increase in the alpha, beta, theta and delta frequency bands (Fig. 1). The main changes in brain network functional connectivity postsurgery were also concentrated in the alpha and beta frequency bands, involving important areas, such as the premotor cortex, primary motor cortex, and sensorimotor cortex, suggesting an improvement in neurological function after surgery. Further analysis showed a significant decrease in the levels of brain injury biomarkers in the postoperative plasma of patients. Moreover, we performed nontargeted metabolomics to profile and analyze alterations in plasma metabolites of transplant patients presurgery and post-surgery, revealing a significant postoperative increase in S-methyl-5′-thioadenosine (MTA) levels (Fig. 2A-C). Subsequent patch–clamp electrophysiological recordings in mouse brain slices demonstrated that MTA administration enhanced ion channel activity and promoted neuronal activation (Fig. 2D). These results suggest that metabolic pathway remodeling, potentially driven by MTA-mediated mechanisms, may critically contribute to restoring neuronal activity and cognitive recovery in these patients.
Conclusions: In conclusion, this study not only provides the first detailed description of the impact of liver transplantation on neural network connectivity but also further confirms the important role of improved metabolic pathways in restoring neuronal activity and cognitive function after transplantation.

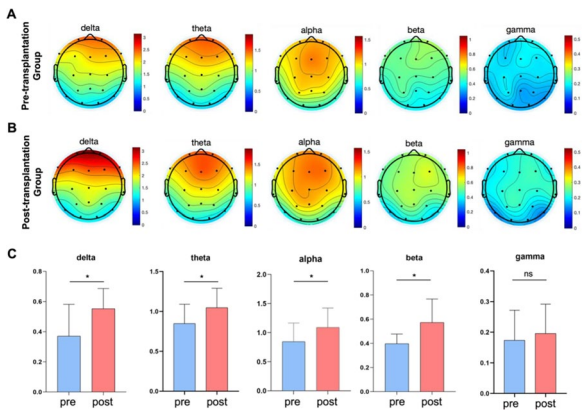


Fig. 1 (abstract 000943) EEG power spectral density in different frequency bands between two groups

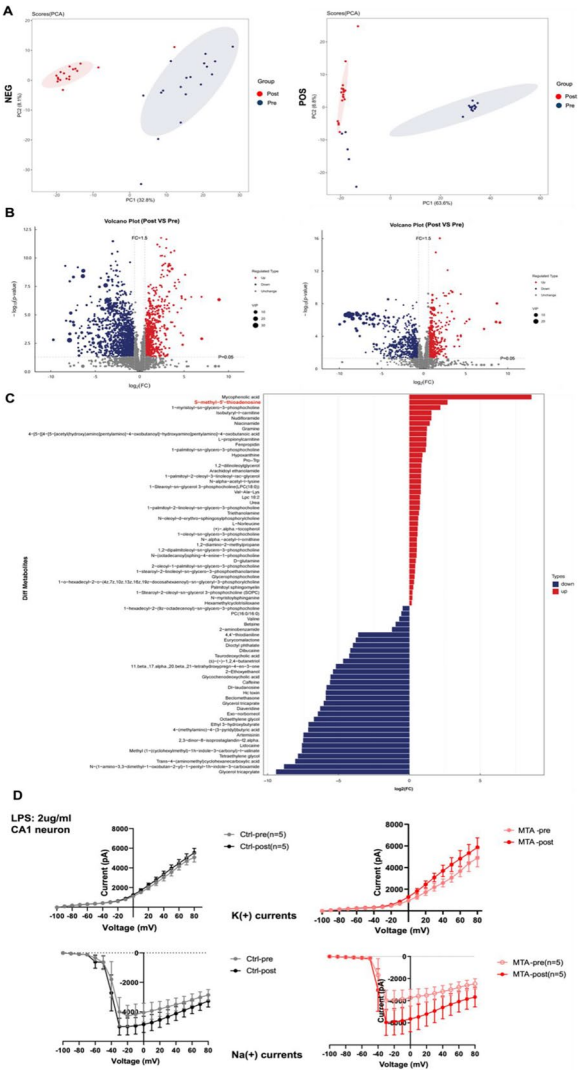


Fig. 2 (abstract 000943) **Metabolomic profiling of plasma samples between two groups reveals that MTA treatment enhances the voltage-gated potassium and sodium currents in neurons**

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5. This work was supported by the National Natural Science Foundation of China (grants number: 82402511), Natural Science Foundation of Anhui Province (grants number: 2308085QH272)

Topic: Brain death, organ donation and transplantation

000944

Hypoxia-driven DNT cell activation in bronchoalveolar lavage fluid predicts acute rejection after lung transplantation

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*944

Introduction: Lung transplantation serves as the definitive therapeutic intervention for end-stage pulmonary diseases; however, long-term survival of lung allograft recipients remains suboptimal compared to other solid organ transplants, primarily attributable to chronic lung allograft dysfunction (CLAD)-related mortality [1-2]. The current gold-standard surveillance modalities such as transbronchial biopsies are invasive and lack sensitivity for early CLAD detection [3]. Crucially, the pathophysiological underpinnings linking CLAD progression to early post-transplant mortality, particularly hypoxia-driven immune dysregulation in the early post-transplant phase, remain poorly characterized [1-3].
Objectives: This study integrates multi-omics approaches to elucidate the pathological role of double-negative T (DNT) cells in early-stage allograft rejection and investigate hypoxia-mediated immunoregulatory networks contributing to adverse outcomes.
Methods: Flow cytometry was performed on bronchoalveolar lavage fluid (BALF) from 17 recipients during the early postoperative period. Two external transcriptomic datasets (N = 16) were analyzed to validate immune cell-specific markers [4]. Murine left lung scRNA-seq under normobaric hypoxia/normoxia was conducted to elucidate hypoxia's role in immune cell differentiation.
Results: Flow cytometry revealed significantly elevated proportions of double-negative T cells (DNT, CD4-CD8-) in BALF from patients who died within 1 month post-transplantation compared to survivors (Fig. 1A). Transcriptomic validation demonstrated upregulation of DNT-specific marker LCK in incipient CLAD cases (Fig. 1B), indicating T cell hyperactivation and Graft-versus-host disease (Fig. 1B). Murine scRNA-seq (Fig. 2A 2B) showed hypoxia-induced DNT expansion with enhanced expression of activation markers (Lck, Cd3d, Zap70). Differential pathway analysis identified MHC-II overexpression in hypoxic–DNT cells, activating antigen presentation pathways associated with allograft rejection (Fig. 3).
Conclusions: Early elevation of DNT cells in post-transplant BALF correlates with acute rejection and poor prognosis. Hypoxia promotes DNT activation via MHC-II-mediated antigen presentation, driving immune rejection. These findings provide novel insights into targeting hypoxia–DNT crosstalk for improving lung transplant outcomes.

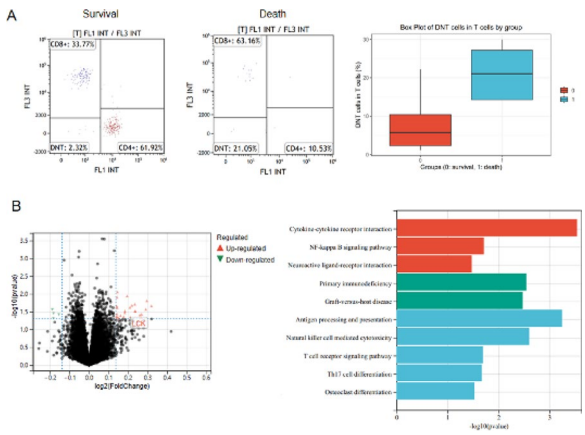


Fig. 1 (abstract 000944) DNTs in T cells significantly increases in CALD and early death patients

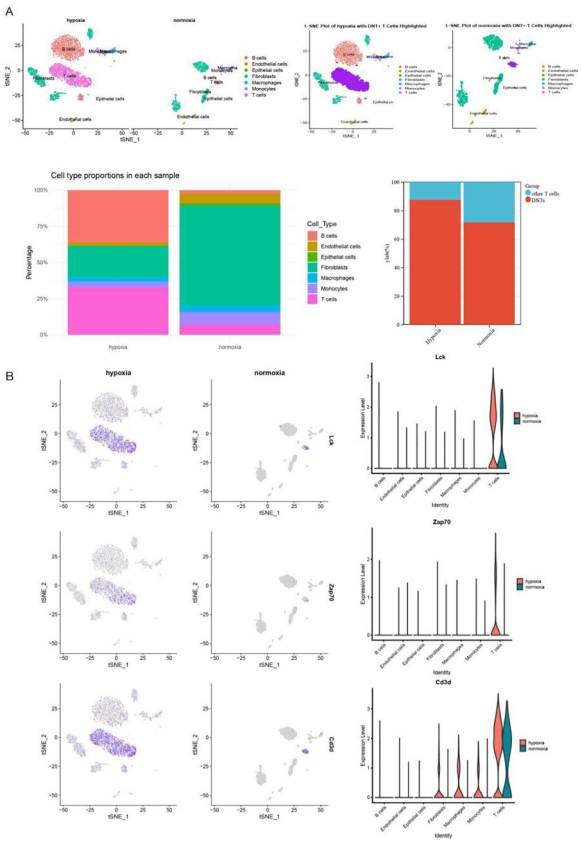
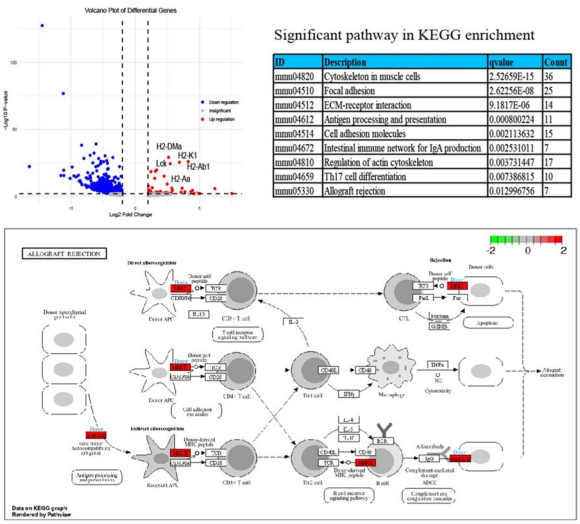


Fig. 2 (abstract 000944) Hypoxia activates DNT cells in lung



ID	Description	qvalue	Count
mmu04820	Cytoskeleton in muscle cells	2.52659E-15	36
mmu04510	Focal adhesion	2.62256E-08	25
mmu04512	ECM-receptor interaction	9.1817E-06	14
mmu04612	Antigen processing and presentation	0.000800224	11
mmu04514	Cell adhesion molecules	0.002113632	15
mmu04672	Intestinal immune network for IgA production	0.002531011	7
mmu04810	Regulation of actin cytoskeleton	0.003731447	17
mmu04659	Th17 cell differentiation	0.007386815	10
mmu05330	Allograft rejection	0.012996756	7

Fig. 3 (abstract 000944) Overexpression of MHC-II activates the allograft rejection pathway of DNT cells under hypoxic conditions

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5. No funding was received for this study.

Topic: Brain death, organ donation and transplantation

000945

Repeatability of renal perfusion quantification with CEUS in critically ill patients: a prospective observational study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***945***

Introduction: Contrast-enhanced ultrasound (CEUS) is a promising tool to assess renal microcirculation. However, its reproducibility has never been formally assessed.
Objectives: We aimed to assess the reproducibility and variability of repeated CEUS measurements in critically ill patients.
Methods: We conducted an observational trial in 20 critically ill patients in a stable cardiopulmonary condition for > 12 h. In group 1 (n = 10), we performed renal CEUS examinations with similar settings at three time points: baseline (T0), 30 min (T1), and 1 h (T2). In group 2 (n = 10), we performed CEUS at T0 and T1, with the ultrasound contrast agent (UCA) infusion rate doubled at T1. CEUS-derived parameters assessed included relative blood volume (RBV), mean transit time (mTT) and perfusion index (PI). The primary endpoint was the inter-measurement variability of these parameters across different time points. Linear quantile mixed models were used. Secondary endpoint was intra-measurement variability as assessed by the parameters' coefficient of variability. Finally, logistic regression analysis was performed to identify patients-related factors associated with high variability.
Results: In Group 1 (patients 1 to 10), CEUS derived parameters remained similar across the three study timepoints (3289 vs 3680 vs 3590 for RBV, 4.1 vs 4.2 vs 4.2 for mTT and 684 vs 762 vs 735 for PI, all p values > 0.05), indicating stability of these parameters within individual patients over time. In Group 2 (patients 11 to 20), doubling the UCA rate at T1 resulted in a significant increase in RBV (3207 vs 1624, $p = 0.01$), and in PI (977 vs 617, $p = 0.01$), while mTT remained stable (4.6 vs 3.8, $p = 0.08$). Coefficient of variability was 23.2% (RBV), 13.9% (mTT) and 33.8% (PI). The median of five CEUS assessments yielded reliable estimates. No parameter was found to be associated with CEUS parameters variability.
Conclusions: CEUS derived parameters demonstrate reproducibility, supporting the utility of CEUS in renal microcirculation monitoring. The observed rise in RBV after an increase in UCA infusion suggests that mTT might be more reliable under varying infusion conditions. Further studies are required to establish the clinical utility of CEUS in critically ill patients.

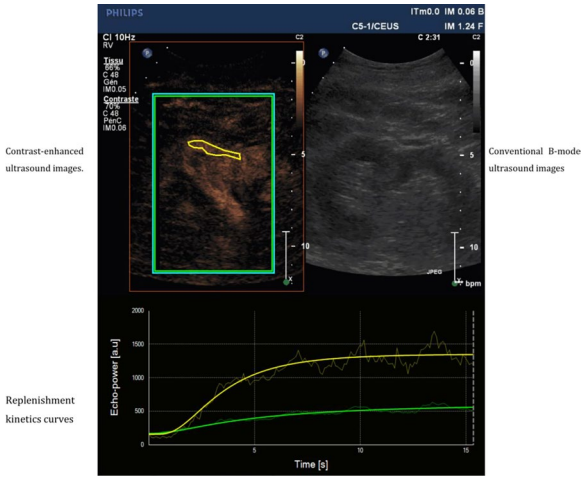


Fig. 1 (abstract 000945) Sequence analysis with Sonotumor®. A region of interest was drawn (yellow line) in the largest possible area of renal cortex closer to the ultrasound probe. The software generates a time intensity curve. This curve is used to generate CEUS-derived parameters

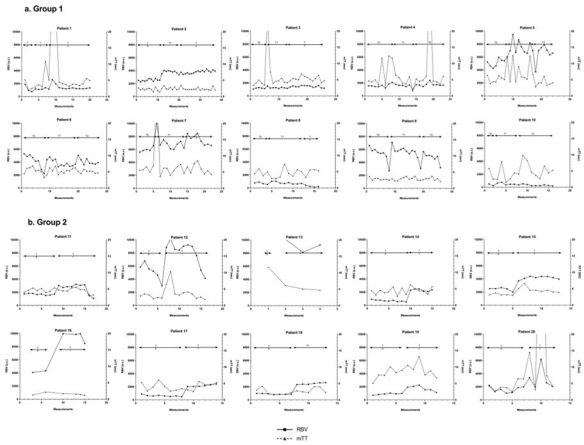


Fig. 2 (abstract 000945) Individual patient CEUS derived parameters in line plots of RBV (■, dashed line) and mTT (▲, dotted line) across phases T0 → T1 → T2 (arrows)

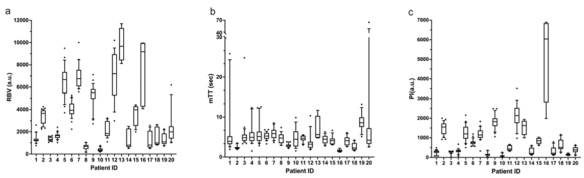


Fig. 3 (abstract 000945) Individual patient CEUS derived parameters in scatter-box plots. The boxplot displays the distribution of RBV, mTT and PI of every patient, with the box spanning Q1 to Q3, the median marked as a horizontal line, and whiskers extending to 1.5 × *IQR. Dots (•) represent outliers beyond this range*

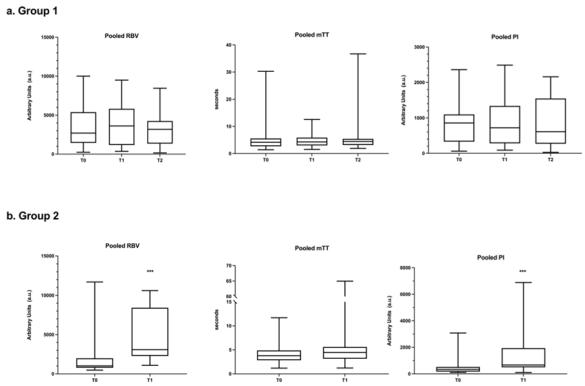


Fig. 4 (abstract 000945) Parameters of two groups in different time points. The boxplot displays the distribution of RBV, mTT and PI of each time point, with the box spanning Q1 to Q3, the median marked as a horizontal line, and whiskers extending to 1.5 × IQR. Triple asterisks (***) signify statistically significant differences ($p < 0.05$)

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Topic: Imaging in intensive care

000946

Prevalence of post-intensive care syndrome and potential influencing factors: a cohort study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):*946*

Introduction: Many critically ill patients suffer from persistent symptoms long after intensive care therapy has ended. These cognitive, psychological or physical impairments are summarized under the term Post-Intensive-Care Syndrome (PICS). Previous studies have demonstrated notable reductions in the quality of life and survival of patients, but the extent and causes of the condition remain opaque. The aim of this study was to determine the 3-month prevalence of PICS in a cohort of ICU survivors, and to identify key influencing factors in an effort to aid hypothesis generation and the design of future studies.
Methods: This was a monocentric, retrospective cohort study including patients who spent at least four days in an intensive care unit. PICS prevalence was assessed through structured interviews and clinical testing 3 months after the completion of intensive care therapy as part of follow-up care. Relevant individual and intensive care-related factors were documented from the hospital's patient data management system. The study was approved by the Ethics Committee of the Medical Association of Westphalia–Lippe and the University of Münster. Statistical analyses were done using Chi-square test and Welch's t test without correction for multiple testing. The results are considered exploratory and hypothesis generating.
Results: Among the 94 ICU survivors who were enrolled and clinically evaluated, the prevalence of PICS was 34%. Patients who suffered from PICS 3 months after intensive therapy were more likely to have required vasopressors, sedatives, antibiotics, or invasive ventilation during their ICU stay, and had a longer duration of non-oral nutrition, as well as more frequent organ dysfunctions and intensive care complications such as infections. Surgical patients with PICS had longer operation times. Statistically notable variables (p value < 0.05) are summarized in Table 1. No statistically significant differences were found between groups in terms of age, gender, BMI, and most pre-existing conditions.

Table 1 (abstract 000946) xxxx

Demographic Parameters	PICS	No PICS	p-Value
Male gender, %	62	73	0.36
Age, Mean (SD), years	59 (14)	58 (19)	0.74
BMI, Mean (SD), kg/m²	27 (6)	28 (6)	0.41
Therapy during ICU stay			
Surgery duration, Mean (SD), minutes	322 (175)	201 (98)	0.002*
ICU stay duration, Mean (SD), days	19 (10)	13 (10)	0.03*
Days without vasopressors in 30 days, Mean (SD), days	18 (9)	26 (4)	< 0.01*
Days without ventilation in 30 days, Mean (SD), days	24 (8)	28 (4)	0.04*
Days without sedation in 30 days, Mean (SD), days	25 (6)	28 (3)	0.24
Days without gastric tube in 30 days, Mean (SD), days	20 (12)	27 (8)	0.03*
Medication during intensive therapy			
Sedatives, %	88	61	0.03*
Antibiotics, %	88	64	0.04*
Complications during intensive therapy			
Infection, %	54	27	0.05*
Bleeding, %	81	52	0.03*
Hypoxia, %	58	24	0.01*
Vasoplegia, %	69	39	0.03*
Acute liver damage, %	50	24	0.05*
Acute kidney damage, %	69	39	0.03*

Conclusions: The occurrence of PICS after surviving a critical illness is common and should be considered in the ongoing care of patients. Further research is necessary regarding the potential risk factors and possible preventive measures.

Topic: Systemic diseases

000947

Clinical characteristics of *Chlamydia psittaci* pneumonia: a single-center, retrospective study over 5 years

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)*:947*

Introduction: Psittacosis is a zoonotic infectious disease caused by Chlamydia psittaci and manifests primarily as community-acquired pneumonia, which is often atypical. Previous data indicate that C. psittaci infection accounts for approximately 1.03% of cases of community-acquired pneumonia [1]. However, owing to technological limitations, there is a high risk of missed or incorrect diagnoses. Diagnosis of psittacosis pneumonia has become easier with the introduction of metagenomic next-generation sequencing (mNGS), which enables direct sequencing of nucleic acids in samples, allowing precise identification of pathogens by database analysis, especially pathogens that are difficult to culture or detect using traditional methods [2, 3].
Objectives: To identify the clinical characteristics of *Chlamydia psittaci* pneumonia and its risk factors with the aim of improving decision-making regarding diagnosis and treatment.
Methods: According to the guidelines for CAP, 59 patients with *Chlamydia psittaci* pneumonia were divided into a nonsevere pneumonia group and a severe pneumonia group, and their clinical characteristics and the differences were analyzed and compared.
Results: The incidence of consciousness disorders is higher($P = 0.020$), and the time from onset to diagnosis is longer (8 days vs 14 days, $P = 0.002$),it is more prone to myocardial injury, kidney injury, hypoalbuminemia, coagulation abnormalities, and venous thrombosis ($P < 0.05$) in the severe group, while fatigue is more common in the nonsevere group ($P = 0.022$). On laboratory indicators, the severe pneumonia group had a significantly longer prothrombin time ($P = 0.007$), higher WBC and neutrophil percentages and lower lymphocyte count and percentages, higher lactate dehydrogenase and D-dimer values (all $P < 0.001$). After adjustment for sex and age, logistic regression analysis identified myocardial injury as an independent risk factor for severe C. psittaci pneumonia (OR,124.3, [95%CI,4.25 ~ 3633.24]; $P = 0.005$).
Conclusions: Impaired consciousness indicates severe illness and myocardial injury is an independent risk factor for severe *C. psittaci* pneumonia.

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4. This work was partly supported by Anhui Provincial Natural Science and Technology Foundation(2208085MH236).

Topic: Infections and prevention

000949

Early predictors of delayed cerebral ischemia: vasospasm timing and clinical severity after aneurysmal subarachnoid hemorrhage

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)*:949*

Introduction: Among aneurysmal subarachnoid hemorrhage (aSAH) patients who survive the initial bleed, delayed cerebral ischemia (DCI), often leading to infarction, remains the leading preventable factor contributing to mortality and poor neurological outcome [1]. Reliable prediction models are still lacking, and diagnosis is challenging, particularly with high-grade aSAH, where serial neurological examinations have limited value [2]
Objectives: To identify and validate clinical and radiological predictors associated with DCI-related infarction in aSAH patients.
Methods: Single-center retrospective study including 221 consecutive aSAH patients admitted to a Neurocritititical Care Unit at a tertiary hospital, between 2018 and 2022. Logistic regression models were used to evaluate the predictive value of clinical and radiological admission variables for DCI-related infarction. Procedure-related infarctions were not included. Model performance was assessed using measures of discrimination and calibration. Cerebral vasospasm was diagnosed with transcranial Doppler or cerebral angiography.
Results: Baseline characteristics of the cohorts are presented in Table 1. DCI-related infarction occurred in 69 patients (31.2%). In a multivariate logistic regression (Table 2), time to vasospasm was a robust and consistent predictor of DCI-related infarction, showing an inverse association, suggesting earlier vasospasm may aligns more frequently with DCI development (OR 0.824, 95% CI 0.385-09.968, $p = 0.019$). The Hunt and Hess and Fisher scales were also among the strongest predictors of DCI-related infarction, confirming their established role in clinical severity and initial hemorrhage burden. No significant association was found between intraventricular hemorrhage and DCI-related infarction in this cohort. Other ICU-related variables, including SAPS II, duration of invasive mechanical ventilation, and analgo-sedation contributed modestly to DCI risk. Predictors like anemia, epileptiform activity or rebleeding showed clinical relevance and large effect sizes, though they did not reach statistical significance. The multivariate logistic regression achieved a moderate discriminative performance with an AUC of 0.65 (95% CI 0.729-0.909) (Fig. 1).
Conclusions: This work provides clinically relevant insights on predictors of DCI-related infarction in aSAH. Classic severity scores (Hunt and Hess and Fisher scores) remain strong indicators of risk, while earlier vasospasm onset appears to play a central role in DCI development. These findings can guide early risk stratification and patient monitoring strategies.

Table 1 (abstract 000949) Baseline characteristics of the participants in the delayed cerebral ischemia and control cohorts

	DCI-Infarction n=69 (31.2%)	No DCI-Infarction n=152 (68.8)	p
Age (years), mean (±SD)	58 (±14.1)	58 (±13.0)	0.819[1]
Female, n (%)	46 (66.7%)	90 (59.2%)	0.291[2]
Baseline mRankin 0-1, n (%)	67 (97.1%)	146 (96.1%)	0.781[2]
Smoking History, n (%)	25 (36.2%)	48 (31.6%)	0.496[2]
Hypertension History, n (%)	38 (55.1%)	78 (51.3%)	0.604[2]
Aneurysm Location:			
Anterior communicating artery, n (%)	22 (31.9%)	31 (20.4%)	
Middle Cerebral Aretry, n (%)	15 (21.7%)	26 (17.1%)	0.082[2]
Posterior Communicating artery, n (%)	10 (14.5%)	21 (13.8%))	
Admission Glasgow Coma Score (GCS):			
GCS 15, n (%)	28 (40.6%)	65 (42.8%)	
GCS 13-14, n (%)	16 (23.1%)	43 (28.3%)	0.488[2]
GCS 7-12, n (%)	11 (15.9%)	22 (14.5%)	
GCS 3-6, n (%)	14 (20.3%)	20 (12.2%)	
Hunt and Hess:			
Hunt and Hess I-III, n (%)	**41 (59.4%)**	**109 (71.7%)**	**0.07[2]**
Hunt and Hess IV-V, n (%)	**28 (40.6%)**	**43 (28.3%)**	
Fisher Score:			
Fisher Score 1-2, n (%)	7 (10.1%)	26 (17.1%)	0.268[2]
Fisher Score 3-4, n (%)	62 (89.9%)	126 (82.9%)	
SAPS II, median (IQR)	**34 (24)**	**28 (22)**	**0.016[3]**
Interventricular Hemorrhage, n (%)	58 (84.1%)	115 (75.7%)	0.160[2]
Aneurysm Management:			
Clipping, n (%)	**39 (56.5%)**	**54 (35.5%)**	
Coilling, n (%)	**27 (39.1%)**	**58 (38.2%)**	**0.001[2]**
Seizure, n (%)	12 (17.4%)	13 (8.6%)	0.055[2]
Anaemia, n (%)	**48 (69.6%)**	**66 (43.4%)**	**0.001[2]**
Rebleed, n (%)	**13 (18.8%)**	**12 (7.9%)**	**0.017[2]**
Invasive Mechanical ventilation	**59 (85.5%)**	**88 (57.9%)**	**0.001[2]**
Duration of ventilatory support, median (IQR)	**19 (28)**	**10 (19)**	**0.001[3]**
Duration of analgosedation, median (IQR)	**15 (21)**	**7 (12)**	**0.001[3]**
ICU Length of stay, median (IQR)	**25 (19)**	**15 (16)**	**0.001[3]**
Hospital Length of stay, median (IQR)	**43 (50)**	**26 (26)**	**0.001[3]**
Vasospasm, n (%)	**47 (68.1%)**	**55 (36.2%)**	**0.001[2]**
Time to vasospasm diagnosis (days), median (IQR)	5.0 (3)	7.0 (5)	0.446[3]
Interhemispheric index, median (IQR)	3.8 (1.1)	3.5 (1.3)	0.489[3]

1 Independent samples *t* test; 2 Chi-square test; 3 Mann–Whitney *U*

Table 2 (abstract 000949) Multivariate logistic regression analysis results

	Odds Ratio	95% Confidence Interval	p
Glasgow Coma Score	0.957	[0.895-1.022]	0.189
Hunt and Hess	**1.287**	**[1.035-1.600]**	**0.023**
SAPS II	**1.021**	**[1.002-1.04]**	**0.030**
Fisher	**1.407**	**[1.01-2.039]**	**0.004**
Interventricular Hemorrhage	0.589	[0.280-1.240]	0.163
Clipping	0.161	[0.046-0.567]	0.004
Coilling	1.551	[0.839-2.869]	0.162
Seizures	0.060	[0.001-3.027]	0.130
Anaemia	1.45	[0.58-4.81]	0.145
Rebleed	0.069	0.04-1.362	0.079
Invasive Mechanical Ventilation	0.077	[0.003-1.759]	0.134
Duration of Invasive Mechanical Ventilation	1.033	1.015-1.052	0.001
Duration of analgosedation	1.053	[1.026-1.08]	0.001
ICU Length of stay	1.011	[0.983-1.040]	0.457
Hospital Length of stay	1.013	[0.998-1.028]	0.096
Vasospasm	0.265	[0.145-0.486]	0.001
Timing of vasospasm	**0.824**	**[0.385-0.968]**	**0.019**
Interhemispheric index	4.0	[0.866-18.479]	0.073

Summary statistics: Nagelkerke R^2 = 0.695; classification accuracy = 86.2%; Hosmer and Lemeshow test $X2$ = 7.867 (DF = 8; p = 0.447); n = 221

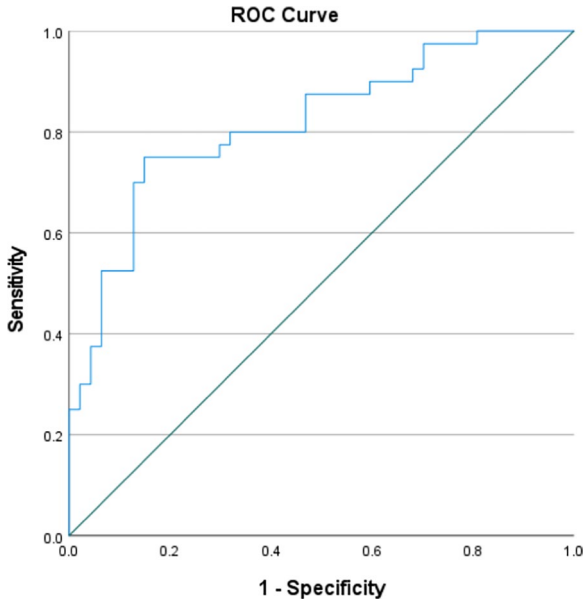


Fig. 1 (abstract 000949) Receiver-operating characteristic (ROC curves) showing a moderate discriminative performance with an AUC of 0.65 (95% CI 0.729-0.909)

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Topic: Neurointensive care

000950

Early targeted cerebral blood flow management following endovascular treatment for acute ischemic stroke

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:950***

Introduction: Given that post-treatment with endovascular treatment(EVT) for acute ischemic stroke often leads to complications, such as hyperperfusion syndrome, hemorrhagic transformation, or ineffective recanalization, it is recommended to admit patients to the neurocritical care unit in the acute phase within 24 h for strict and necessary blood pressure management (1). The American Stroke Association recommends maintaining blood pressure at or below 180/105 mmHg (2). However, due to the broad guidelines, several clinical trials(3-7) have explored systolic blood pressure thresholds, but results are inconsistent. Therefore, inconsistency in study conclusions

on postoperative blood pressure control targets for EVT patients may stem from the focus on a single peripheral blood pressure target.
Objectives: The objective is to regulate brain blood flow and oxygenation, control cerebral perfusion, and maintain normal brain microcirculation to enhance prognosis.
Methods: This study is designed as a single-center, prospective, controlled clinical trial to observe patients with anterior circulation acute ischemic stroke who have undergone endovascular treatment and achieved blood flow restoration. The objective is to monitor cerebral blood flow velocity in the middle cerebral artery using transcranial Doppler (TCD), and to regulate blood pressure to maintain cerebral blood flow within the normal range. This is accomplished by comparing quantitative EEG and brain oxygen monitoring data before and after the intervention to assess benefits.
Results: The study included 62 patients who underwent endovascular treatment for anterior circulation stroke, with 46 in the cerebral blood flow regulation group (33 males, 13 females) and 16 in the normal cerebral blood flow group (13 males, 3 females). In the cerebral blood flow regulation group, 37 patients received antihypertensive treatment with TCD indicating hyperperfusion; 9 patients received hypertensive treatment with TCD indicating hypoperfusion. In terms of brain function evaluation, oxygen levels on the affected side increased with faster cerebral blood flow ($P = 0.088$) and decreased with slower cerebral blood flow ($P = 0.005$), whereas oxygen levels on the healthy side remained unchanged despite regulation. In quantitative EEG, the ratio of θ waves on the healthy side decreased with cerebral blood flow regulation ($P = 0.021$), indicating improved EEG activity on the healthy side. On the affected side, the ratio of δ waves showed no significant difference but an increasing trend with cerebral blood flow regulation ($P = 0.248$).
Conclusions: The use of blood pressure regulation to manage cerebral blood flow during endovascular treatment of acute stroke will subsequently change the oxygenation of the affected hemisphere and the quantitative EEG function of the healthy hemisphere. This represents a novel approach to blood pressure regulation in the clinical practice of endovascular treatment for acute stroke.

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8. No funding was received for this study.

Topic: Neurointensive care

000951

Influence of short-term spinal cord stimulation on neurovascular coupling and EEG dynamics in patients with prolonged disorders of consciousness

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)*:951*

Introduction: Prolonged disorders of consciousness (pDOC) refer to prolonged alterations in consciousness lasting more than 28 days due to various brain injuries, such as traumatic brain injury (TBI), intracerebral hemorrhage, ischemic stroke, and cardiac arrest. Spinal cord stimulation (SCS) is commonly used to treat back pain and has also shown some potential in treating disorders of consciousness (DoC). Neurovascular coupling is an efficient intrinsic vascular regulation mechanism that reflects the adjustment and adaptation of neuronal activity and cerebral blood flow (CBF). SCS involves surgically implanting electrodes into the epidural space to stimulate the dorsal columns, but it may also influence the ascending reticular activating system. The research indicates that SCS increases cerebral blood flow and alters the concentrations of neurotransmitters in cerebrospinal fluid. However, the precise mechanisms through which it benefits DoC patients remain unclear.This study hypothesizes the following: 1. A relationship exists between EEG and cerebral blood flow velocity (CBFV) in DOC patients, reflecting the state of NVC. 2. SCS surgery affects thalamic connectivity and NVC. 3、Certain patients benefit more from SCS in terms of thalamocortical activity.
Objectives: To explore changes in neurovascular coupling and EEG dynamics in patients received short-term spinal cord stimulation (SCS),providing a Biomarker for the evolution of consciousness in patients with prolonged disorders of consciousness (pDOC).
Methods: Analysis of the prognosis of implantation of spinal cord neurostimulation in patients with traumatic brain injury, cerebral hemorrhage and ischemic–hypoxic encephalopathy admitted to the Neurological Intensive Care Unit of Hefei Hua'an Brain Hospital. The resting EEG signals were collected by continuous monitoring of 19-lead (FP1, FP2, F3, F4, C3, C4, P3, P4, O1, O2, T3, T4, T5, T6, Fz, Pz, Cz) EEG and cerebral blood flow velocities (CBFV) in bilateral middle cerebral arteries were synchronously collected by transcranial Doppler ultrasound (TCD). The prognosis of patients implanted with SCS was calculated and compared in terms of resting-state brain topography, middle cerebral artery blood flow, and neurovascular coupling. Neurovascular coupling values were obtained by calculating the cross-frequency phase-amplitude coupling (PAC) between the CBFV phase in the frequency band of (0.01-0.1 Hz) and the EEG amplitude in five frequency bands (δ, θ, α, β, γ). The global PAC for each frequency band was calculated as the sum of all PACs for each patient's 19 EEG channels with the corresponding EEG bands.
Results: Twelve patients met our inclusion criteria. Their age was 50.75 ± 12.55 years. The PAC enhancement of the patients in the minimally conscious state (MCS) was more pronounced by surgery compared to patients in the vegetative state (VS), and all five EEG frequency bands of the Global PAC was significantly elevated in all five EEG frequency bands. The global PAC in the gamma band was significantly elevated in the postoperative awakening patients. Preoperative PAC was 0.92 ± 0.39, postoperative PAC was 1.84 ± 1.30, and γ-segment global PAC was elevated 0.93 ± 1.34 ($P = 0.0011$).
Conclusions: The SCS surgery significantly improved the patients' PDA values,especially in γ-segment global PAC.This study may provide guidance for the selection of patients for SCS surgery and the research on its mechanism of action.

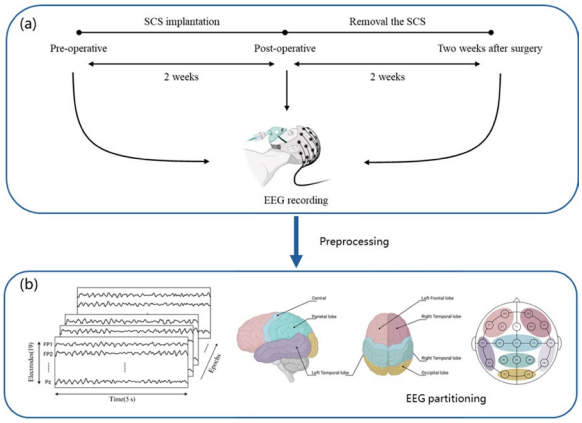


Fig. 1 (abstract 000951) EEG recording process, preprocessing and partion

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11. No funding was received for this study.

Topic: Neurointensive care

000952

Evaluation of noninvasive central venous pressure in mechanically ventilated patients using handless carotid artery doppler ultrasound

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Introduction: Assessment of right atrial pressure (RAP) is an important component of hemodynamic evaluation [1]. Central venous pressure (CVP) is an approximation of RAP and is equivalent to right ventricular pressure during diastole; thus, CVP can reflect the cardiac preload [2]. CVP is determined by the interaction between cardiac function and venous return [3] and can assist in diagnosing right heart failure and guiding fluid resuscitation, especially as a crucial indicator for sufficient fluid resuscitation in shock patients. However, the measurement of CVP requires the placement of a central venous catheter, which can be time-consuming [4-6]. In emergency situations or when a patient's condition deteriorates rapidly, quick insertion of a central venous catheter may not be feasible. In addition, as an invasive procedure, it may lead to complications such as pneumothorax, arrhythmias, and site infections [7]. Noninvasive portable bedside ultrasound can obtain Doppler ultrasound parameters related to CVP from structures, such as the internal jugular vein, inferior vena cava, and hepatic vein. However, it requires specialized ultrasound training and measurements can be influenced by subjective human factors. The relative motion and pressure changes between the ultrasound probe and the skin make it difficult to maintain continuous blood flow measurements during the assessment. The handless carotid artery Doppler ultrasound (hCDU) is a monitoring ultrasound that has a patch component which can be applied to the skin, allowing for continuous blood flow monitoring. The data obtained will be automatically analyzed and measured, converting it into various hemodynamic indicators. This ultrasound, due to its innovative patch design, can ensure measurement objectivity while avoiding the confounding factors that commonly affect conventional ultrasound measurements, all while ensuring ease of use and minimizing the need for extensive training. This study intends to utilize patch-based automatic Doppler blood flow measurement technology to obtain immediate and continuous hemodynamic information to develop a new noninvasive method for CVP assessment.
Objectives: To develop a new method for noninvasive assessment of central venous pressure (CVP) in mechanically ventilated patients using the handless carotid artery Doppler ultrasound (hCDU).
Methods: This prospective study included patients admitted to the Intensive Care Unit (ICU), who underwent invasive mechanical ventilation and had a central venous catheter for CVP monitoring from November 2024 to January 2025. Within 24 h of ICU admission, blood pressure, heart rate, mean arterial pressure, CVP, and ventilator parameters were collected. The carotid artery velocity time integral (cVTI) and the internal jugular vein velocity time integral (jVTI) were obtained by using the hCDU. Simultaneously, conventional ultrasound was performed to measure the cross-sectional area of carotid artery (CSAa) and the cross-sectional area of internal jugular vein (CSAj). We analyzed the correlation between the aforementioned parameters and CVP, constructed a regression equation, and used receiver operating characteristic (ROC) curve analysis to predict the optimal cutoff value for CVP > 10 cm H2O.
Results: A total of 94 patients were included. Correlation analysis showed that both CSAj ($r = 0.422$, $P < 0.001$) and CSAj/CSAa ($r = 0.444$, $P < 0.001$) had a moderate positive correlation with CVP, while CSAa ($r = -0.073$, $P = 0.484$) had a weak correlation with CVP. We also confirm a weak positive correlation between cVTI ($r = 0.384$, $P < 0.001$) and CVP, a moderate negative correlation between jVTI($r = -0.677$, $P < 0.001$) and CVP, and a strong positive correlation between cVTI/jVTI($r = 0.846$, $P < 0.001$) and CVP. Subsequently, we constructed a univariate linear regression equation: CVP = 6.937 × (cVTI/jVTI) + 3.147, which yielded an area under the ROC curve of 0.9734 for predicting CVP > 10 cm H2O. The optimal cutoff value of 1.15 provided the best predictive performance, with a sensitivity of 92.1% and a specificity of 93.5%.
Conclusions: The cVTI/jVTI parameter obtained from the hCDU can serve as a new method for noninvasive assessment of CVP.

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8. This research received no external funding.

Topic: Cardiovascular issues in ICU

000954

Hematological patients in the ICU: a journey through time

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Introduction: Hematological critically ill patients have become a challenge in our units in the recent years, with constantchanges and updates regarding their treatment and prognosis
Objectives: To analyze and compare hematological patients admittedto our Intensive Care Unit (ICU) over two different time periods.
Methods: A descriptive comparative analysis is performed betweentwo similar studies conducted over different periods (2004 to 2016 and 2018 to 2024). Both studies collected clinicalinformation from patients' medical records (in the firststudy using analog records and in the second one usingdigital records).
Results: The first study was conducted from 2004 to 2016 (13 years) and the second from 2018 to 2024 (7 years) including 102 and 61 patients respectively, suggesting anupward tendency in the number of hematological patientsadmitted to the ICU (annual mean 7.8 vs. 8.7).
In both periods, the main source of these patients was the Haematology ward, followed by the EmergencyDepartment and Internal Medicine ward. The mostcommon underlying hematological pathology was non-Hodgkin lymphoma, followed by multiple myeloma. Themeanageatadmissionofthesepatientshasslightlyincreased(57.8vs. 61.67), and these patients also tend to present a greater number of comorbidities. The mean number of days prior the ICU admission has decreased slightly (10.56 days vs. 9.02), and the number of cases where dopamine infusion was initiated on theHaematology ward, a common practice in our hospital, has decreasen (14.7% to 9.8%), suggesting an earlier ICU admission.
Severity index at admission (measured according to theAPACHE score) is very similar in both periods (24.18 vs. 24.70), but the invasive measures implemented haveincreased: vasoactive infusion (75% vs. 83.61% $p = 0.24$), invasive mechanical ventilation (36.27% vs. 45.95% $p = 0.29$), and continuous renal repleacement therapy(16.3% vs. 22.95% $p = 0.34$), which leads to an increase in ICU admission days (7.94 vs. 10.52).
Mortality during ICU admission also decreased slightly(53% vs. 45.9%, $p = 0.47$), although we also observed anincrease in subsequent mortality (11% vs. 16%), whichcould be biased by age and underlying pathology
Conclusions: Despite the limitations in the comparability of both studies(probably related to the short time difference between theperiods and the difference in sample size), we can observe an ascendant tendency regarding the admission of haematological patients in our critical care units, accompanied by a greater implementation of aggressivetherapeutic procedures. Despite this, and given the complexity of these patients, mortality is still a challenge. The importance of early diagnosis and treatment of thecomplications must be emphasized.

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Topic: Haematologic-oncologic issues in the ICU

000955

What is the appropriate feeding strategy in patients with traumatic brain injury: the role of central GLP-1 resistance

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Introduction: Neuroinflammation following traumatic brain injury (TBI) can disrupt the dynamic balance of the brain-gut axis, leading to gastrointestinal dysfunction [1]. Inappropriate nutrition delivery exacerbates the mechanisms of secondary brain injury and results in short- and long-term complications [2]. The ideal nutritional therapy in patients with TBI is currently controversial due to the lack of high-quality data from large-scale prospective clinical trials [3-5]. So, what is the ideal nutritional therapy for TBI patients? Glucagon like peptide-1 (GLP-1) is an insulin stimulating glucocorticoid that enhances postprandial insulin release [6]. Central GLP-1/GLP-1R system activation plays a crucial role in regulating feeding by delaying gastric emptying and suppressing appetite [7]. In the previous study, we found severe neural damage may lead to dysfunction of the central GLP-1/GLP-1R system, which cannot effectively regulate peripheral insulin secretion and glucose metabolism, resulting in sustained hyperglycemia [8]. We wonder whether disruption of central GLP-1/GLP-1R signaling could lead to GLP-1 resistance, resulting feeding intolerance in patients with TBI. Therefore, we performed a prospective observational study in patients with severe TBI to investigate the 14-day kinetics of plasma GLP-1, insulin, and tolerable enteral caloric intake. In this study, we verify our hypothesis that the elevation of endogenous GLP-1 secondary to central GLP-1 resistance, leads to feeding intolerance, which could possibly be used to predict appropriate feeding strategies for individual TBI patients.
Objectives: We propose a hypothesis that disruption of central GLP-1/GLP-1R system is involved in mediating the occurrence of feeding intolerance in TBI patients.
Methods: We conducted a prospective observational study on patients with severe TBI to investigate the first 2-week kinetic of plasma GLP-1, insulin and the relationship with feeding tolerance. Enteral feeding was conducted with the target of 25 kcal/kg·d and adjusted according to the tolerance. The blood samples were collected

on four timepoints: postinjury days 1-3 (PID1), PID 4-7 (PID2), PID 8-10 (PID3), and PID 11-14 (PID4).
Results: It was found that those with feeding intolerance (lower than 70% target calorie) showed higher serum GLP-1 and insulin levels ($p < 0.01$) than fully fed (achieved 70-100% target calorie) patients, which was more prominent in patients with severe intolerance (lower than 40% target calorie) (both $p < 0.001$). In addition, insulin supplementation dose in intolerant patients was comparable with that of adequately fed patients ($p = 0.202$). GLP-1 on days 8-10 and insulin on days 1-3 were positively associated with feeding tolerance.
Conclusions: Central GLP-1/GLP-R system malfunction can lead to elevated peripheral GLP-1 levels, inducing feeding intolerance. The GLP-1 based feeding strategy may be a breakthrough for personalized feeding strategy in TBI patients.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000956

Aneurysmal subarachnoid hemorrhage in the ICU

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Introduction: Aneurysmal subarachnoid hemorrhage (aSAH) is a common cause of admission to the Intensive Care Unit (ICU) and leads to significant functional impairment in patients at discharge.
Objectives: To describe the characteristics of patients with aSAH admitted to the ICU at a tertiary hospital.
Methods: Retrospective, observational study conducted on patients diagnosed with aSAH who were admitted to the ICU of HGU Gregorio Marañón between January 2022 and November 2024. Epidemiological data, aSAH risk factors, comorbidities, severity scales (APACHE II, SOFA, GCS, FOUR), modified Fisher scale (mFS), World Federation of Neurological Surgeons scale (WFNS) and Hunt and Hess scale (H&H), organ support, aneurysm location, treatment type, and complications were collected. Functional status at discharge was evaluated using the modified Rankin scale (mRS). In the descriptive analysis, quantitative variables were expressed as mean (SD) if the distribution followed a normal pattern or median (IQR) otherwise. Qualitative variables were expressed as percentages.
Results: Seventy-six patients were included. The mean age was 57 ± 12 years, with 72.4% being female. aSAH risk factors included hypertension (50%), smoking (29%), and dyslipidemia (20%). Severity scales: APACHE II 11 ± 7, SOFA 5 ± 4, GCS 11 ± 4 at admission; 88% had mFS ≥ 3, 21% were classified as WFNS 5 and 29% had H&H ≥ 4. In 70% of cases the aneurysm was located in the anterior circulation with the most common location being the anterior communicating artery (29%). 70% of patients had intraventricular hemorrhage, 41% required external ventricular drainage and 9% experienced rebleeding. The most frequent treatment was endovascular (71%). In the sample 25% developed delayed cerebral ischemia (DCI) at 6 ± 3 days and 15% experienced delayed cerebral infarction. ICU complications occurred in 58% of patients. 62% required mechanical ventilation (MV) and 33% underwent tracheostomy. The ICU stay was 12 days (6-34) with a mortality rate of 18.4%. Hospital stay was 26 days (17-61) with favorable functional outcomes at discharge (mRS 0-3) in 56.6% of cases.
Conclusions: Aneurysmal subarachnoid hemorrhage was more frequent in middle-aged women with no significant comorbidities. Nearly one-third of patients developed delayed cerebral ischemia. A high proportion of patients had an unfavorable modified Rankin score at hospital discharge.

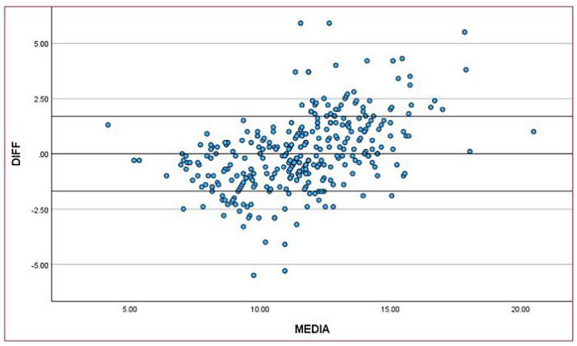
Topic: Neurointensive care

000957

Correlation and concordance of non-invasive haemoblobin with invasive haemoglobin measurement techniques in critically ill patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***706***

Introduction: Acute anaemia is a common clinical problem in the critically ill. Ninety-five percent of patients in intensive care units (ICU) for 72 h or more suffer from anaemia and approximately 40% of them receive transfusions of packed red blood cell units. Disease-specific factors and phlebotomy sampling contribute to this event, but non-invasive haemoglobin measurement methods are available to benefit patients in these situations.
Objectives: To determine the correlation and concordance of non-invasive haemoglobin measurement to determine the validity of its use in critically ill patients.
Methods: Prospective analytical study that analysed and evaluated the correlation and concordance of serum haemoglobin values with Masimo Radical-7® Pulse CO-Oximeter® (SpHb) plethysmograph haemoglobin concentration monitoring.
Results: A total of 329 patients were analysed. 54.74% were male with a mean age of 59.91 ± 18.71 years. Vasopressor support was required in 29.18%. Mean haemoglobin values were 11.52 ± 2.88 g/dL at serum level and measured by SpHb of 11.48 ± 2.14 g/dL with a correlation coefficient $r = 0.805$ ($p = 0.001$) which remains acceptable despite high doses of vasopressors $r = 0.764$ ($p = 0.001$). Concordance analysis showed an average difference of 0.03 ± 1.65 g/dL with moderate limits of agreement between − 1.02-1.05 g/dL.
Conclusions: These findings are concordant with different studies and suggest the use of SpHb as an opportunity to assess the trend of haemoglobin values in critically ill patients. SpHb showed acceptable accuracy and excellent correlation with serum haemoglobin and provides a rapid, feasible and accurate solution for haemoglobin measurement in ICU.



Bland–Altman plot of differences and means between serum haemoglobin and SpHb values.

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Topic: Hematologic–oncologic issues in the ICU

000958

Empirical antibiotic dose adjustment in sepsis and septic shock patients with AKI: a retrospective comparative study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***958***

Introduction: Appropriate antimicrobial dosing is critical in sepsis, especially in patients with acute kidney injury (AKI), which alters drug clearance. Timely dose adjustment based on the renal function balance efficacy and toxicity. However, the impact of the timing in dose modifications on safety outcomes remains unclear, particularly in critically ill patients receiving nephrotoxic or antimicrobial agents excreted via kidney, such as piperacillin/tazobactam and colistin.
Objectives: This study aimed to compare the safety outcomes of early (within 24 h) versus delayed (after 24 h) antimicrobial dose adjustment based on the renal function in patients with AKI complicated by sepsis or septic shock.
Methods: A retrospective study was conducted using data from ICU units at university hospital, Thailand, spanning January 2021 to November 2024. Inclusion criteria were patients aged over 18 years diagnosed with sepsis or septic shock who developed AKI, as defined by KDIGO criteria. Major exclusions included patients who required renal replacement therapy or did not receive a loading dose of antibiotics. Primary outcomes assessed were AKI progression within 72 h, resolution of kidney injury within 7 days, ICU-free days, and in-hospital mortality. Secondary outcomes included clinical cure and length of ICU stay.
Results: Of the 785 screened patients, 84 met the inclusion criteria and received piperacillin/tazobactam or colistin therapy. The median age was 74 years. According to KDIGO criteria, most patients (71.5%) had stage 1 AKI, followed by 19% with stage 2 and 9.5% with stage 3. Among these, 43 received antimicrobial dose adjustments within 24 h, and 41 after 24 h. No significant differences were observed between early and delayed groups in AKI progression within 72 h (25.6% vs. 22.0%, P = 0.696), kidney injury resolution within 7 days (9.3% vs. 17.1%, $P = 0.291$), or ICU-free days (median 3 vs. 12 days, $P = 0.080$). However, in-hospital mortality was significantly higher in the early group (65.1% vs. 39.0%, $P = 0.017$).
Conclusions: The study findings suggest that delaying dose adjustment based on renal function for piperacillin/tazobactam or colistin beyond 24 h in patients with sepsis or septic shock and AKI may improve safety outcomes, particularly by reducing in-hospital mortality. However, due to the small sample size and limited data on colistin in the delayed adjustment group, further studies with larger cohorts are needed to clarify the optimal timing for dose adjustments in this population.

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Topic: Infections and prevention

000959

Personalized scheme of opioid administration during reconstructive operations after head and heck mine blast injuries

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):959

Introduction: Injuries resulting from blast trauma are complex cases that require numerous surgical interventions and adequate pain management.
Objectives: The goal of this study was to assess the effectiveness and safety of a personalized fentanyl administration method compared to the standard pain management approach. Materials and
Materials and methods: A study was conducted on fifty patients undergoing reconstructive surgeries following head and neck mine blast injuries sustained at the frontlines in Ukraine. These patients were evenly split into two groups based on the intraoperative anesthesia approach. The first group received a standard multimodal analgesia regimen that included paracetamol, dexketoprofen, and fentanyl solutions. The second group was administered multimodal analgesia with paracetamol, dexketoprofen, and a personalized opiate administration approach, which involved assessing the response to a slow fentanyl bolus (1.5 μg/kg) using the Ramsey scale before induction. The fentanyl test outcomes were categorized as follows: 1. Negative: No sedation observed after the fentanyl bolus. 2. Weakly positive: Anxiolysis or Ramsey level 2 sedation observed. 3. Positive: Superficial sedation or Ramsey level 3 sedation observed. For positive tests, 2-3 μg/kg

fentanyl was administered per hour to maintain analgesia. For weakly positive tests, 3-4 µg/kg was given per hour, and for negative tests, more than 5 µg/kg was administered per hour. Analgesia and sedation levels were monitored using the Conex monitoring system.
Results: The personalized fentanyl administration scheme during reconstructive operations showed better outcomes compared with the standard anesthesia protocol. It was associated with improved blood pressure control, like lower blood pressure during and after surgery, lower stress markers (intraoperative blood cortisol: 14.74 ± 6.48 mcg/dL in group 1 vs. 9.58 ± 6.73 mcg/dL in group 2), and reduced incidences of perioperative pain, postoperative nausea, and vomiting.
Conclusions: A method of personalized anesthesia was elaborated, based on an individual scheme of fentanyl administration («fentanyl test») during reconstructive operations after head and heck mine blast injuries. Its usage is safe (due to the optimal parameters of hemodynamics and fewer side effects, such as nausea and residual sedation) and more effective (due to the lower level of stress markers and less frequent complaints of pain of various origins) than when the routine technique was used.

Topic: Sedation, analgesia and delirium

000960

Bioactive adrenomedullin levels and endothelial stress in cardiac surgery patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***960***

Introduction: Cardiac surgery with cardiopulmonary bypass (CPB) induces significant endothelial disorder, often leading to postoperative complications. Bioactive Adrenomedullin (Bio-ADM) is a marker that reflects the integrity and function of the endothelial structure, where a higher level indicates a decline in endothelial function. The perioperative trajectory of Bio-ADM and its relationship to postoperative complications remains underexplored. The aim of this study is to evaluate the dynamics of Bio-ADM levels in relation to various outcomes as inflammation, renal dysfunction and fluid balance.
Methods: In this preliminary study we analyzed the perioperative Bio-ADM course in ten patients undergoing cardiac surgery. Bio-ADM levels were measured preoperatively and at three postoperative time points, postoperative day (POD) 1, 2 and 5. Based on the preoperative median (17.8 pg/mL) Bio-ADM level patients were divided into two groups (low and high).
Results: Patients in the high Bio-ADM group developed significantly higher postoperative Bio-ADM levels (POD1: 71.30 ± 29.69 pg/mL vs. 29.08 ± 15.06 pg/mL in the low group; p = 0.030). Whereas no difference in preoperative CRP levels was found (high Bio-ADM 0.16 ± 0.20 mg/dL vs. low Bio-ADM 0.19 ± 0.23 mg/dL; p = 0.787), postoperative CRP levels were elevated in the high Bio-ADM group (POD1: 3.65 ± 1.70 mg/dL vs. 3.04 ± 2.96 mg/dL; p = 0.677; POD2: 14.46 ± 5.09 mg/dL vs. 8.34 ± 5.33 mg/dL; p = 0.085). Also, the high Bio-ADM group showed a higher intraoperative fluid balance (4335.8 ± 1623.0 mL vs. 3847.8 ± 1439.0 mL; p = 0.615). Furthermore, a higher incidence and severity of postoperative edema was found in the high Bio-ADM group on POD1 (high Bio-ADM 0.75 ± 0.25 cm vs. low Bio-ADM 0.17 ± 0.26 cm; p = 0.029) and on POD2 (0.83 ± 0.14 cm vs. 0.21 ± 0.25 cm; p = 0.002).
Conclusions: These findings indicate that high preoperative Bio-ADM levels are associated with elevated postoperative Bio-ADM and CRP values, higher intraoperative fluid balances and a higher risk of developing postoperative edema. These findings underline the value of Bio-ADM as a predictive marker for postoperative complications in cardiac surgery patients.

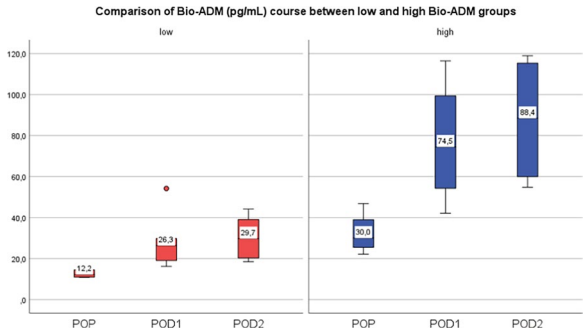


Fig. 1 (abstract 000960) Perioperative Bio-ADM course: the boxplots show the perioperative course of Bio-ADM between patients with high (blue) vs. low (red) preoperative Bio-ADM at different time points. In the boxplots, the lower boundary of the box indicates the 25th percentile, a black line in the box marks the median, and the upper boundary of the box indicates the 75th percentile. Whiskers above and below the box indicate the 10th and 90th percentiles. Points indicate outliers outside the 10th and 90th percentiles. Abbreviations: Bio-ADM, Bioactive Adrenomedullin; POP, preoperative; POD, postoperative day; pg, picogram; mL, milliliters

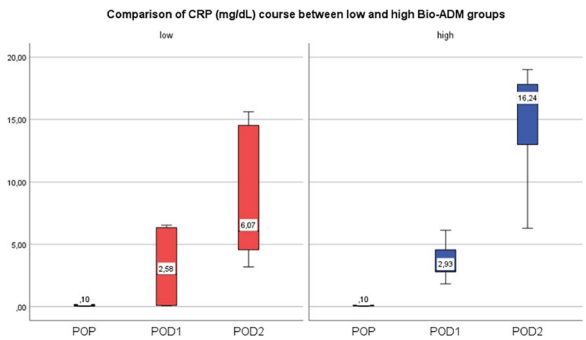


Fig. 2 (abstract 000960) Perioperative CRP course: The boxplots show the perioperative course of CRP between patients with high (blue) vs. low (red) preoperative Bio-ADM at different time points. Abbreviations: CRP, C-Reactive Protein; POP, preoperative; POD, postoperative day; mg, milligram; mL, milliliters

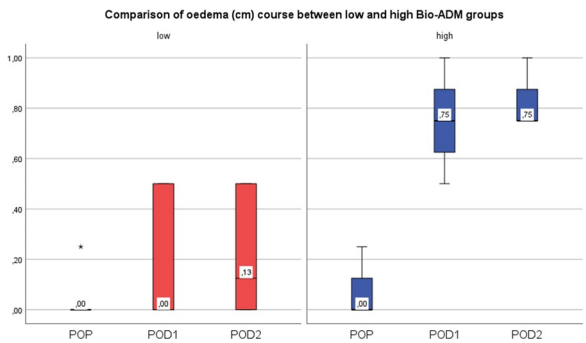


Fig. 3 (abstract 000960) Perioperative edema: The boxplots show the perioperative development of oedema between patients with high (blue) vs. low (red) preoperative Bio-ADM at different time points. Abbreviations: Bio-ADM, Bioactive Adrenomedullin, POP, preoperative; POD, postoperative day, cm, centimeters

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Topic: Perioperative care

000961

90-day survival in critically ill patients with bacterial pneumonia in a tertiary care hospital: retrospective study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***961***

Introduction: Pneumonia has a significant burden in hospitalized patients with high morbidity and mortality and it is one of the most common infections observed in Intensive Care Units (ICUs). The patient-related factors, local antibiogram and infections with multidrug-resistant organisms (MRDO) are fundamental risks that are associated with higher mortality. This study evaluated the 90-day survival of critical ill patients diagnosed with bacterial pneumonia.
Objectives: This study aims to evaluate the 90-day survival in patients diagnosed with bacterial pneumonia during their ICU stay.
Methods: This retrospective study conducted in a 22-bed intensive care unit at a tertiary care center in the eastern province, Saudi Arabia that included adult patients diagnosed with pneumonia (community acquired pneumonia (CAP), hospital acquired pneumonia (HAP) and ventilator associated pneumonia (VAP)) with positive sputum culture for bacterial organism from January 2023 to March 2024. The ICU database was utilized to identify all patients who were diagnosed with pneumonia. Demographic data, type of pneumonia, the isolated pathogens susceptibility testing, the appropriateness of empirical antimicrobial regimen, and the 90-day survival were recorded. The primary outcome was the 90-day survival among the patients diagnosed with any type of pneumonia during their ICU stay.
Results: A total of 98 patients diagnosed with bacterial pneumonia during their ICU stay were included in our analysis. Mean age was 56 Years, 56 (57.1%) patients were males, 76 (77.5%) were immunocompromised (55.1% with malignancies, 10.2% transplant, and 12.2% with liver disease), 82 (83.7%) required vasopressors, and 95 (96.9%) were mechanically ventilated. HAP was the most common type of pneumonia followed by VAP, and CAP, 52 (53.1%), 34 (34.7%), and 12 (12.2%), respectively. Multidrug-resistant organisms (MDROs) were detected in 46 (46.9%) patients. The most frequently encountered MDROs were extended spectrum beta lactamase (ESBL)-producing organisms, followed by Stenotrophomonas, and carbapenem-resistant Enterobacteriaceae (CRE), 13.3%, 11.2%, and 10.2%, respectively. Sixty-one patients (62.2%) received empirical antibiotics that appropriately covered the isolated pathogens. Vasopressors use was identified as a significant risk for ICU mortality ($p = 0.025$). Seven (7.1%) patients were alive upon ICU discharge and only 4 (4.1%) survived at 90-day follow up.
Conclusions: Most patients in this study didn't survive at 90-days from the pneumonia diagnosis during their ICU stay. Despite advancement in diagnosis, management, antimicrobial therapy, and prevention, pneumonia continues to have a major impact on critically ill patients' outcomes.

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10. none

Topic: Sepsis

000962

Exploring the clinical experiences of nurses to understand the contextual nature of sepsis recognition expertise: a phenomenographic study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***962***

Introduction: Sepsis is a common but often unrecognised condition associated with high mortality [1]. Educational programmes designed to improve sepsis recognition, often structured around standardised sepsis screening tools are being produced at an increasing rate [2]. While these initiatives have been effective in improving knowledge outcomes, change in clinical practice remains suboptimal [2]. The challenge is that sepsis education research has tended to focus on knowledge acquisition related to sepsis screening tools [2], often neglecting the necessary step of translating that knowledge into the clinical context where sepsis exhibits a broad spectrum of disease manifestation [3,4].
Objectives: This study examined the nurses' clinical experiences to understand the contextual nature of sepsis recognition expertise. Such an understanding may allow future sepsis educational programmes to be grounded in a framework of a relevant and personalised approach to sepsis recognition which is currently lacking [3,4].
Methods: Twenty-six nurses from various hospital settings were interviewed. Transcripts of the interviews were analysed by a phenomenographic approach, a research method aiming to determine the various ways a group of people experience a phenomenon [5]. The findings were arranged into categories based on the Cynefin Framework [6].
Results: The findings revealed that sepsis recognition takes on a range of meanings, depending on the complexity of the clinical context. In the simple context (with well-known cause/effect links), sepsis recognition meant understanding how the patients' physiological values match predetermined criteria from a protocol. In the highly complex context (webs and loops of cause/effect with unpredictable, emergent properties), sepsis recognition meant learning about the individual patient, where a patient was considered to have a disease which might manifest in a unique and unpredictable manner. Clinical problems were comprehended via learning from the patient's evolving and dynamic state, paying attention to unique and adaptive responses to interventions. Nurses used the information of patient responses and symptom progression as supplemental knowledge to construct and reconstruct their understanding of patient problems.
Conclusions: Our findings suggest that sepsis education, as we know it, in which sepsis is taught to be recognised by the application of standardised sepsis criteria, irrespective of clinical context, may be of limited value. We suggest that learning about sepsis criteria remains a valuable starting point but no longer the only one. Rather, optimising sepsis education towards learning to apply them in a personalised manner is more relevant, with understanding whether the sepsis criteria apply to the individual patient at all and, if so, how it should be integrated into a clinical decision. Considering the characteristics of the clinical contexts, such as the availability of data can help guide an appropriate approach to sepsis recognition.

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Topic: Nursing care and physiotherapy

000963

Italian ICU, UK clinical pharmacy skills: a frontline report on integration

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Introduction: The positive role of critical care pharmacists in the Intensive Care Unit (ICU) Multiprofessional Team (MPT) on improving patient outcomes such as mortality, ICU length of stay, and incidence of preventable adverse drug events (ADE) has been well evidenced (1,2,3). Building on the recent European momentum to expand the clinical pharmacy role in ICU MPTs, the ICU team at the Azienda Ospedaliera Ordine Mauriziano di Torino expressed interest in evaluating the feasibility and potential impacts of a new clinical pharmacy service in ICU.
Objectives: To explore the potential contributions of care an UK specialist ICU clinical pharmacist can make in an Italian ICU.
Methods: A UK trained and specialist critical care pharmacist joined the ICU team as an observer for 5 working days. The pharmacist attended the daily ward/board rounds, recorded clinical activities, and possible areas for pharmacy contributions in a Microsoft Excel spreadsheet. In addition, a short narrative summary of each patient encounter was collected in Microsoft Word. Specific data were collected for 5 clinical topics, which are key performance indicators for the host ICU. Contributions were graded using the Adapted Severity Rating by Bates et al.; contributions that targeted improvements in the safety of the care provided were recorded as "Safety" interventions. Grading was verified by two independent UK ICU pharmacists.
Results: Data for 22 patient encounters were recorded, of which 10 were for patients newly admitted into the unit. Overall, 408 prescription items were reviewed by the visiting pharmacist, 200 of which were for newly prescribed items. Some 200 prescription items were screened for possible ADEs, with 2 identified and prevented. Overall, 48 interactions (consults or communications) with medical and nursing teams were recorded, 14 interactions with Nurses (7 consults, 7 Communications) and 34 with doctors (21 Consults, 13 Communications). A total of 49 contributions were recorded, 39 low severity rating (79.6%), 8 Moderate (16.3%) and 2 Severe (4.1%); in addition to these 42 Safety contributions were recorded. An additional 6 major interventions around medicines related clinical guidance and standard operating procedures (SOPs) were identified during the data collection period; 3 with Severe safety rating and 3 with Moderate.

Conclusions: This observational experience demonstrates that introducing a clinical pharmacy service led by an advanced pharmacist with specialist critical care expertise into a "naïve" ICU setting could yield significant benefits. The pharmacist's participation in daily clinical rounds led to valuable contributions, particularly in preventing ADEs, ensuring patient safety, and sparked protocol and SOPs review processes. Further research with larger sample sizes and a prolonged service period is needed to fully assess the scope, long-term impact on ICU outcomes and acceptability into the Italian healthcare system.

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Topic: Health services research and outcome

000964

Use of isofluorane for sedation and relaxation in clinical tetanus: case report

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***964***

Introduction: Tetanus is a rare and fatal condition if airway and neuromuscular relaxation are not properly managed. Current therapies show little change in the clinical course of the disease and management requires opioid medications and neuromuscular relaxants that can have deleterious effects.
Methods: Clinical case report: A 77-year-old female patient with chronic kidney disease who had no history of tetanus vaccination. She presented with a lower limb injury caused by a sharp metal object. During the 7 days following the event, she began to present nuchal and masseter rigidity, sardonic laughter and finally dancers' feet and opisthotonos, and was diagnosed with severe clinical tetanus with acute respiratory failure requiring invasive mechanical ventilation and sedation with isoflurane on arrival at the ICU. During his clinical stay, it was observed by means of brain function monitoring and electromyography with SedLine that after administration of isoflurane he maintained adequate sedation and coupling to mechanical ventilation, as well as adequate neuromuscular relaxation, without the need to use opiates or neuromuscular relaxants.
Results: No changes in blood chemistry or elevation of creatine phosphokinase were observed. The patient was considered to have a benign course of disease with complete resolution, no further sedation or relaxation was required and adequate rehabilitation was achieved. There are few cases in the literature on the use of inhaled sedation in tetanus, however, the current evidence shows that isoflurane used in different settings is an opioid and neuromuscular relaxant sparing agent.
Conclusions: Isoflurane could represent a supportive measure in tetanus patients in order to reduce the use of opioids and neuromuscular relaxants as it provides an adequate state of sedation-analgesia and relaxation, helping to avoid the complications associated with these drugs. Consent to publish had been obtained.



Fig. 2 (abstract 000964) **A** Brain function monitoring and electromyography (EMG) with SedLine under isoflurane sedation (EMG at 0%). **B** Monitoring of brain function and electromyography with SedLine without sedation (EMG at 39%)

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Topic: Sedation, analgesia and delirium

000967

Evaluation of the impact of statin therapy intensity on the risk of delirium in critically ill patients admitted to medical ICUs: a multicenter, retrospective cohort study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:967***

Introduction: Statins have well-established pleiotropic effects by interrupting delirium pathogenesis through their anti-inflammatory, immunomodulatory, and antithrombotic properties. The existing literature presents conflicting findings regarding the potential effects of statins on critically ill patients with delirium. It is still unknown whether the pleiotropic properties of statins and their influence on delirium are influenced by their lipophilicity, dose, agent-specific, or statin intensity. Therefore, this study aims to assess the impact of statin therapy intensity on the risk of delirium in critically ill patients.
Methods: This multicenter, retrospective cohort study evaluated critically ill patients. All adult patients aged 18 who received statin therapy were admitted to the Intensive Care Unit (ICU). Patients were categorized into high-intensity vs. low-moderate intensity groups. The primary endpoint was the delirium occurrence during ICU stays. The secondary endpoints were delirium recurrence, delirium-free days (DFD) within 60 days, mortality (30-day and in hospital), hospital and ICU length of stay. Propensity score (PS) match procedure (SAS Cary, NC) at (1:1 ratio) was used. Multivariable logistic regression was used to determine the adjusted *p* value and odds ratio for outcomes.
Results: After PS matching, a total sample of 1054 patients were included: 527 patients in each statin group. The odds of delirium were numerically higher in the high-intensity group but not significantly different between the two groups (OR: 1.10, 95% CI 0.774,1.571, $P = 0.5886$). In contrast, the odds of delirium recurrence were lower in the high-intensity statin group (OR: 0.92, 95% CI 0.44,1.94, $P = 0.84$). Moreover, there was no statistically significant difference between the two groups' DFDs, mortality, and ICU length of stays. However, the length of hospital stay in high-intensity statin was significantly shorter than low-intermediate group (beta coefficient: -0.12, 95% CI (– 0.23, -0.01), $P = 0.04$).
Conclusions: The use of high-intensity statin in medical ICU patients was not associated with a lower risk of delirium as compared to low-moderate-intensity statin. Delirium risk may be a factor to consider with additional indications of statin when choosing the intensity of statin used in patients admitted to the ICU. However, to confirm that further studies are required to explore various hypotheses and deepen the understanding of this correlation.

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Topic: Sedation, analgesia and delirium

000968

The effect of endovascular treatment of vasospasm on the outcomes of subarachnoid hemorrhage patients with delayed cerebral ischemia

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:968***

Introduction: Delayed cerebral ischemia (DCI) occurs in 20-30% of patients after subarachnoid hemorrhage (SAH) and is one of the most modifiable factors associated with poor outcome in this population. However, few data are available on the optimal treatment in this context.
Objectives: The aim of this study was to assess if endovascular treatment of cerebral vasospasm was associated with less development of cerebral infarction and better neurological outcome than no endovascular therapy
Methods: This is an international multicentre (n = 20) retrospective study including the last 20-25 adult patients with aneurysmal SAH who developed DCI per center (2022-2023). Patients who received endovascular therapy (e.g. intra-arterial vasodilators and/or angioplasty) were compared with those not receiving such therapy. The primary outcome was the development of DCI-related cerebral infarction, as reported by local investigators. Secondary outcome was the occurrence of unfavourable neurological outcome at 3 months, assessed by a modified Rankin scale 3-6.
Results: A total of 444 patients were included, of which 249 (56.1%) received endovascular treatment for cerebral vasospasm. The mean age was 56 (± 12) years and 311 (70.0%) patients were female. The median admission World federation of neurological surgeons score (WFNS) was 4 (2-5). Aneurysms were most commonly localized in the anterior communicating artery (155/444, 34.9%) followed by the middle cerebral artery (104/444, 23.4%). Most aneurysms were secured by coiling (342/444, 77.0%). A total of 275 patients (61.9%) developed DCI-related cerebral infarction and 205 experienced unfavourable neurological outcome. Patients who underwent endovascular therapy had higher WFNS scores on admission, received less nimodipine prophylaxis and underwent induced hypertension more frequently than others. The occurrence of DCI-related cerebral infarction and unfavourable neurological outcome was similar between groups. In a multivariate logistic regression, endovascular therapy was not independently associated with DCI–cerebral infarction (OR 0.83 95% CI 0.55-1.27), when adjusted for age, pupillary light reflex, WFNS,

rebleeding during aneurysm securement, intracranial hypertension, pneumonia, septic shock, stress cardiomyopathy, nimodipine prophylaxis and induced hypertension Similarly, endovascular therapy was not associated with unfavorable neurological outcome (adjusted OR 0.97 95% CI 0.61–1.52).
Conclusions: In this cohort study of SAH patients with DCI, endovascular therapy was not associated with less cerebral infarction and better neurological outcome than other interventions.

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Topic: Neurointensive care

000970

Microcirculatory deterioration is alleviated with plasma resuscitation in a rat model of poly trauma and hemorrhagic shock

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Intensive Care Medicine Experimental 2025 **13(Suppl 1):*970***

Introduction: In the last several decades, the importance of deranged microcirculation in the development of organ failure in shock has gained prominence (1). Early plasma transfusion is one of the well-established approaches to treating bleeding caused by trauma (2); however, its effect on microcirculation is unknown. Here, we hypothesize that plasma transfusion effectively mitigates microcirculatory disturbances, as well as having a beneficial effect on correcting systemic hemodynamics after traumatic hemorrhagic shock.
Objectives: Determining the effectiveness of plasma resuscitation on the muscle microcirculation in a rat model of poly trauma and hemorrhagic shock.
Methods: Under deep anesthesia and mechanical ventilation ($n = 30$), traumatic injury was induced by clamping the gut and liver, and inflicting a femur fracture. Shock was induced with arterial blood withdrawal and kept at a mean arterial pressure of 40 mmHg for 1 h. Trauma groups were resuscitated with either crystalloid (TC) or rat plasma (TP) for 2 h. The right biceps brachii muscles were exposed and used for microcirculatory measurement by a handheld vital microscope (HVM, Cytocam, Braedius Med. The Netherlands) and tissue laser-Doppler (O2C, LEA Medizintechnik, Germany), in 6 h. Each time point (T0-T6), total vessel density (TVD), functional capillary density (FCD), tissue red blood cell perfusion (tRBCp) were measured by HVM and microvascular red blood cell velocity (mRBCv), and capillary blood flow (CBF) by O2C.
Results: Plasma resuscitation increased the MAP and HR at T3 and T4 compared to trauma + crystalloid ($p < 0.05$). Lactate increased dramatically in both trauma groups at T1 compared to the sham ($p < 0.05$) (Table 1). Trauma led to a significant reduction in TVD and mRBVc in comparison to the sham ($p < 0.05$). Plasma resuscitation improved TVD, FCD, tRBCp, and mRBCv compared to the trauma group resuscitated with crystalloid ($p < 0.05$) (Fig. 1-2).

Table 1 (abstract 970) Hemodynamic parameters; data are represented as mean (SEM). *($p < 0.05$), *($p < 0.001$) vs. sham. + ($p < 0.05$), + + ($p < 0.01$) vs. trauma + crystalloid**

MAP (mmHg)	T0	T1	T2	T3	T6
Sham	87,3 (6,4)	79,5 (3.2)	102,1 (3,8)	87,7 (4.4)	70,3 (3,6)
Trauma + Crystalloid	89,9 (8,2)	39,6 (1) *	57,7 (2,2)	58,8 (2,4)	55,4 (7,9)
Trauma + Plasma	79,1 (3,5)	41,0 (0,7) *	66,3 (1,3)	66,6 (2,1) + +	45,4 (3)
HR (BPM)	T0	T1	T2	T3	T6
Sham	215 (6,7)	247 (13,1)	270 (19,1)	291 (16,7)	325 (12,9)
Trauma + Crystalloid	225 (14,1)	236 (16,3)	255 (10,6)	253 (8,5)	269 (9,1)
Trauma + Plasma	237 (6,4)	210 (9,2)	263 (8,2)	287 (8,7) +	280 (6,3)
Lactate (mmol/L)	T0	T1	T2	T3	T6
Sham	0,8 (0,1)	1,6 (0,1)	1,9 (0,1)	1,8 (0,2)	1,1 (0,1)
Trauma + Crystalloid	0,8 (0,1)	3,8 (0,2) ***	2,5 (0,2)**	2,4 (0,3)	2,7 (0,6) *
Trauma + Plasma	1,0 (0,1)	3,8 (0,2) ***	3,1 (0,1) ***	2,7 (0,2) ***	3,9 (0,5) ***

Conclusions: Our study has shown that plasma resuscitation has beneficial effects on the microcirculatory convection (tRBCp, mRBCv) and diffusion (TVD, FCD, tRBCp) parameters in a rat model of poly-trauma and hemorrhagic shock. Further studies are required to ascertain the fundamental mechanisms of plasma and microcirculation interaction.

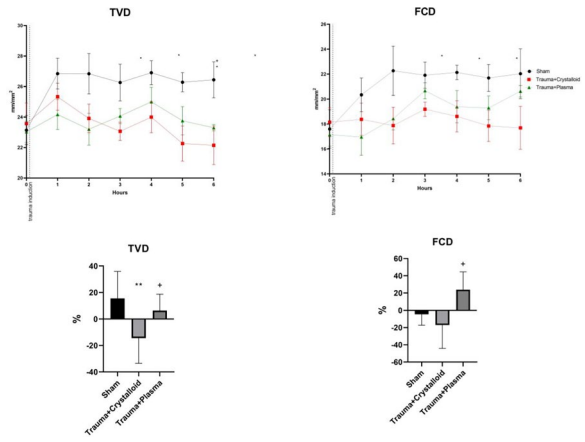


Fig. 1 (abstract 000970) The alteration of microcirculatory convection parameters. Data are represented as mean and SEM. *($p < 0.05$), **($p < 0.01$) vs. sham; + ($p < 0.05$) vs. trauma + crystalloid

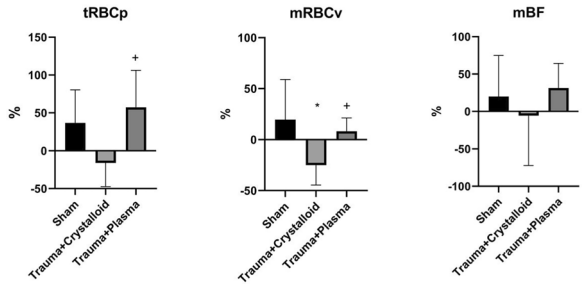


Fig. 2 (abstract 000970) The percentage change of microcirculatory perfusion parameters from BL to T6. Data are represented as mean and SEM *($p < 0.05$), **($p < 0.01$) vs. sham; + ($p < 0.05$) vs. trauma + crystalloid

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Topic: Trauma

000971

Bloodstream infections (BSIs) in ICU patients: preliminary results from the Bact.GR 2024 National Point Prevalence Study in Greek ICUs

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:971***

Introduction: Bloodstream (CBSI) is a frequent healthcare-associated infection in Greek ICUs that merits systematic surveillance.
Objectives: A (second) national Point Prevalence Study (Bact.GR 2024) was conducted to describe the current epidemiology of BSIs in Greek ICUs and delineate necessary and targeted infection control measures at a national level.
Methods: Prospective, observational 2-month PPS between November and December 2024. All ICU-acquired BSIs in patients with a central venous catheter (CVC) in place were included. Definitions were according to CDC-NHSN and ECDC criteria. Demographic and clinical patients' characteristics along with ICU-level data were collected. Results are reported as means ± SD or median values as appropriate.
Results: 43 adult and 6 pediatric ICUs in 47 hospitals participated and 312 patients were included (67% males, 8% pediatric patients). Most ICUs (85%) were mixed-polyvalent. Mean patient age was 63.18 (± 15.13). Reasons for ICU admission were mainly medical (55%), surgical (29%) and trauma (17%). Mean APACHE II and SOFA scores on ICU admission were 20 ± 7.01 and 8.9 ± 3.1, respectively. Septic shock and mechanical ventilation were recorded in 41% (19% for pediatric patients) and 84% (48% for pediatric patients) of the cases. The overall ICU mortality was 39%. The central line was inserted in internal jugular, femoral and subclavian sites in 58%, 26% and 15% of the cases, respectively, while PICC was present in 1.4% of the cases. 27930 patient-days and 26587 catheter-days were analyzed (pooled central line utilization ratio 0.95) and 367 BSIs were recorded. 263/367 BSIs (72%, 9.89/1.000 catheter-days) were primary bacteremias and characterized as CLABSIs and 104/367 cases (28%, 3.91/1000 CVC-days) were secondary BSIs (primary site of infection was the lung 40%, the abdomen 23%, the urinary tract 14%, trauma 15%). Seventy-three out of 263 primary BSIs (28%, 2.74/1000 catheter-days) were considered Catheter-Related BSIs (CR-BSIs) as compared to 4.7/1000 catheter-days reported in the first national PPS conducted in 2012 in Greek ICUs (statistical analysis is actually in progress).
Conclusions: BSIs represent an important burden in the ICU setting in Greece. CR-BSIs tend to decline compared to historical cohorts. Secondary BSIs derive mainly from the lung and the abdomen. Evidence-based preventive bundles should be promptly implemented to prevent further ventilator-associated pneumonia and CR-BSI cases in critically ill patients.

Reference

1. None

Topic: Infections and prevention

000972

Use of vibroacoustic therapy in geriatric patients with respiratory pathology after orthopedic surgery on the lower extremities: a retrospective analysis

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*972

Introduction: Respiratory pathology ranks third in geriatric patients among the causes of an unfavorable outcome [1]. Given that the average duration is steadily increasing, the management of this category of patients with diseases of the respiratory system requires an integrated approach [2]. Early physiotherapy with the use of vibro-acoustic chest massage can prevent the development of pulmonary complications, especially in patients with limited activity after orthopedic surgery on the lower extremities. Previously, vibroacoustic therapy has demonstrated positive results in patients with coronavirus infection complicated by acute respiratory failure [3].
Objectives: To evaluate the effect of gases in arterial blood (PaO2, PaCO2), cough and shortness of breath when using vibroacoustic therapy in geriatric patients with various respiratory pathologies based on retrospective data.
Methods: The study was approved by the National Scientific Center of Traumatology and Orthopaedics named after N.Batpenov in Astana on 19.11.2024. A retrospective analysis of $n = 71$ medical records of patients who were observed after orthopedic surgery on the lower extremities in the intensive care unit was performed. The inclusion criteria were patients aged 65 to 85 years with verified respiratory pathology. Exclusion criteria for patients who were on a ventilator and in critical condition. All patients received a course of VAT 4 times a day for 5 min for 3 days. The study included patients with COPD ($n = 50$), post-COVID syndrome ($n = 5$), community-acquired pneumonia ($n = 16$). Descriptive statistics were performed using SPSS Statistics version 23.
Results: As a result, the following statistically significant data were obtained. The greatest effectiveness was demonstrated in patients with COPD mean PaO2 value was increased by 10.8 mmHg, median by 8.4 mmHg, 95% CI ± 9.3 mmHg, SD 17.6 mmHg on the third day after application. The largest decrease in PaCO2 was in the same group on the third day after the session: mean 7.7 mmHg, median at 6.8 mmHg 95% CI ± 8.1 mmHg, SD 9.2 mmHg. A reduction in dyspnea and cough was noted in 89% of patients.
Conclusions: Thus, vibroacoustic therapy can be a useful component in the treatment of geriatric patients with respiratory pathology after orthopedic surgery on the lower extremities. The method has shown an advantage in patients with COPD. The data obtained confirm the expediency of using vibroacoustic therapy in this category of patients.

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Topic: Nursing care and physiotherapy

000975

Sepsis induces redistribution of cholesterol from plasma to erythrocyte membranes

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*975

Introduction: Sepsis is characterised by both hypocholesterolaemia [1] and by dysfunctional erythrocytes[2]. Underlying mechanisms; however, remain poorly understood. Erythrocyte membrane cholesterol (EMC) content is known to modulate the membrane's mechanical properties, such as deformability, fluidity and oxygen diffusion [3-5]. EMC levels are also heavily influenced by plasma cholesterol levels [3].
Objectives: To investigate cholesterol levels in plasma and erythrocyte membranes in septic patients and healthy volunteers and the relationship to erythrocyte osmotic fragility.
Methods: Blood samples were collected from healthy volunteers and from septic patients on ICU days 1-2. The erythrocyte membrane was isolated by ultracentrifugation [6] and non-esterified cholesterol (the only cholesterol constituent in erythrocytes) measured by an Amplex Red enzymatic assay. Non-esterified and esterified cholesterol levels in plasma were also measured by Amplex Red (± esterase). An osmotic fragility test was performed by incubating erythrocytes in a series of hypotonic NaCl concentrations with haemolysis quantified by optical density measurement of the supernatant at 538 nm. Statistics were performed using unpaired Student´s t-tests with significance established at $p < 0.05$.
Results: Compared to healthy controls, septic patients showed a significant increase in EMC levels despite a fall in total plasma cholesterol (Table 1). Notably, plasma non-esterified cholesterol rose but the esterified fraction fell by 63%. Osmotic fragility was decreased in erythrocytes from septic patients compared to healthy controls (example shown in Fig. 1).

Table 1 (abstract 975) Cholesterol concentration in plasma and erythrocyte membrane from septic patients taken on day 1–2 after ICU admission ($n = 5$) and healthy controls ($n = 12$)

	Erythrocyte membrane cholesterol (μg/10^8 cells)	Plasma total cholesterol (μg/mL)	Plasma non-esterified cholesterol (μg/mL)	Plasma cholesterol ester (μg/mL)
Healthy controls	49 ± 8	1560 ± 304	305 ± 52	1254 ± 302
Septic patients	80 ± 19	911 ± 282	443 ± 135	468 ± 344
P value	0.0003	0.0012	0.0091	0.0004

Conclusions: Our findings indicate that decreased cholesterol esterification may explain the well-recognised fall in plasma cholesterol seen during sepsis, since esterified cholesterol (mainly contained within HDL and LDL) is the main fraction of circulating cholesterol. The increase in erythrocyte membrane cholesterol points to a redistribution of non-esterified cholesterol to the red blood cell membrane. The reduced osmotic fragility of erythrocytes in sepsis suggests changes in membrane properties, which may be related to the increase in membrane cholesterol. Further studies are needed to confirm whether higher membrane cholesterol levels seen during sepsis directly affects red blood cell functionality, (e.g. deformability and oxygen carriage/release).

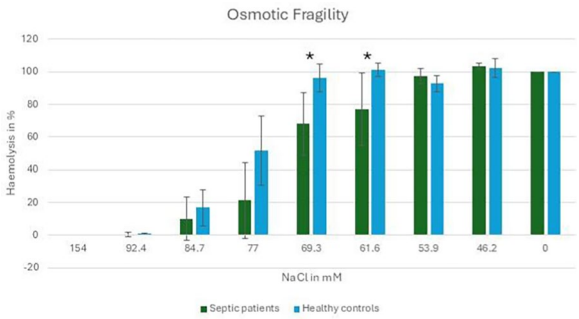


Fig. 1 (abstract 000975) Osmotic fragility of erythrocytes from healthy controls ($n = 6$) and septic patients taken on day 1-2 after ICU admission ($n = 5$); *$p < 0.05$

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7. Departmental funds
8 IZKF Graduate Program Experimental Medicine

Topic: Sepsis

000977

Impact of cardiovascular disease comorbidity defined using different data sources on ICU outcomes

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Intensive Care Medicine Experimental 2025* 13(Suppl 1):*977

Introduction: Approximately 25% of adults admitted to intensive care units (ICUs) have pre-existing cardiovascular disease (CVD). (1,2) Although acute CVD is a strong predictor for mortality in ICU (3), the effect of pre-existing CVD on critical care outcomes is unknown. Moreover, defining CVD as a comorbidity varies in research and depends on the data sources available. Linked primary care data are often challenging to obtain. (4)
Objectives: This study aimed to define pre-existing CVD using data-driven methods to best identify patients at highest risk of mortality. We hypothesised that different data sources for CVD identification would impact ICU outcomes differently.
Methods: This was a retrospective cohort study using Scotland's national ICU, hospital and primary care prescribing (PIS) databases, and the population included all ICU admissions from 01/01/2010 to 31/12/2022 aged 18 or older. We used three definitions of CVD based on three different data sources: APACHE II severe CVD comorbidity definition (5) (ICU data), selected ICD10 codes (hospital data) (6,7) and selected CVD medications (PIS data). (8) We excluded hypertension from both hospital and PIS data to enhance the models' discrimination of ICU outcomes. The primary outcome was 60-day mortality, and secondary outcomes included: ICU mortality, hospital mortality, 30-day mortality and ICU length of stay. Associations with outcomes were estimated using binary logistic regression and used to calculate unadjusted and adjusted (by age, sex, deprivation, ethnicity, comorbidity) odds ratios between the different definitions of CVD (Fig. 1).

Results: The cohort included 144,515 patients. CVD amongst the ICU patients had the highest prevalence when hospital data was used (53.5%) and lowest when the APACHE II CVD definition was used (2.5%). The prevalence of CVD identified in any of the three data sources was 61.25%. The percentage agreement of people identified as having CVD in both hospital and prescribing data was 47% (Fig. 2). The overall 60-day mortality in the ICU cohort was 19.4%. The 60-day mortality increased with increasing severity of CVD, ranging from 14.9% for patients with no CVD to 32.5% for patients with Apache II defined CVD. Adjusting for age, sex, deprivation and non-CVD comorbidities, the OR for mortality was highest when ICU-defined CVD was used (1.92, 95%CI 1.78–2.07, $p < 0.001$) followed by hospital data-defined CVD (OR 1.24, 95%CI 1.20–1.28, $P < 0.001$). There was no association between PIS defined CVD and 60-day mortality (0.99, 95%CI 0.94-1.03, $p = 0.539$, Fig. 3).
Conclusions: Our study shows a much higher pre-existing CVD prevalence in ICU compared to previous research. Using the APACHE II definition of CVD comorbidity identifies only a small number of patients. Where primary care data is not available, using previous hospital admissions for CVD excluding hypertension will identify ICU patients with CVD at higher risk of mortality.

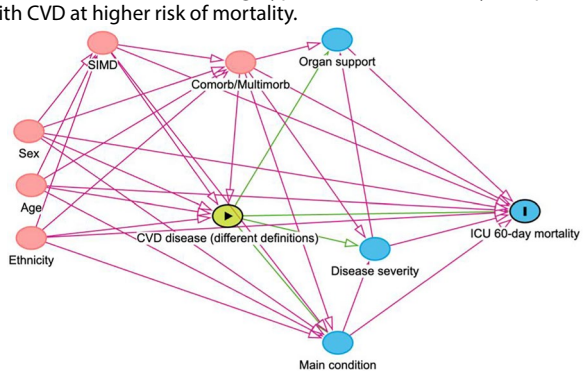


Fig. 1 (abstract 000977) Directed acyclic graph (DAG) identifying the minimal sufficient adjustment set for estimating the total effect of CVD disease (different definitions) on ICU 60-day mortality: age, comorbidities, ethnicity, Scottish Index of Multiple Deprivation (SIMD) and sex

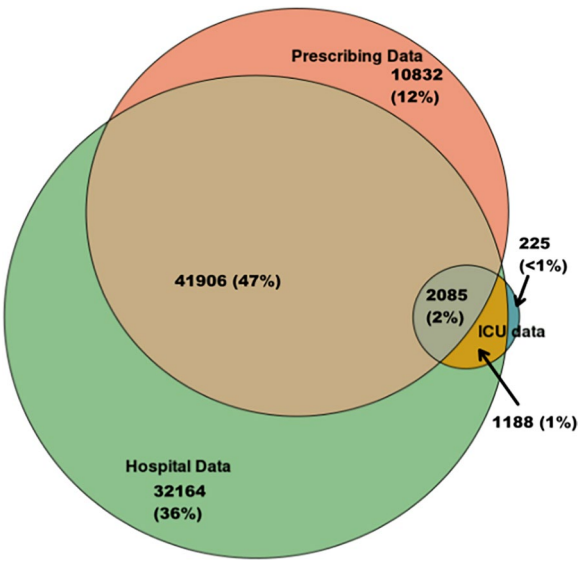


Fig. 2 (abstract 000977) Concordance between the different data sources to define CVD. Pink represents people identified from prescribing data, green represents people with CVD derived from hospital data (ICD-10 codes), and the small circle (blue) represents the people

diagnosed with severe CVD derived from ICU data. (Denominator = all patients with CVD: 88521 patients)

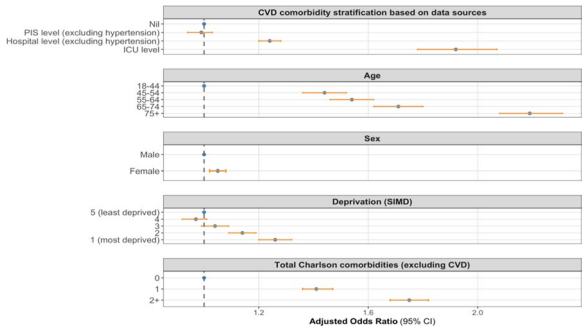


Fig. 3 (abstract 000977) Forest plot of multivariable associations with 60-day mortality. SIMD: Scottish Index of Multiple Deprivation; CI: confidence interval

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Topic:Information systems and data science

000978

Whole-blood transcriptomic response varies over time in septic patients and is influenced by infection site

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***978***

Introduction: Sepsis is a heterogeneous life-threatening condition related to the dysregulated immune response to an infectious hit with different molecular transcriptomic patterns. However, their temporal variation and the influence of the sepsis source remains poorly understood.
Objectives: This study aims at assessing the influence of both infectious site and time from sepsis onset on the whole-blood transcriptomic profiles of circulating cells is severe sepsis patients admitted in intensive care unit (ICU).
Methods: We analyzed transcriptomic data of peripheral blood leukocytes from healthy individuals (HV) and from severe septic shock patients at two time points (day 1-3 and day 5-7) after ICU admission. We compare the expression level of genes between both timepoints and infectious site (pulmonary, abdominal, urinary tract and skin and soft tissue). We also performed unsupervised analysis between conditions and timepoints using principal component analysis. Patients and HV were part of the REALISM study (NCT02638779). Statistical analyses were performed using R.
Results: 30 HV and 60 septic patients were included in this study. Infectious sites were distributed as follow: 30 (50%) pulmonary, 18 (30%) abdominal, 7 (12%) skin and soft tissue and 5 (8%) complicated urinary tract infection and soft tissue skin infection ($n = 7$, 11.6%). The median age of septic patients was 67.5 [Q1:59.00–Q3:78.00] years old, the median SOFA score at day 1 was 9 [Q1:6.75–Q3:11.0] and 5 patients (8.3%) died at day 28. We have observed a specific transcriptomic signature in septic patients compared to healthy donors, mostly due to an increase in the expression of genes related to neutrophil activation, regardless of the time point or infection site. The amount of differentially expressed genes between different infectious sites were low and non-discriminating. We observed that the evolution of the transcriptome leading to patient recovery is not the same for patients depending on the infection site.
Conclusions: This study allows us to show that the transcriptomic profile of septic patients is distinct from that of healthy donors, without transcriptomic molecular signature specific to infection sites in blood. We identified dynamic transcriptomic molecular signature associated with differences in mortality.

Topic: Sepsis

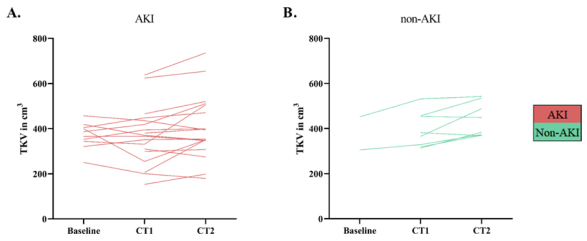
000979

Automated segmentation of CT scans successfully quantifies changes in kidney volume in ICU patients

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***979***

Introduction: ICU admissions are frequently complicated by acute kidney injury (AKI) (1). Kidney volume is associated with kidney function. Fluid overload is an independent risk factor for AKI and can increase kidney volume (2-4). In contrast, chronic kidney disease (CKD) is associated with decreased kidney volume (5). AKI can progress into CKD (6). Both increases and decreases in kidney volume can be associated with AKI, creating a U-shaped association. Therefore, anthropometric features, such as total kidney volume (TKV), could play a role in evaluating and/or predicting the risk of AKI and its potential progression. Automated segmentation can provide an objective technique to assess multiple anthropometric features (7).
Objectives: This study aims to validate automated segmentation as a tool for measuring TKV and to analyse the association between (changes in) TKV using CT imaging with automated segmentation and AKI incidence and/or severity in patients acutely admitted to the ICU.
Methods: This retrospective pilot cohort study was part of the HEALICS, which focuses on associations between characteristics of patients acutely admitted to the ICU and the severity of diseases (8). In this study, patients were included when at least two abdominal CT scans (CT1 and CT2) were performed during ICU admission. In addition, baseline abdominal CT scans up to one year before hospital admission were included. TKV was measured by automated segmentation using DAFS (version 3.11.0, Voronoi Analytics Incorporated, Vancouver,

Canada). ΔTKV was calculated between baseline CT and CT1 (ΔTKVCT1-baseline) and CT1 and CT2 (ΔTKVCT2-CT1). AKI was defined following the KDIGO guidelines (9). Primary outcomes were AKI incidence and severity on the day of scanning related to TKV. The Mann–Whitney *U* test and Kruskal–Wallis *H* test were applied appropriately.
Results: Twenty-six patients were included, of whom 18 developed AKI during ICU admission. Manual correction of the automated segmentations was needed in 22% (left) and 23% (right) of the kidney segmentations. No significant differences in kidney volume were found before and after manual correction. Median TKV during ICU admission was 377 cm3 (IQR 330—461). TKV did not correlate with AKI incidence or severity on the day of scanning. Longitudinal intraindividual changes in TKV were observed, as seen in Fig. 1. Median ΔTKVCT1-baseline was 12 cm^3 (-35—37), while the median ΔTKVCT2-CT1 was 27 cm^3 (-4—78). Median ΔTKVCT1 baseline proved statistically significantly different for AKI versus non-AKI patients (-22 cm3 (-49—9) versus 42 cm3 (23—43), P = 0.03) on the day of scanning and also among the different KDIGO groups. No differences in ΔTKVCT2-CT1 were found.
Conclusions: This study is the first to successfully demonstrate the possibility of measuring TKV in ICU patients using automated segmentation software. Changes in TKV were observed, however, no clear association between TKV and the incidence or severity of AKI was found.



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Topic: Imaging in intensive care

000981

Cerebrospinal fluid to blood sCD14-ST (presepsin) ratio as a biomarker for early diagnosis of health-care associated ventriculitis/meningitis

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Intensive Care Medicine Experimental 2025 **13(Suppl 1)*:981***

Introduction: Health care-associated meningitis/ventriculitis (HAVM) is often difficult to diagnose in the ICU setting and is associated with adverse outcomes, longer duration of hospital stay and increased costs [1]. New biomarkers are needed for early diagnosis and prompt treatment initiation [2].
Presepsin is the residue of CD14 protein, anchored on the macrophage's membrane which binds to bacterial cell wall lipopolysaccharide. Presepsin has been measured in blood and cerebrospinal fluid to identify infections [3].
Objectives: We aimed to investigate the diagnostic performance of cerebrospinal fluid (CSF) presepsin levels and its ratio to the corresponding blood concentration in neurosurgical ICU patients with fever, in order to explore its potential as an early indicator of bacterial CNS infection.
Methods: Neurosurgical patients (including patients with traumatic brain injury, intracranial and subarachnoid hemorrhage, acute brain injury needing drainage catheter insertion) admitted in a tertiary ICU in Central Greece were included. Cerebrospinal fluid was collected for CSF infection evaluation. Laboratory examinations included blood and CSF measurements of leukocytes, glucose, lactate, culture and presepsin [PATHFAST technology (PHC Europe, LSI Medience, Tokyo, Japan)]. CSF/blood presepsin ratio was calculated. Definite diagnosis of meningitis/ventriculitis was established by a positive CSF culture.
Results: Fifty patients were included, 14 with confirmed CSF infection and 36 without. Patients with a CNS infection presented a significantly higher number of CSF WBC [93 (5, 80000) vs 5 (0, 342)/μL, $p = 0.005$], lower CSF glucose levels [27 (0, 84) vs 83 (18, 157) mg/dl, $p < 0.0001$] and CSF/blood glucose ratio [0.20 (0, 0.75) vs 0.65 (0.17, 0.98), $p < 0.0001$], higher CSF protein [430 (89, 1084) vs 52.5 (11, 656) mg/dl, $p < 0.0001$] and lactate [4.2 (1.4, 15) vs 2.5 (0.1, 6.6) mmol/lt, $p = 0.003$]. CSF presepsin levels were significantly higher in the infection group [1762 (361, 3000) vs 227 (18.5, 6913) pg/ml, $p < 0.0001$] while the corresponding blood levels did not differ [733.5 (191, 1980) vs 588.5 (119, 13988) pg/ml, $p = 0.713$]. CSF/blood presepsin level ratio was significantly higher in the CNS infection group [1.59 (1.26, 15) vs 0.46 (0.03, 2.88), $p < 0.0001$]. CSF/blood presepsin ratio was the test with the highest accuracy in identifying a CNS infection [cut-off 1.24, sensitivity 100% specificity 94%, AUC 0.944 95%CI (0.838-1.000, p < 0.0001)], followed by CSF to blood glucose ratio with an AUC 0.887, CI (0.767-1.000), cut-off 0.47, sensitivity 86%, specificity 83%,(p < 0.0001) while CSF presepsin levels presented a cut-off value of 1198 pg/ml, sensitivity 78% specificity 75%, AUC 0.847 95%CI (0.693-1.000), $p = 0.005$.
Conclusions: CSF/blood presepsin ratio seems to accurately predict HAVM in neurosurgical patients and it could be used as an adjunct tool for early diagnosis. Certainly, larger studies are needed to support these findings.

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a new biomarker for postneurosurgical and nosocomial central nervous system infections: A systematic review and meta-analysis of diagnostic test accuracy studies. Clin Neurol Neurosurg 2025;249: 108,767.

Topic: Neurointensive care

000982

Tracheostomized patients undergoing decannulation training: a low-volume and high-resource use population

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***982***

Introduction: Advances in intensive care have increased survival rates, leading to a growing population of chronically critically ill patients. While no longer in acute organ failure, many develop chronic organ dysfunctions that overwhelm routine ward care, resulting in delayed discharge from Intensive Care Units (UCI). In our hospital, these patients tend to remain for prolonged periods on our level 2 Intermediate Care Unit (Level 2 ICU), many of whom have a tracheostomy. Attempts are made to identify those able to be decannulated early in the IntCU as there is a low number of rehabilitation beds and personnel in the general ward of our institution for routine attempts at decannulation.
Objectives: This study aimed to quantify the resource utilization of patients undergoing decannulation training in a level 2 Intermediate Care Unit (Level 2 ICU) in Portugal and to identify predictors of decannulation success.
Methods: We conducted a retrospective cohort study of tracheostomized patients admitted to a level 2 intermediate care unit in Portugal from 2022 to 2024. Inclusion criteria were the presence of a tracheostomy and eligibility for decannulation. Patients without potential for decannulation—due to irreversible neurological impairment or chronic ventilator dependency—were excluded. To evaluate the potential for earlier transfer to a level 1 medical or surgical ward, we retrospectively applied a set of predefined clinical criteria to determine when each patient would have been eligible for transfer. These included: $\geq$ 48 h without vasopressor support, $\geq$ 48 h without mechanical ventilation, Glasgow Coma Scale $\geq$ 9, and the absence of continuous IV infusions requiring level 2 ICU care.
Results: Among 1967 level 2 ICU patients, only 57 (2.8%) were tracheostomized and 43 (2.1%) met inclusion criteria. These 43 patients accounted for 1220 ICU-days, representing 13.5% of total occupancy. Their mean length of stay was 28.3 $\pm$ 18 days relative to 4.6 $\pm$ 3,6 days for non-tracheostomized patients. Only 22/43 (51.1%) were ultimately decannulated: 12 in the level 2 UCI, 8 on the ward, and 2 at a rehabilitation center after hospital discharge. Amongst non-decannulated patients, 3 died in the intermediate care unit, 15 died on the wards, 2 remained tracheostomized post-hospital discharge, and 1 returned to their country of origin with no follow-up data available. Retrospective application of a clinical discharge rule showed that 810 days (66%) of level 2 ICU care were potentially avoidable if adequate support was provided on the level 1 wards. Successful decannulation was associated with younger age (50 vs. 63 years, $p = 0.008$) and lower SOFA scores at level 2 ICU admission (2.5 vs. 4.2, $p = 0.03$). No significant associations were found with sex or pre-tracheostomy duration of intubation
Conclusions: Tracheostomized patients in decannulation training represent a significant care burden for intermediate care units that may not be clinically indicated. In this retrospective cohort, only half of patients achieved decannulation despite a high investment of time and resources. Structural investments in ward-based decannulation teams or chronic critical illness units could reduce ICU length of stay and improve patient flow.

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Topic: Acute respiratory failure and mechanical ventilation

000983

Effect of different phenotypes of reverse triggering on prognosis in critically ill patients based on a real-time monitoring platform

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***983***

Introduction: Reverse triggering (RT) is a complex form of asynchrony with different phenotypes and their clinical implications are underexplored. This study aimed at determining the incidence of RT in ICU patients with long-term monitoring platform, characterizing the phenotype's impacts on mechanical ventilation and identifying risk factors associated with the poor outcome.
Methods: Patients with mechanical ventilation under the remote-ventilate view system for at least 24 h in ICU were included. We investigated two phenotypes of RT (with and without breath stacking) according to the ventilator waveforms and their effects on pulmonary ventilation through the respiratory mechanics monitoring. We also screened out the risk factors associated with prolonged mechanical ventilation in RT.
Results: One hundred and ninety-five patients (22.4%) occurred RT under the unified definition of the RT frequency and 80 patients had RT with breath stacking. RT with breath stacking was associated with greater tidal volume [447 (418, 495) vs. 406 (359, 445) ml, $P < 0.001$], higher minute ventilation [7.0 (6.2, 7.8) vs. 6.5 (5.7, 7,2) L/min, $P = 0.004$], plateau pressure [15.4 (14.3, 17.0) vs. 13.7 (11.3, 14.9) cmH_2O, $P < 0.001$] and driving pressure (DP) [8.5 (7.5, 10.0) vs. 7.0 (5.8, 8.8) cmH_2O, $P < 0.001$]. RT with breath stacking had a longer duration of IMV [7 (3, 15) vs. 4 (2, 7), $p = 0.007$] and a shorter number of VFD-28 [20 (6, 25) vs. 24 (21, 26), $p = 0.004$]. RT with breath stacking (OR, 1.959; 95% CI, 1.053-4.025), higher APACHE II score (OR, 1.078; 95% CI, 1.011-1.149), lower oxygenation index (OR, 0.993; 95% CI, 0.098-0.997), more fentanyl infusion (OR, 1.034; 95% CI, 1.000-1.062) and higher DP (OR, 1.386; 95% CI, 1.125-1.708) were potential risk factors for prolonged mechanical ventilation. There was no difference in hospital mortality between the two phenotypes.
Conclusions: Long-term monitoring-based RT incidence and characteristics of different phenotypes provide more comprehensive information for epidemiological investigations. The poor outcome of RT seems to display the breath stacking, higher APACHE II and DP, worse oxygenation index and more fentanyl infusion.

Topic: Acute respiratory failure and mechanical ventilation

000984

A case of severe septic shock and septic cardiomyopathy caused by *Pseudomonas aeruginosa* pneumonia, which was managed with V-A ECMO and Impella®

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***984***

Introduction: *Pseudomonas aeruginosa* is often implicated in severe, community-acquired pneumonia, which can rapidly worsen and often leads to death. Thus, it is essential to make a differential diagnosis accurately and administer the appropriate treatment.
Methods: We report a case of a young adult patient in whom Pseudomonas aeruginosa pneumonia which developed after coronavirus disease 2019 (COVID-19) onset progressed to septic shock and septic cardiomyopathy. The patient was successfully managed with V-A ECMO and Impella®.
Results: A previously healthy man in his 20's presented to the hospital after a persistent, wet cough developed following COVID-19 onset one month earlier. Two days before his current presentation, he began coughing up blood, then experienced chest pain and dyspnea, which prompted an emergency transfer to a previous hospital. Upon arrival, his vital signs were blood pressure 70/- mmHg, heart rate 120 bpm, respiratory rate 40/min, SpO2 96% on oxygen 6 LPM and temperature 39.0 °C. Pneumonia was diagnosed, and the patient was intubated. However, despite intubation, his P/F ratio remained around 80, and shock persisted. He was therefore transferred to our hospital for further management. Upon arrival, intensive treatment, including broad-spectrum antibiotic therapy, was begun. However, his circulatory status continued to deteriorate. Despite administration of norepinephrine 1.0 μg / kg / min and vasopressin 2.0 units/hour, his mean arterial pressure remained around 50 mmHg. His cardiac function markedly decreased, with the left ventricular ejection fraction (LVEF) being approximately 10%. His lactate level remained elevated at 8.1 mmol/L, indicating septic shock and septic cardiomyopathy. Given the severity of his condition, V-A ECMO was introduced. However, his cardiac function and left ventricular dilation continued to worsen. To unload the left ventricle, an ImpellaCP® heart pump was placed. Thereafter, his circulatory dynamics stabilized. After antibiotic therapy brought the infection under control, the vasopressors were tapered, and his cardiac function improved. On day 4, he was weaned off V-A ECMO. On the same day, Pseudomonas aeruginosa was isolated from a sputum culture. On day 5, Impella® was removed, and on day 9, the patient was extubated. The patient regained his ability to walk without assistance and was discharged on day 49.
Conclusions: The present case demonstrates that the combination of V-A ECMO and Impella® can be life-saving in patients with septic shock and septic cardiomyopathy caused by severe Pseudomonas aeruginosa pneumonia. The timely recognition of immune suppression following COVID-19 onset played a crucial role in choosing an appropriate antibiotic. Even in young, healthy adults, it is important to consider the patient's medical history and underlying conditions carefully before choosing a treatment for severe, community-acquired pneumonia. Consent to publish had been obtained.

Topic: Sepsis

000985

How liver transplantation alters the ACLF trajectory: a retrospective comparison between transplanted and non-transplanted patients

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Introduction: Acute-on-chronic liver failure (ACLF) is a clinical syndrome defined as an acute decompensation of chronic liver disease, associated with organ failure and high short-term mortality. The most common precipitating factors include bacterial infections, alcoholic hepatitis and gastrointestinal bleeding.1,3 In 35-40% of patients, no clear precipitating factor can be identified.4 Therapeutic options are limited to organ support; liver transplantation (LT) is the only definitive treatment and has shown substantial survival benefits in ACLF.
Objectives: We aimed to compare clinical characteristics and outcomes of ACLF patients who underwent LT versus those managed without transplant in a specialized ICU.
Methods: A retrospective cohort study was conducted on 42 patients diagnosed with ACLF admitted to a liver transplant centre affiliated intensive care unit (ICU) over three years (2019, 2022, and 2023). Baseline demographics, cirrhosis etiology, precipitating ACLF causes, organ support requirements, and severity scores (MELD-Na and CLIF-C ACLF score) were collected. Patients were grouped by whether they received LT during hospitalization. Descriptive statistics were presented as mean ± SD or percentages. Group comparisons used t tests or Mann–Whitney U for continuous variables and chi-square/Fisher's exact tests for categorical variables. Correlation analysis (Pearson's r) examined relationships between clinical variables. Survival was analyzed by Kaplan–Meier curves (log-rank test) for ICU, hospital, and 1-year outcomes.
Results: Of the 42 patients (mean age 58.9 ± 9.4 years; 81.0% male), 64.3% had alcohol-related cirrhosis, 9.5% due to chronic infection by hepatotropic viruses, 9.5% cryptogenic, 7.1% autoimmune, 2.4% primary biliary cholangitis, and 2.4% sarcoidosis. Common ACLF precipitants were gastrointestinal bleeding (42.3%) and infection (33.3%), with 19% no clear precipitant identified. Sixteen patients (38.1%) underwent LT, and 26 (61.9%) did not. Transplant vs. non-transplant groups had similar baseline age (54.7 vs 61.6 years, $p = 0.02$) and gender (25% vs 15% female, $p = 0.44$) distributions, and comparable severity scores (MELD-Na 28.6 vs 27.3, $p = 0.61$; CLIF-C 58.0 vs 58.5, $p = 0.94$). LT patients required less invasive mechanical ventilation (62.5% vs 84.6%) and renal replacement therapy (43.8% vs 65.4%) than non-LT patients, although these differences did not reach statistical significance ($p > 0.10$). Confirmed infections during ICU stay were more frequent in the LT group (68.8% vs 38.5%, $p = 0.11$), who received a mean of 7.8 ± 3.0 days of antibiotic coverage before transplant. On average, transplantation occurred on the 18th day of hospitalization. Survival outcomes were markedly better with LT: ICU survival was 87.5% with LT vs 46.2% without LT ($p = 0.01$), hospital survival 75.0% vs 34.6% ($p = 0.03$), and 1-year survival 62.5% vs 23.1% ($p = 0.02$).
Conclusions: This study includes two groups of ACLF patients with comparable epidemiology and severity. In this cohort, liver transplantation dramatically improved survival across short-term and 1-year timeframes, supporting liver transplantation as a life-saving therapy for selected ACLF patients.

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Topic: Metabolism, endocrinology, liver failure and nutrition

000986

Lactate-driven natural killer cell dysfunction shapes immune dysregulation in sepsis

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***986***

Introduction: Sepsis is a life-threatening condition marked by organ dysfunction due to an uncontrolled immune response to infection, with septic shock carrying a high mortality rate [1, 2]. Immune suppression, especially NK cell depletion, contributes significantly to sepsis-related mortality [3]. Elevated lactate levels, indicative of impaired tissue microcirculation, are a key prognostic marker in septic shock [4]. Lactate not only functions as an epigenetic modifier but also disrupts immune cell function, including effector T cells and macrophages, in sepsis [5, 6]. While the effects of lactate on NK cells have been studied in cancer, its impact during sepsis remains underexplored.
Objectives: In this study, we aimed to elucidate the effects of lactate on NK cell quantity and function in patients with sepsis, exploring the underlying mechanisms to enhance understanding of sepsis pathophysiology and inform potential therapeutic approaches.
Methods: We enrolled 36 patients with sepsis admitted to the ICU. Lymphocyte counts, NK cell frequency, and the expression of activation and inhibitory markers were assessed.
Results: In sepsis, peripheral blood NK cells, including CD11b + and CD16 + subsets, are significantly reduced(Fig. 1A-C). Sepsis also leads to dysfunctional NK cell receptor expression, with decreased NKG2D, NKG2C, and CD226, and increased inhibitory receptors like TIGIT, PD-1, and NKp44 (Fig. 1D-K). Elevated lactate levels further decrease NK cell numbers (Fig. 2A-C). Lactate induces a dose-dependent increase in NK cell apoptosis, with almost complete depletion at concentrations above 20 mmol/L (Fig. 2A-C). Inhibition of lactate transport via AZD3965 reduces NK apoptosis in septic serum, suggesting a potential therapeutic approach to mitigate NK cell death (Fig. 2D, E).
Conclusions: In conclusion,sepsis induces a significant reduction in NK cell numbers and dysfunction in their activation, contributing to increased susceptibility to secondary infections. Elevated lactate levels exacerbate NK cell depletion, and targeting lactate transport may offer a potential therapeutic strategy to mitigate immune dysfunction in sepsis.

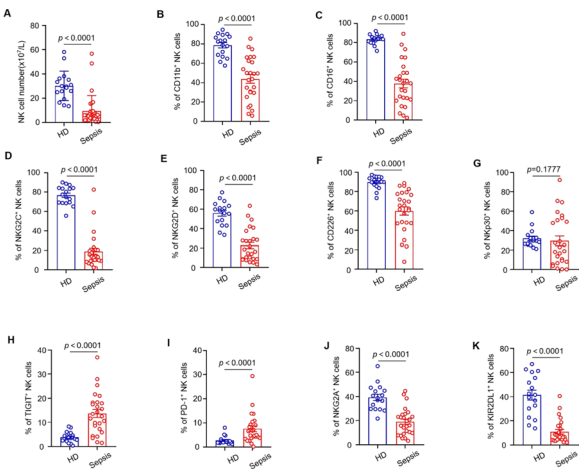


Fig. 1 (abstract 000986) Decreased Peripheral Blood NK Cell Count and Dysregulated NK Cell Receptor Expression in Sepsis

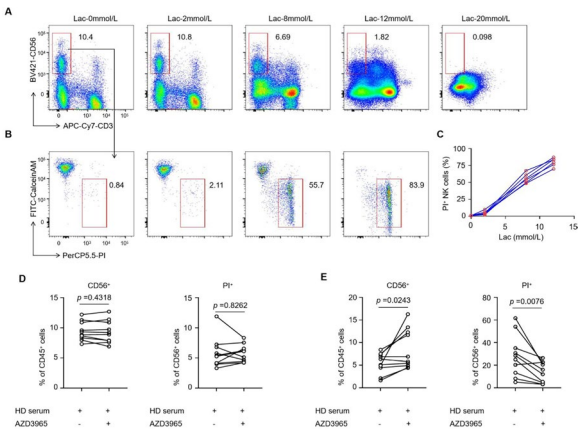


Fig. 2 (abstract 000986) Lactate-Induced Peripheral NK Cell Death and the Protective Effect of Reduced Lactate Transport on NK Cell Survival

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Topic: Sepsis

000988

Neutrophil ORAI1 calcium channel protects against acute respiratory distress syndrome via NFATC2-CD166 axis and liposome-targeted therapy

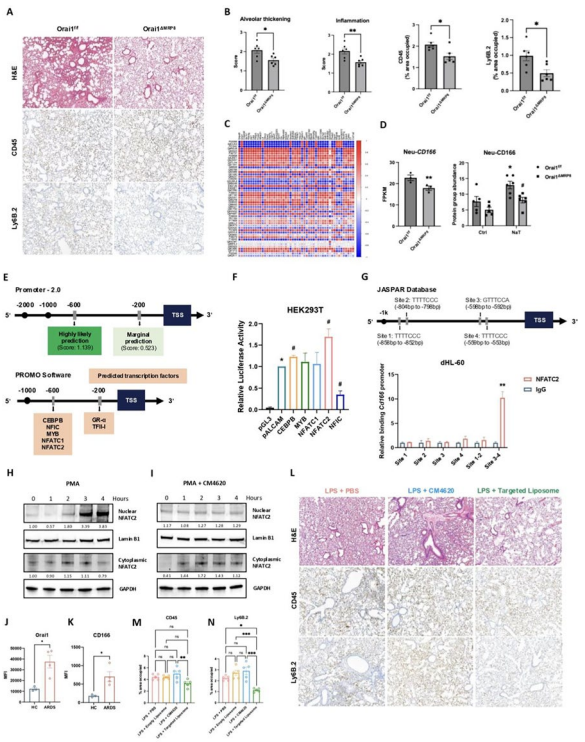
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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***988***

Introduction: Acute respiratory distress syndrome (ARDS) is a life-threatening respiratory syndrome driven in large part by dysregulated neutrophil activation. Activated leukocyte adhesion molecule (CD166) is a transmembrane glycoproteinwhose deficiency mitigates LPS-induced acute lung injury (ALI). We previously showed neutrophil-specific Orai1 deletion ameliorated both acute pancreatitis (AP)-associated and LPS-induced ALI, yet the underlying mechanisms remain unclear. This study aims to investigate how Orai1 deletion affects neutrophil function, and to explore the therapeutic potential of targeting neutrophil Orai1 for treating ALI triggered by systemic inflammation response.

Methods: Neutrophil-specific Orai1-depleted mice were generated by crossing MRP8-Cre mice with Orai1f/f mice. ALI was induced by LPS or sodium taurocholate-triggered AP 24 h before sacrifice. Lung neutrophils and macrophages were sorted via flow cytometry for bulk RNA-seq, and for single-cell proteomic profiling using ultrahigh-sensitivity mass spectrometry with advanced nanoliter-scale oil-air-droplet chips. Integrated transcriptome-proteome correlation analysis was performed. Candidate transcription factors (TFs) and promoter motifs were predicted using PROMO and Promoter-2.0 programs, with TF-promoter binding analyzed via AlphaFold and JASPAR. Neutrophil-like cells (dHL-60), murine bone marrow-derived neutrophils and human polymorphonuclear neutrophils (PMNs) were used for functional assays. Anti-Ly6G-modified liposomes loaded with the Orai1 inhibitor (CM-4620) were designed to target neutrophils and downregulate Orai1 in vivo.

Results: Orai1ΔMRP8 mice exhibited significantly reduced neutrophil infiltration and ameliorated lung injury in both AP and sepsis models compared to littermate controls. Transcriptomic analysis of differentially expressed genes revealed that neutrophil-specific Orai1 deletion is strongly associated with cell motility, while proteomic analysis showed that differentially expressed proteins are significantly enriched in pathways related to cell adhesion. Integrated transcriptome-proteome analysis revealed that Orai1 deletion selectively downregulated CD166 expression in neutrophils ($r = 0.95$). This effect, however, was not observed in alveolar or interstitial macrophages. Five potential TFs were predicted, with NFATC1 and NFATC2 demonstrating the highest binding confidence. Luciferase reporter assay confirmed that NFATC2 effectively activated CD166 transcription, and ChIP-qPCR verified direct binding of NFATC2 to the CD166 promoter between the -598 bp and -553 bp regions. Orai1 inhibition sustained NFATC2 nuclear translocation, whereas NFATC2 knockdown reduced CD166 expression. In addition, both Orai1 and CD166 expression were significantly elevated in PMNs from patients with ARDS, and single-cell RNA-seq of bronchoalveolar lavage fluid (BALF) from ARDS patients revealed that Orai1, NFATC2, and CD166 are markedly elevated in BALF-derived neutrophils. Liposomes targeting neutrophil Orai1 demonstrated good biocompatibility and promising targeting efficiency upon both intranasal and intravenous administration, significantly reducing pulmonary neutrophil infiltration and ameliorating both AP-associated and LPS-induced ALI.

Conclusions: Neutrophil-specific Orai1 deletion ameliorates ALI via the NFATC2-CD166 axis, highlighting liposomes targeting neutrophil Orai1 as a promising therapeutic strategy.



(A) Representative images of lung tissue stained with H&E and IHC for CD45 and Ly6B.2, illustrating LPS-ALI in Orai1f/f and Orai1ΔMRP8 mice. **(B)** Scores for H&E histological assessment and quantitative analysis of the percentage of IHC-positive cells. **(C)** Integrated Pearson's correlation analysis plot showing the correlation between transcriptomics and proteomics data. **(D)** Relative expression levels of CD166 derived from transcriptomic and proteomic data. **(E)** Prediction of promoter regions and associated transcription factors using Promoter 2.0 and PROMO software. **(F)** Luciferase reporter assay demonstrating that NFATC2 enhances *CD166* promoter transcriptional activity. **(G)** Chromatin immunoprecipitation (ChIP) detecting the enrichment of NFATC2 around the CD166 promoter. The immunoprecipitated DNA was analyzed by RT-qPCR using specific primers targeting predicted binding sites identified from the JASPAR database. Anti-IgG antibody was used as a negative control. **(H) (I)** Immunoblotting analysis of NFATC2 localization in dHL-60 cells. Cells were stimulated with PMA for 1-4 h, with or without CM4620 pretreatment for 30 min. Subcellular fractionation was performed to separately analyze nuclear and cytoplasmic fractions. **(J) (K)** Flow cytometry analysis of Orai1 and CD166 expression in polymorphonuclear neutrophils from HC and ARDS patients. **(L)**Representative images of lung tissue stained with H&E and IHC for CD45 and Ly6B.2, illustrating LPS-ALI in C57BL6/J mice. **(M) (N)** Quantitative analysis of the percentage of IHC-positive cells.

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Topic: Sepsis

000990

A prospective randomized blinded controlled study on the efficacy of propofol–fentanyl versus ketamine–dexmedetomidine sedation in patients with severe traumatic brain injury admitted in trauma intensive care

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Introduction: Sedation in traumatic brain injury patients is essential not only for comfort and ventilator synchrony but also to reduce intracranial pressure and optimise cerebral oxygen consumption. Propofol and opioids like fentanyl are frequently used agents, though their side effects—such as respiratory depression, hemodynamic instability, and opioid withdrawal—can complicate care. Alternatives like dexmedetomidine, which offers sedation with minimal respiratory suppression, and ketamine, known for hemodynamic stability, are increasingly considered in neurocritical settings due to their favourable pharmacologic profiles.1,2,3
Objectives: This study evaluates the efficacy and safety of an opioid-free sedation regimen using ketamine–dexmedetomidin (Group KD) compared to the standard propofol–fentanyl combination (Group PO) in adults patients with severe TBI. The goal is to identify a sedation strategy that ensures effective sedation and analgesia while reducing the opioid-related side effect burden. The primary objective was to find out the "percentage of time spent in goal Richmond Agitation Sedation (RASS) score, i.e., RASS score of -3 to -4" in two groups.
Methods: This study is a single-blinded, prospective randomized controlled trial conducted in trauma ICU of Level 1 Trauma centre. 52 adult patients of severe traumatic brain injury were enrolled into the study (26 in each group). Ketamine and dexmedetomidine combination was given as sedation in Group KD and propofol and fentanyl in Group PO. Sedation was initiated and titrated to achieve a target RASS score of -3 to -4, checked every 15 min initially and hourly thereafter for 48 h. ONSD and TCD were checked at baseline then every 6 hourly for 48 h. Hemodynamic alterations, VAP, withdrawal symptoms, decrease in serum cortisol level at end of 48 h, FOUR score, any neuroworsening during ICU stay and GOSE at 90 days were noted.
Results: Baseline characteristics were comparable between the two groups. Target RASS was maintained in both groups for similar duration (45.27 h vs 45.62 h, p = 0.106) but was achieved a little early in Group PO (40.38 min vs 36.92 min, p 0.095). Group KD demonstrated a significantly higher reduction in serum cortisol compared to Group PO ($p < 0.0001$) pointing towards better control of stress response. Incidence of bradycardia (p0.235) and hypotension requiring noradrenaline support (p = 0.116) was higher in Group KD though statistically not significant. Group PO was found to have statistically significant higher incidence of withdrawal symptoms ($p = 0.001$) and constipation (0.017). No significant difference was observed in the incidence of ventilator-associated pneumonia. Neuroworsening occurred in 2 patients in Group KD and 1 patient in Group PO. FOUR score at ICU discharge ranged from 8 to 16 and was comparable across groups (p > 0.05). GOSE at 90 days had a similar distribution with majority of patient having good outcome with GOSE of > 5 ($p = 1$).
Conclusions: Ketamine–dexmedetomidine sedation for conservative management of severe TBI patients is as effective as the more practiced propofol–fentanyl sedation while avoiding the significant side effects of opioid use. This study highlights nonopioid drug combinations as a promising alternative for regular analgo-sedative in management of TBI patients.

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Topic: Sedation, analgesia and delirium

000993

Comparative effectiveness of renal transplantation from controlled donation after circulatory death with normothermic regional perfusion versus donation after brain death (cDCD-NRP vs. DBD)

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:993***

Introduction: Over the past decade, kidney transplantation has faced increasing challenges. This has led to a significant expansion of donation after circulatory death (DCD), particularly controlled DCD (cDCD), also known as Maastricht category III donors. In many regions, cDCD now constitutes a substantial portion of deceased donor kidney transplants. However, cDCD is associated with inherent limitations, notably prolonged warm ischemia time (WIT), which can lead to ischemia–reperfusion injury and delayed graft function (DGF). To mitigate these risks, in situ preservation techniques such as abdominal normothermic regional perfusion (NRP) with extracorporeal membrane oxygenation (ECMO) have been developed. NRP aims to restore warm, oxygenated blood flow to abdominal organs after the determination of death, following the withdrawal of life-sustaining treatments (WLST) and before organ recovery. The objective of this study is to compare the effectiveness of kidney transplantation from cDCD and brain death donors (DBD) and to demonstrate that the outcomes between these two techniques are comparable.
Objectives: Comparative analysis of kidney transplant effectiveness between two populations under 75 years old: donors from controlled donation after circulatory death (cDCD) versus brain death donors (DBD)
Methods: A single-center retroprospective observational cohort study conducted between 2020 and 2024, aiming to compare the effectiveness of kidney transplantation from donors under 75 years of age: controlled donation after circulatory death (cDCD) versus brain death donors (DBD). Quantitative variables are presented as medians and interquartile ranges (IQR, p25-p75), and were compared using the Mann–Whitney *U* test. Qualitative variables are expressed as frequencies and percentages (n, %) and were analyzed using the Chi-square test (χ^2 test)
Results: Between 2020 and 2024, a total of 64 potential kidney donors under 75 years of age were evaluated: 44 were controlled donation after circulatory death donors (cDCD, 68.8%) and 20 were brain death donors (DBD, 31.2%). Among cDCD donors, 61.3% were male, compared to 45% in the DBD group ($p = 0.04$). The median age was similar between groups: 61 years (IQR 56.2-67.2) in cDCD vs. 57.5 years (IQR 49.5-67) in DBD ($p = 0.54$). Median ICU stay was longer in cDCD donors (3 vs. 2 days; $p = 0.03$). Smoking history (current or former) was comparable: 45% in cDCD vs. 50% in DBD ($p = 0.82$). Hypertension was more frequent in the DBD group (55% vs. 34%; $p = 0.04$). Dyslipidemia rates were similar (29.5% in cDCD vs. 25% in DBD; $p = 0.76$), as were diabetes rates (9% vs. 10%; $p = 0.25$). Charlson Comorbidity Index was 0 in both groups ($p = 0.38$). Donation effectiveness was slightly higher in cDCD donors (84%) as compared to DBD donors (80%), but the difference was not statistically significant ($p = 0.46$)

Conclusions: Based on our findings and in line with the current medical evidence, kidney transplantation outcomes from controlled donation after circulatory death with normothermic regional perfusion (cDCD-NRP) are comparable to those from brain death donors (DBD) in individuals under 75 years of age. No statistically significant differences were observed in donation effectiveness between the two groups (84% cDCD-NRP vs. 80% DBD; $p = 0.84$), supporting the clinical equivalence of both donation modalities. The higher prevalence of hypertension observed in the DBD group ($p = 0.04$) may reflect a greater burden of chronic comorbidities typically associated with the pathophysiological mechanisms of brain death. In contrast, the slightly longer ICU stay in cDCD-NRP donors ($p = 0.03$) appears consistent with the procedural and logistical aspects inherent to this type of donation. These findings reinforce the role of cDCD-NRP as a safe and effective alternative to DBD, helping to expand the donor pool without compromising the success of kidney transplantation

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Topic: Brain death, organ donation and transplantation

000998

Noninvasive ventilation for the mnagement of acute respiratory failure in the prehospital setting:a study of an EMS report

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:998***

Introduction: Noninvasive ventilation (NIV) has become a key therapeutic approach in the management of acute respiratory failure (ARF). It encompasses all ventilatory assistance techniques that partially or fully support respiratory effort, ensuring adequate alveolar ventilation.
Objectives: This study aims to evaluate the use of NIV in the prehospital setting with its two modes (BiPAP and CPAP), identify factors associated with success or failure, and characterize the clinical progression of patients managed by the Emergency Medical Services (EMS) in the Central-Eastern region of Tunisia.
Methods: This retrospective study was conducted over one year (January 1 to December 31, 2023), including 263 adult patients who received NIV (BiPAP or CPAP) during prehospital intervention. The data were collected from the online "SI SAMU" records.
Results: The results show a predominance of primary-secondary missions (64.9%), with heterogeneous distribution among the involved SMUR teams. The study population was predominantly male (69.2%) and elderly (68.1 ± 10.8 years), with multiple comorbidities, including hypertension (52.1%), diabetes (41.8%), and chronic obstructive pulmonary disease (COPD) (37.3%). Analysis of clinical parameters revealed a significant improvement in oxygen saturation (from 80.6 ± 13.6% to 92.3 ± 9.5%) and respiratory rate after NIV initiation (from 30.6 ± 6.7 to 26 ± 6.3), confirming the efficacy of this technique in managing acute respiratory failure. The main indications for NIV were acute pulmonary edema (APE) and COPD exacerbations, in line with the international guidelines. The overall success rate of NIV was satisfactory (72.6%), with a positive correlation between therapeutic success and the etiology of ARF (APE). Patients with APE showed the best outcomes, followed by those with COPD. Multivariate analysis identified a history of chronic respiratory failure as the only independent factor associated with NIV success in the prehospital setting.
Conclusions: This study confirms the value of NIV in the prehospital management of acute respiratory failure. However, prospective, multicenter studies are needed to better assess the long-term impact of this approach and identify predictive factors of success.

Topic: Acute respiratory failure and mechanical ventilation

001000

The interplay between flow rate and respiratory rate during high-flow nasal cannula therapy: a computational study

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**)***:1000***

Introduction: High-flow nasal cannula (HFNC) therapy enhances oxygenation and reduces respiratory effort in patients with Acute Hypoxemic Respiratory Failure (AHRF). Its benefits stem mainly from improved CO_2 clearance from anatomical dead space and the delivery of a flow-dependent positive airway pressure.
Objectives: This study aimed to use a detailed model of the anatomical dead space to simulate washout dynamics during HFNC therapy, quantifying clearance efficiency and characterising gas mixing under varying HFNC flow and respiratory rates (RR). Simulation outcomes were validated against in vivo and in vitro studies.
Methods: The ICSM simulator (schematic in Fig. 1) was employed to simulate dead space gas clearance in six healthy subjects [1] across a range of HFNC flow rates and RRs. The anatomical dead space was modelled as a 150 ml volume [2], represented by 50 stacked laminae, each with a volume of 3 ml (Vl_a = 3 ml). HFNC clearance was assumed to occur at the end of exhalation and the start of inhalation [3], [4]. The number of layers cleared of CO_2 by HFNC was calculated as:
Nwashed_layers = (HFNC flow rate × time slice) / Vlam (1)
Gas mixing between fresh HFNC-delivered gas and residual expired gas in the dead space was defined by:
fnew_SD,j,x = ω × finspired,x + (1 -ω) × fold_SD,j,x, for j < Nwashed_layers (2)
where fSD,j,x is the fraction of gas x in lamina j and ω = 0.8 is the mixing factor determining the proportion of gas mixing during washout.
In addition, a gas mixing module [5] was employed with a mixing parameter (σ = 0.1) based on the clearance half-time reported in [6]:
fSD,j,x = (1-σ) × fSD,j,x + σ × fSD,j + 1,x for j < NSD (3)
Results: Similar to the results in [4], mean upper airway clearance increased with HFNC flow but declined with higher RRs. At a RR of 15 bpm, clearance occurred across all flow rates; at 45 bpm, it fell to 31% at 20 L/min and 61% at 60 L/min (Fig. 3B). Increasing HFNC flow rates markedly improved oxygen penetration within the dead space. Layers with > 15% O_2 rose from a mean of 19 at 20 L/min to 26 at 100 L/min (Fig. 2). Mean end-tidal CO_2 pressure at a 5 cm nasal depth fell from 35.9 mmHg to 19.6 mmHg at 30 L/min, further reducing to 10.5 mmHg at 100 L/min. Mean CO_2 pressures were consistently higher at greater nasal depths. For instance, at 60 L/min, end-tidal CO_2 pressure increased from 11 mmHg at 2 cm depth to 15.8 mmHg at 5 cm depth (Fig. 3A).
Conclusions: The findings from this simulation study indicate that higher HFNC flow rates significantly enhance oxygen delivery and facilitate more effective clearance of anatomical dead space, as evidenced by elevated O_2 fractions and reduced end-tidal CO_2 pressures. However, while higher HFNC flow rates improve upper airway clearance, elevated respiratory rates reduce this effect. These results

emphasise the necessity of optimising HFNC settings to achieve effective gas washout and simultaneously reduce patients' respiratory efforts. Future work will develop Digital Twins of AHRF patients receiving HFNC to provide detailed data on the interplay between flow and respiratory rates in acute respiratory conditions.

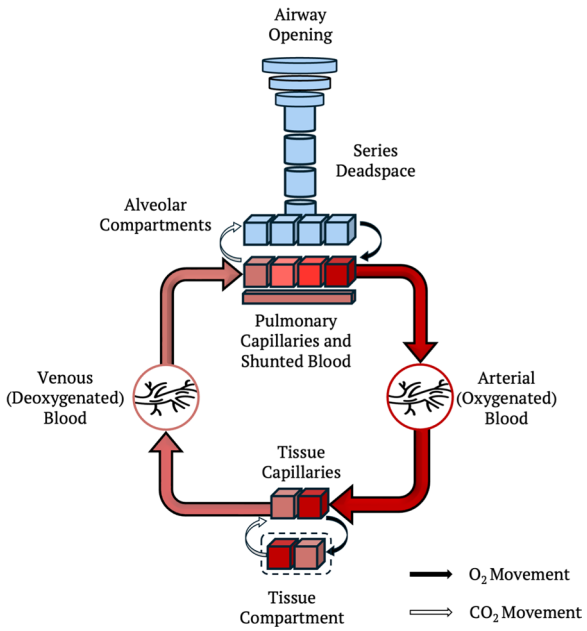


Fig. 1 (abstract 001000) Schematic of ICSM simulator

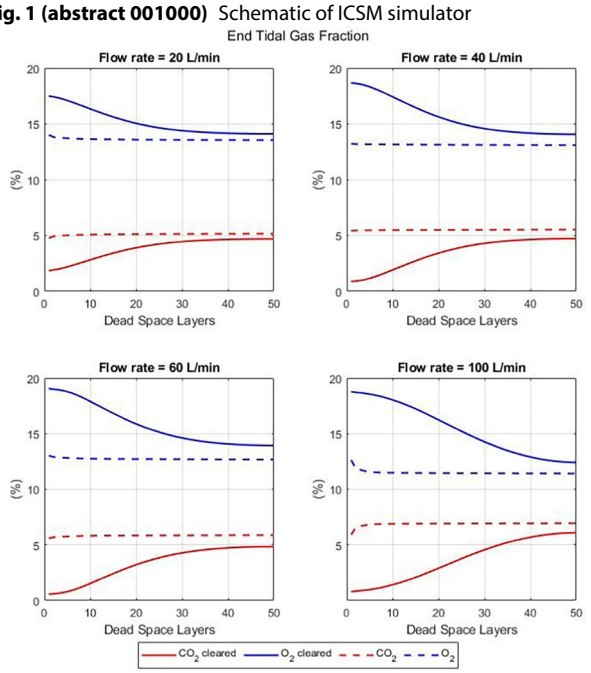


Fig. 2 (abstract 001000) End-tidal O_2 (blue) and CO_2 (red) fractions (%) at varying HFNC flow rates (RR = 15 bpm). Solid lines represent conditions with washout, and dashed lines indicate conditions without washout

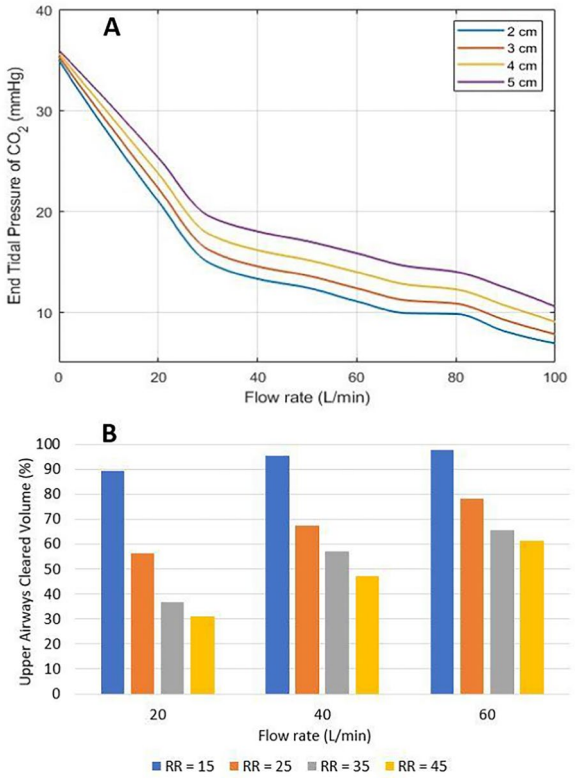


Fig. 3 (abstract 001000) End-tidal CO_2 pressure at nasal cavity depths of 2, 3, 4, and 5 cm across varying HFNC flow rates (**A**) and the percentage of upper airway cleared volume at different flow rates (**B**)

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Topic: Acute respiratory failure and mechanical ventilation

001001

Noncoding RNAs encoding small peptides are associated with sepsis development

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***1001***

Introduction: Immune dysregulation is the fundamental mechanism for the occurrence and development of sepsis [1]. To date, no diagnostic biomarker nor targeted therapeutic agent for sepsis has proven useful or effective, necessitating deeper investigation into its pathogenic mechanisms. Small peptides derived from noncoding RNAs are important regulators of anti-infection immune response [2]. However, due to the lack of a classical open reading frame for noncoding RNAs, there is still a large gap in the understanding of noncoding RNAs that can encode small peptides in sepsis [3]. Therefore, it is necessary to identify novel lncRNAs with coding ability in sepsis.
Objectives: To identify novel lncRNAs with coding potential associated with sepsis.
Methods: Peripheral blood samples were obtained from five healthy controls (HC) and ten patients with sepsis, followed by lncRNA sequencing (lncRNA-seq). Heatmap analysis was performed to compare the expression patterns of differentially expressed lncRNAs between the two groups. LncRNAs with coding potential and size between 1000 and 3000 bp were screened using the CPC2 tool (coding potential calculator 2, http://cpc2.cbi.pku.edu.cn/). The lncRNAs with coding potential was amplified using reverse transcription followed by real-time quantitative PCR (RT-qPCR) with specifically designed primers. PCR products were then separated by gel electrophoresis and subsequently sequenced to confirm the target lncRNA sequence. The diagnostic efficacy of target lncRNA in sepsis was comprehensively evaluated by group t test and area under the relative expression curve (AUC) between the two groups of population.
Results: A total of 1008 up-regulated lncRNAs and 1201 down-regulated lncRNAs were detected in the peripheral blood of sepsis patients compared with healthy controls (HC). (Fig. 1A) Then, we used CPC2, a web tool widely applied to predict the coding potential of noncoding RNA, to identify translatable lncRNA. Notably, we identify 10 lncRNAs with coding potential within the top 50 differentially expressed lncRNA. Gel electrophoresis of RT-qPCR products and sequencing confirmed the existence of the targeted lncRNAs. To evaluate the diagnostic potential of the lncRNAs for sepsis, we performed receiver operating characteristic (ROC) curve analysis. LncRNA ENST00000697493 is highly expressed in HC. The area under the curve (AUC) for [LncRNA ENST00000697493] reached 1.000. (Fig. 2A) LncRNA ENST00000701713 is highly expressed in sepsis patients. The area under the curve (AUC) for [LncRNA ENST00000701713] reached 0.920. (Fig. 2B) LncRNA ENST00000649154 is highly expressed in HC. The area under the curve (AUC) for [LncRNA ENST00000649154] reached 1.000. (Fig. 2C) LncRNA XR_005646961.1 is highly expressed in sepsis patients. The area under the curve (AUC) for [LncRNA XR_005646961.1] reached 1.000. (Fig. 2D) LncRNA ENST00000402027 is highly expressed in sepsis patients. The area under the curve (AUC) for [LncRNA ENST00000402027] reached 1.000. (Fig. 2E) LncRNA ENST00000664650 is highly expressed in sepsis patients. The area under the curve (AUC) for [LncRNA ENST00000664650] reached 0.940. (Fig. 2F) LncRNA ENST00000692968 is highly expressed in HC. The area under the curve (AUC) for [LncRNA ENST00000692968] reached 1.000. (Fig. 2G) LncRNA NR_152604.1 is highly expressed in HC. The area under the curve (AUC) for [LncRNA NR_152604.1] reached 0.960. (Fig. 2H) LncRNA ENST00000688334 is highly expressed in HC. The area under the curve (AUC) for [LncRNA ENST00000688334] reached 0.800. (Fig. 2I) LncRNA ENST00000412250 is highly expressed in sepsis patients. The area under the curve (AUC) for [LncRNA ENST00000412250] reached 1.000. (Fig. 2J).

Conclusions: This study indicated that lncRNAs with coding ability are associated with the occurrence of sepsis. These translatable lncRNAs may shed light on the underlying mechanisms of immune dysregulation, laying the foundation for further studies on the role of the small peptides they encode in the progression of sepsis.

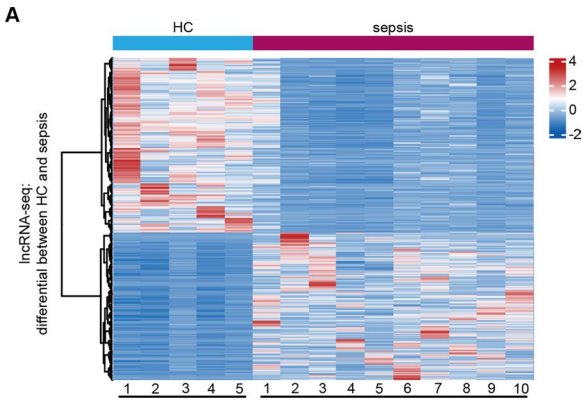


Fig. 1 (abstract 001001) lncRNAs expression in peripheral blood of five healthy controls (HC) and ten patients with sepsis

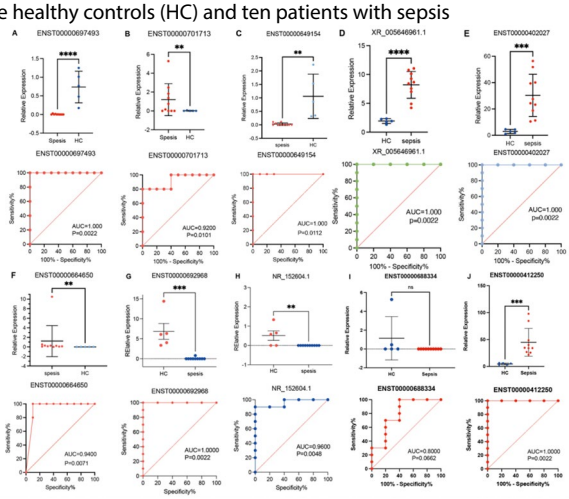


Fig. 2 (abstract 001001) Group t test and receiver operating characteristic (ROC) curve analysis of target lncRNAs. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$, ****$p < 0.00001$

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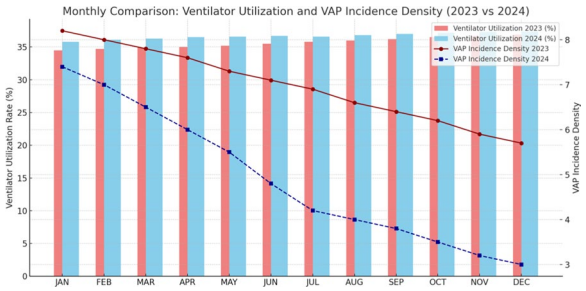
Topic: Sepsis

001002

From numbers to impact: a epidemiological assessment of VAP reduction after evidence-based protocol implementation

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***1002***

Introduction: Ventilator-associated pneumonia (VAP) is one of the most frequent and severe healthcare-associated infections in intensive care units (ICUs), with significant implications for patient morbidity, mortality, and healthcare costs. Beyond increasing the duration of mechanical ventilation (MV) and hospital stay, VAP often requires escalation of care and prolongs critical illness. Continuous monitoring and implementation of standardized prevention strategies are crucial for improving outcomes in critically ill patients.
Objectives: To evaluate the epidemiological impact of a structured, evidence-based VAP prevention protocol in a tertiary ICU by comparing VAP incidence, density, and mechanical ventilation utilization rates before and after its implementation.
Methods: This was a prospective, observational, and comparative study conducted in the ICUs of a tertiary hospital in a middle income country. All adult patients (≥ 18 years) who received invasive mechanical ventilation were included. The pre-intervention period spanned from January to May 2024, and the post-intervention period from June 2024 to March 2025. Exclusion criteria included pre-existing pneumonia, discharge or death within 48 h of intubation, or incomplete clinical data. The intervention began in June 2024 and involved a multicomponent VAP prevention protocol including: elevation of the head-of-bed (30°-45°), oral hygiene with 0.12% chlorhexidine twice daily, sedation control (RASS target 0 to − 2), cuff pressure maintenance (25-30 mmHg), daily assessment for extubation readiness, and real-time data monitoring. Data were extracted from the EPIMED clinical database, with variables including number of VAP episodes, VAP density (per 1000 MV-days), mechanical ventilation days, MV-days per patient, and ventilator utilization rate.
Results: In the preintervention phase, VAP density ranged from 7.41 to 13.20 cases per 1,000 MV days, with a mean of approximately 9.2. Following protocol implementation, VAP density declined to a range of 0.00 to 9.54, with a mean of 4.73 cases/1,000 MV days—an overall reduction of nearly 50%. Notably, no VAP cases were reported in December. The number of episodes also dropped from 28 (average 5.6/month) to 22 (average 3.1/month) post-intervention. The mechanical ventilation utilization rate remained stable (31.25% to 38.34%), confirming that VAP reduction was independent of MV exposure. The average MV duration per patient (4.8–5.6 days) showed no significant change.
Conclusions: This epidemiological study highlights the effectiveness of implementing a structured, evidence-based VAP prevention protocol in reducing VAP incidence without reducing mechanical ventilation use. The results underscore the critical role of consistent protocol adherence, staff education, and continuous data monitoring in improving patient safety in ICUs. Sustainable reductions in VAP require a coordinated multidisciplinary effort grounded in real-world epidemiological surveillance and best clinical practices.



Monthly comparison: ventilador utilization and VAP incidence density (2023 vs 2024)

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Topic: Infections and prevention

001005

Assessment of hemodynamic status based on transpulmonary thermodilution and echocardiography monitoring techniques in critically-ill children

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***1005***

Introduction: Point-of-care hemodynamic monitoring, guiding each patient's appropriate inotrope-vasoactive management, is of paramount importance, especially for critically-ill patients in pediatric intensive care units (PICUs). Conventional parameters have proven to be inaccurate and subjective, while studies on continuous cardiac output monitoring techniques have not yet led to definitive conclusions.
Objectives: The goal of the present study is to compare invasive (transpulmonary thermodilution-TPTD by pulse-index contour continuous cardiac output-PICCO) and noninvasive (echocardiography) techniques, to monitor cardiac output normalized to body surface area (cardiac index- CI) and hemodynamic status in critically ill pediatric patients.
Methods: This prospective single-center study consecutively recruited hemodynamically unstable and mechanically-ventilated critically-ill PICU patients aged < 18 years of age in an academic pediatric ICU from March 2024 to March 2025. Patients were stratified based on

vasoactive-inotropic score (VIS) (Group HU, $n = 25$). Hemodynamically stable patients (Group C, $n = 10$) served as the control group. Demographics, clinical data and outcome indices were recorded.
Results: The mean age of patients was 8 years (± 6,7 SD), 52% females, mechanical ventilation duration 9 days (IQR 5-16), and PICU LOS 14 days (8.5-18.5). The diagnoses of HU patients were sepsis/septic shock (n = 8 patients), non-cardiogenic pulmonary edema/ARDS ($n = 10$ patients), pulmonary edema due to cardiogenic shock ($n = 2$ patients), and central nervous system traumatic or nontraumatic pathology ($n = 5$). Crude mortality was 28% ($n = 7$). Pearson correlation analysis showed positive correlations between echo and TPTD cardiac output estimations (Pearson's $r = 0.774$, $p < 0.001$-Fig. 1a). Agreement between invasive and noninvasive techniques was high (Cronbach's alpha 0.867; 95% confidence intervals 0.968-0.941; $p < 0.001$). Both CO TPTD and echo measurements highly predicted mortality (AUROC CI TPTD 0.94; $p < 0.001$, AUROC CI echo 0.980; $p < 0.001$), but differed in cutoff values (CI TPTD 2.6 and CI echo 3.65 lt/min/m^2—Fig. 1b).
Conclusions: The implementation of both invasive and noninvasive advanced monitoring techniques can reliably assess the hemodynamic status and predict the outcome of critically ill pediatric patients. Invasive parameters from transpulmonary thermodilution technologies lead to objective estimations for less experienced intensivists on cardiac ultrasound.

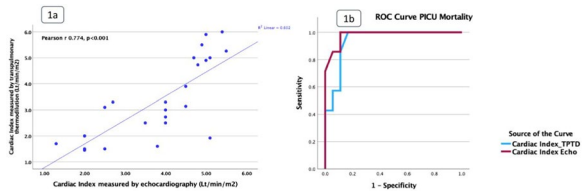


Fig. 1 (abstract 0001005) a Correlation regression cure of cardiac output measurements by echocardiography and transpulmonary thermodilution techniques. **b** Area under the curve for mortality prediction based on the invasive and noninvasive techniques

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Topic: Cardiovascular issues in ICU

001006

The silent strain on the heart: septic cardiomyopathy in the intensive care unit

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Intensive Care Medicine Experimental 2025 **13**(**Suppl 1**):***1006***

Introduction: Septic cardiomyopathy (SC) is characterized by myocardial dysfunction in patients with sepsis, leading to severe hemodynamic instability. Many uncertainties still remain regarding mechanisms, characteristics, treatment and even prognosis of this condition.
Objectives: To compare intensive care unit (ICU) mortality between patients with septic cardiomyopathy (SC) and patients without septic cardiomyopathy (controls). Also, to compare clinical, laboratory and echocardiographic characteristics of SC patients who survived (SCs) and those who did not (SCd).
Methods: Retrospective, observational, single-center study of patients admitted in ICU during 2022 and 2023 due to sepsis, with or without a diagnosis of SC. Kaplan–Meier survival analysis was performed.
Results: We included 58 SC patients (mean age 66.7 ± 15.4 years, 62.1% male) and 248 controls (mean age 65 ± 16.2 years, 61.3% male). Regarding SC patients, in-hospital mortality was 56.9%, with 55.2% of deaths occurring during ICU stay. The mean time to death was 3.5 days for SC patients and 5 days for non-SC patients. ICU mortality was significantly higher in SC patients than controls ($p = 0.01$, log rank test). Regarding SC patients, length of ICU stay was similar between survivors and non-survivors. However, infection source control was significantly better in survivors (SCs: 80% vs. SCd: 46%, $p = 0.01$). Inotrope and vasopressor doses were higher in non-survivors (peak noradrenaline dose SCd: 220 mcg/min vs. SCs: 60 mcg/min, $p < 0.001$). Organ dysfunction was similar between groups, except for KDIGO III acute renal failure, which was higher in non-survivors, though not statistically significant (SCd: 83.3% vs. SCs: 70%, $p = 0.052$). Non-survivors had higher troponin (SCs: 48 ng/L vs. SCd: 103 ng/L, $p = 0.015$) and peak lactate levels (SCd: 95 mg/dL vs. SCs: 45 mg/dL, $p = 0.05$), at ICU admission. Left ventricular ejection fraction recovery at ICU discharge was significantly higher in survivors (SCd: 10.3% vs. SCs: 93.3%, $p < 0.001$).
Conclusions: SC was linked to higher ICU mortality. Infection source control was better in SC survivors. Non-survivors had higher doses of inotropes/vasopressors and higher troponin and lactate levels, at ICU admission. Early recognition and management are crucial for SC prognosis improvement.

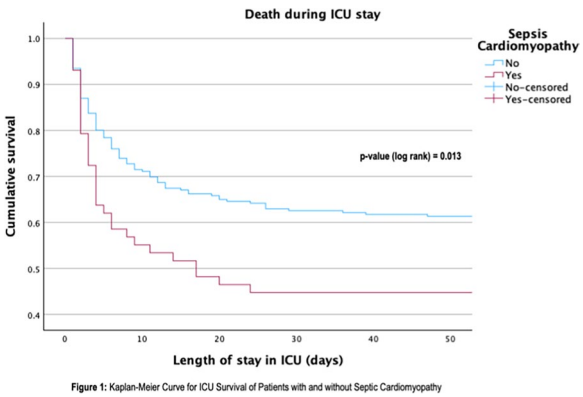


Fig. 1 (abstract 001006) Kaplan–Meier curve for ICU survival of patients with and without septic cardiomyopathy

Baseline Characteristics	Septic Cardiomyopathy (n=58)	No Septic Cardiomyopathy (n=248)	p-value
Male sex - n (%)	36 (62.1)	152 (61.3)	0.913
Age - mean ± SD	66.7 ± 15.4	65.0 ± 16.2	0.477
Comorbidities - n (%)			
Arterial hypertension	36 (64.3)	141 (61.3)	0.680
Diabetes	18 (32.7)	71 (31.7)	0.883
Dyslipidemia	20 (37.0)	103 (46.4)	0.215
Smoking history	6 (11.5)	53 (25.5)	**0.032**
Atrial fibrillation	7 (13.7)	28 (14.4)	0.908
Structural heart disease - n (%)	11 (20.4)	48 (22.2)	0.768

Clinical Characteristics and Evolution	Sepsis Cardiomyopathy (n=58)	No Sepsis Cardiomyopathy (n=248)	p-value
Length of ICU stay (days) - median [IQR]	4 [2-9]	5 [3-11]	0.204
In-hospital cardiac arrest - n (%)	12 (20.7)	20 (8.1)	**0.005**
In-hospital death - n (%)	33 (56.9)	116 (52.0)	0.507
During ICU stay	32 (55.2)	97 (39.3)	**0.027**
Site of infection - n (%)			
Gastrointestinal tract	24 (41.4)	127 (51.6)	
Urinary tract	12 (20.7)	33 (13.4)	0.098
Respiratory tract	8 (13.8)	50 (20.3)	
Other	14 (24.1)	36 (14.6)	
Infection source control - n (%)	35 (61.4)	144 (63.4)	0.776
Initial appropriate antimicrobial therapy - n (%)	36 (67.9)	146 (69.5)	0.822
Time to infection source control (days) - median [IQR]	0 [0-1]	0 [0-2]	0.501
Organ dysfunction			
Cardiovascular - n (%)			
Inotrope and vasopressor use			
Peak dobutamine (mcg/kg/minute) - median [IQR]	5 [2.5-5]	5 [4.5-10]	0.225
Peak noradrenaline dose (mcg/minute) - median [IQR]	165 [60-240]	80 [38-180]	**0.002**
Respiratory			
Invasive mechanical ventilation (days) - median [IQR]	2.0 [0.8-6.3]	2.0 [1.0-7.0]	0.993
Renal - n (%)	58 (100)	213 (91.8)	**0.017**
KDIGO I	4 (6.9)	23 (9.9)	
KDIGO II	7 (12.1)	48 (20.7)	
KDIGO III	21 (36.2)	69 (29.7)	
KDIGO III + Renal replacement therapy	26 (44.8)	73 (31.5)	0.055
Hepatocellular - n (%)	39 (78.0)	97 (57.7)	**0.009**
Hematological - n (%)			
Thrombocytopenia	40 (72.7)	133 (63.9)	0.222
Disseminated intravascular coagulation	9 (18.0)	18 (10.9)	0.185
Neurological (encephalopathy) - n (%)	28 (56.0)	64 (36.6)	**0.014**

Fig. 2 (abstract 001006) Baseline characteristics of patients with and without SC

Baseline Characteristics	SCd (n=32)	Scs (n=26)	p-value
Male sex - n (%)	24 (75.0)	12 (46.2)	**0.024**
Age - mean ± SD	69.0 ± 15.4	63.8 ± 15.1	0.194
Comorbidities - n (%)			
Arterial hypertension	23 (74.2)	13 (52.0)	0.171
Diabetes	11 (36.7)	7 (26.9)	0.283
Dyslipidemia	13 (43.3)	7 (29.2)	0.387
Smoking history	4 (13.3)	2 (9.1)	1.000
Atrial fibrillation	6 (21.4)	1 (4.3)	0.124
Structural heart disease - n (%)	9 (30.0)	2 (8.3)	0.092

Clinical Characteristics and Evolution	SCd (n=32)	Scs (n=26)	p-value
Length of ICU stay (days) - median [IQR]	3.5 [2.0-7.5]	5.0 [3.0-10.5]	0.131
Site of infection - n (%)			
Gastrointestinal tract	13 (40.6)	11 (42.3)	
Urinary tract	4 (12.5)	8 (30.8)	0.126
Respiratory tract	7 (21.9)	1 (3.8)	
Other	8 (25.0)	6 (23.1)	
Infection source control - n (%)	15 (46.9)	20 (80.0)	**0.011**
Initial appropriate antimicrobial therapy - n (%)	21 (72.4)	15 (62.5)	0.441
Time to infection source control (days) - median [IQR]	0 [0-3]	0 [0-1]	0.433
Organ dysfunction			
Cardiovascular - n (%)			
Inotrope and vasopressor use			
Peak dobutamine (mcg/kg/minute) - median [IQR]	5.0 [5.0-5.0]	3.8 [2.5-5.6]	0.434
Peak noradrenaline dose (mcg/minute) - median [IQR]	220 [160-380]	60 [32-128]	**<0.001**
Respiratory			
Invasive mechanical ventilation (days) - median [IQR]	3 [2-5]	2 [0-7]	0.285
Renal - n (%)	32 (100)	26 (100)	N/A
KDIGO I	1 (3.1)	3 (11.5)	
KDIGO II	2 (6.3)	5 (19.2)	
KDIGO III	11 (34.4)	10 (38.5)	
KDIGO III + Renal replacement therapy	18 (56.3)	8 (30.8)	0.052
Hepatocellular - n (%)	25 (83.3)	14 (70.0)	0.311
Hematological - n (%)			
Thrombocytopenia	22 (71.0)	18 (75.0)	0.739
Disseminated intravascular coagulation	5 (16.7)	4 (20.0)	1.000
Neurological (encephalopathy) - n (%)	17 (58.6)	11 (52.4)	0.661

Laboratory and Echocardiographic Parameters	SCd (n=32)	Scs (n=26)	p-value
Laboratory markers			
C-reactive protein (mg/dL) - mean ± SD			
Admission	18.3 ± 16.0	25.7 ± 14.5	0.021
Peak	37.0 ± 13.7	37.5 ± 13.0	0.887
Procalcitonin (µg/L) - median [IQR]			
Admission	17.2 [1.4-73.1]	68.7 [5.5-160.8]	0.098
Peak	64.0 [14.0-193.6]	96.2 [22.4-196.5]	0.595
Troponin T (ng/L) - median [IQR]			
Admission	48 [26-71]	103 [35-284]	**0.015**
Peak	110 [74-377]	203 [79-716]	0.467
NTproBNP (pg/mL) - median [IQR]			
Admission	17087 [2952-32668]	14527 [3024-31888]	0.657
Peak	20276 [3551-62805]	14527 [3258-32418]	0.295
SvO2 on admission (%) - mean ± SD	61.0 ± 16.8	66.2 ± 14.8	0.249
Peak lactate levels (mg/dL) - median [IQR]	95 [50-144]	45 [29-76]	**0.005**
Peak total bilirubin (mg/dL) - median [IQR]	1.55 [0.79-3.58]	1.32 [0.57-2.66]	0.277
Nadir platelet count (x10³/µL) - median [IQR]	85 [17-158]	61 [18-144]	0.784
Echocardiogram			
LV dilation - n (%)	2 (7.4)	2 (10.0)	1.000
Nadir LVEF (%) - median [IQR]	30 [30-40]	43 [30-50]	0.057
LVEF recovery at discharge - n (%)	3 (10.3)	14 (93.3)	**<0.001**
Nadir Aortic VTI (cm) - mean ± SD	14.1 ± 7.6	11.9 ± 4.0	0.619
Peak E/e' ratio - mean ± SD	13.4 ± 3.4	10.2 ± 5.4	0.208
Nadir TAPSE (mm) - mean ± SD	15.3 ± 4.3	16.9 ± 4.6	0.341
Nadir Tricuspid s velocity (cm/s) - median [IQR]	8 [N/A]	8 [3.3- 12.8]	0.857
Peak estimated sPAP (mmHg) - median [IQR]	47 [34-51]	30 [29-51]	0.398

Fig. 3 (abstract 001006) Clinical, laboratory and echocardiographic characteristics of patients with SC who survived and who did not

001007

Factors affecting survival in severe and very severe COPD after admission in ICUs of tertiary care centres of India (FAST COPD): a multicentric cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001007

Introduction: Chronic obstructive pulmonary disease (COPD) is the third leading cause of morbidity and mortality globally. The data from low and middle-income countries, with prevalent biomass exposure and tuberculosis, are scarce.

Objectives: We evaluated factors affecting survival among patients with severe and very severe COPD admitted to the ICU, focusing on exposure phenotypes, mental health, and socioeconomic status.

Methods: Data were collected from 2 tertiary care university hospitals in Mysuru, including demographics, laboratory investigations, mechanical ventilation requirements, complications (corpulmonale, pulmonary hypertension, acute kidney injury, septic shock), pulmonary function tests, medications, mental health (assessed by HAM-A and HAM-D), and socioeconomic status (standardized living index). Exposure phenotypes were classified as tobacco smoke (TS) exposure (≥ 10 pack-years), biomass smoke (BMS) exposure (≥ 10 years of solid fuel use), combined tobacco and biomass exposure (TS & BMS), and tuberculosis-associated obstructive pulmonary disease (TOPD) defined as post-tubercular airway obstruction with no significant TS or BMS exposure. The data were analyzed using Jamovi with ANOVA and Pearson chi-square tests; Kaplan–Meier survival analysis for impact of exposure on survival, and Cox proportional hazards regression to identify independent predictors of mortality.

Results: In this cohort of 717 patients, 38.1% had hypertension, 22.3% had diabetes, and 31.4% had heart disease. Non-survivors had a significantly higher prevalence of hypertension and heart disease ($p = 0.001$). Pulmonary hypertension (34.3%) and corpulmonale (27.8%) were common, with non-survivors showing a higher prevalence of pulmonary hypertension ($p = 0.001$). The prevalence of exposure phenotypes was 16.4% for tobacco-induced COPD (TOPD), 22.4% for biomass COPD, and 53.56% for combined tobacco and biomass exposure. 82.7% were from low-income categories. Mental health assessment revealed mild depressive symptoms (mean HAM-D: 7.0 ± 4.5) and minimal anxiety (mean HAM-A: 1.0 ± 0.1). Mechanical ventilation was required in 8.1% (invasive) and 24.4% (non-invasive); longer in BMS-exposed individuals ($p < 0.001$). In-hospital mortality was 12.7% for severe COPD and 15% for very severe COPD.

Kaplan–Meier survival analysis revealed that TOPD had the poorest survival (log-rank test, $p < 0.0001$) (Figure and Table 1). In a multivariable Cox model (Table 2), TOPD was associated with an increased mortality risk (HR 7.89, 95% CI 4.17–14.91, $p < 0.001$). BMS exposure alone had no significant mortality impact (HR 0.96, $p = 0.914$), and TS and BMS exposure showed intermediate mortality risk (HR 0.57, $p = 0.083$).

Conclusions: TOPD is associated with higher mortality compared to tobacco, biomass, and combined tobacco–biomass exposures. Comorbidities, such as pulmonary hypertension and corpulmonale independently increase in-hospital mortality.

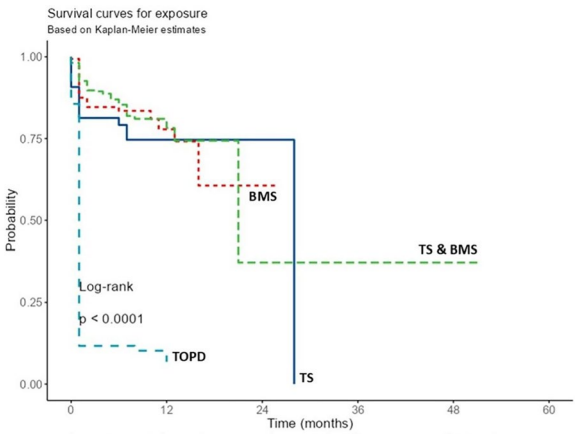


Figure 1: Kaplan–Meier survival curve for AECOPD phenotypes based on exposure. Definition of abbreviations: TOPD: Tuberculosis-Associated Obstructive Pulmonary Disease; TS: Tobacco smoke, BMS: Biomass smoke; and TS & BMS: Tobacco smoke and biomass smoke.

Fig. 1 (abstract 001007) Kaplan—Meier survival curve for AECOPD phenotypes based on exposure

Table 1 (abstract 001007) Pairwise comparisons exposure

Levels	Levels	p-value
BMS	TS	1.000
TS & BMS	TS	0.983
TS & BMS	BMS	1.000
TOPD	TS	<.001
TOPD	BMS	<.001
TOPD	TS & BMS	<.001

Note. p-value adjustment method: holm.

Table 2 (abstract 001007) Pairwise comparisons of exposure phenotypes

		all	HR (univariable)	HR (multivariable)
Age in Years	Mean (SD)	66.1 (9.6)	0.99 (0.98-1.01, p=0.233)	0.99 (0.97-1.01, p=0.196)
BMI (Kg/m²)	Mean (SD)	23.1 (4.5)	**0.92 (0.89-0.96, p<0.001)**	0.98 (0.96-1.01, p=0.180)
Gender	Female	125 (17.4)	-	-
	Male	592 (82.6)	1.42 (0.95-2.10, p=0.083)	1.42 (0.86-2.36, p=0.174)
Exposure	TS	54 (7.5)	-	-
	BMS	161 (22.5)	0.84 (0.44-1.61, p=0.594)	0.96 (0.45-2.03, p=0.914)
	TS & BMS	384 (53.6)	0.70 (0.39-1.28, p=0.247)	0.57 (0.30-1.08, p=0.083)
	TOPD	118 (16.5)	**10.10 (5.61-18.17, p<0.001)**	**7.89 (4.17-14.91, p<0.001)**
No of Times of Hospitalization in Last 1 Year	Mean (SD)	0.9 (1.2)	**1.32 (1.21-1.45, p<0.001)**	**1.18 (1.07-1.31, p=0.002)**
Diabetes Mellitus	No	557 (77.7)	-	-
	Yes	160 (22.3)	**0.58 (0.40-0.85, p=0.005)**	0.69 (0.46-1.03, p=0.066)
Hypertension	No	444 (61.9)	-	-
	Yes	273 (38.1)	**0.51 (0.37-0.70, p<0.001)**	0.89 (0.63-1.25, p=0.495)
Heart Diseases	No	492 (68.6)	-	-
	Yes	225 (31.4)	**0.30 (0.20-0.44, p<0.001)**	0.77 (0.50-1.20, p=0.253)
Chronic Liver Disease	No	706 (98.5)	-	-
	Yes	11 (1.5)	0.81 (0.26-2.55, p=0.723)	1.04 (0.31-3.48, p=0.946)
Chronic Kidney Disease	No	693 (96.7)	-	-
	Yes	24 (3.3)	0.34 (0.11-1.06, p=0.063)	0.58 (0.18-1.88, p=0.363)
Malignancy	No	696 (97.1)	-	-
	Yes	21 (2.9)	0.36 (0.11-1.13, p=0.080)	0.34 (0.08-1.34, p=0.123)
Pulmonary Hypertension	No	471 (65.7)	-	-
	Yes	246 (34.3)	**0.45 (0.32-0.63, p<0.001)**	**0.16 (0.09-0.29, p<0.001)**
Corpulmonale	No	518 (72.2)	-	-
	Yes	199 (27.8)	0.94 (0.68-1.28, p=0.685)	**4.17 (2.44-7.13, p<0.001)**
Septic Shock	No	647 (90.2)	-	-
	Yes	70 (9.8)	1.04 (0.68-1.60, p=0.848)	1.37 (0.84-2.23, p=0.207)
Acute Kidney Injury	No	626 (87.3)	-	-
	Yes	91 (12.7)	1.04 (0.69-1.55, p=0.865)	0.95 (0.60-1.49, p=0.811)

HR: Hazard Ratio; BMI: Body mass index, TS: Tobacco smoke, BMS: Biomass smoke; and TS & BMS: Tobacco smoke and biomass smoke: TOPD: Tuberculosis-Associated Obstructive Pulmonary Disease.

Univariable and multivariable cox proportional hazards for factors associated with mortality.

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Topic: Acute respiratory failure and mechanical ventilation

001008

Cytomegalovirus reactivation and its viral load kinetics in apparently non-immunosuppressed patients requiring prolonged mechanical ventilation

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Intensive Care Medicine Experimental 2025,* 13(1)*:001008

Introduction: In recent years, cytomegalovirus (CMV) reactivation has been reported in apparently non-immunosuppressed patients during their acute illness with worse clinical outcomes [1,2,3]. However, no prospective study is available in patients requiring prolonged mechanical ventilation (PMV).
Objectives: To study the prevalence of CMV reactivation and its viral load kinetics in apparently non-immunosuppressed patients requiring PMV (more than one week).
Methods: After ethics committee approval, this prospective study screened all consecutive adult ICU patients requiring PMV for the presence of CMV seropositivity (anti-CMV IgG antibodies). Exclusion criteria were: age < 18 years, use of antiviral agents within the preceding 7 days, known or suspected underlying immune deficiencies, and pregnant patients. Blood samples from the included patients were analyzed for CMV reactivation every week for a maximum of four weeks after the initiation of mechanical ventilation (MV). Further, in cases of CMV reactivation, 3 more samples (maximum) were collected on a weekly basis to assess the viral load kinetics. The real-time PCR reactions were performed in plasma samples, and the CMV DNA load expressed as copies/ml. CMV reactivation was defined as blood viral load > 1000 copies/ml.
Results: During the study period (Jul 2024-Feb 2025), 52 out of 210 patients met the eligibility criteria. At the time of ICU admission, the median age was 40.5 years (IQR 31–56), and 55.7% were male. At study inclusion, the median SOFA score was 7.5 (IQR 4–12.5). A total of 188 plasma samples were analyzed. CMV reactivation was observed in 22 out of 52 patients (42.30%), and more than half (13/22) of them were positive by two weeks after the initiation of MV (Fig. 1). The clinical characteristics of patients with CMV reactivation compared to those without reactivation were as follows: age 38 versus 41 years ($p = 0.44$), SOFA score at inclusion 8 versus 6.5 ($p = 0.40$). The bloodstream infection (BSI) in CMV reactivation group was 45.5% (10/22) in comparison to 13.3% (4/30) in non-CMV reactivation group. The mortality rate at ICU discharge for the CMV reactivation group was 72.72% (16/22) as compared to 33.35% (10/30) in the non-reactivation group ($p = 0.01$). Among patients with CMV reactivation, the maximum reactivation in survivors occurs at 1st and 2nd week, while in non-survivors at 3rd and 4th week. At the time of reactivation, the median copies (per ml) in survivors were 2850 (IQR 2387–14487) and in non-survivors 4050 (IQR 2216–8462); which decreased to median copies 2,240 (IQR 1,337–5,060) in survivors; while increased to 13,600 (IQR 2,900–48,230) in non-survivors in follow-up samples (Fig. 2).
Conclusions: CMV reactivation occurred in 42% of patients with PMV, with significantly higher mortality in comparison to patients without reactivation. Among CMV reactivation, non-survivors have higher median CMV copies which continued to rise in follow-up weeks in comparison to survivors.

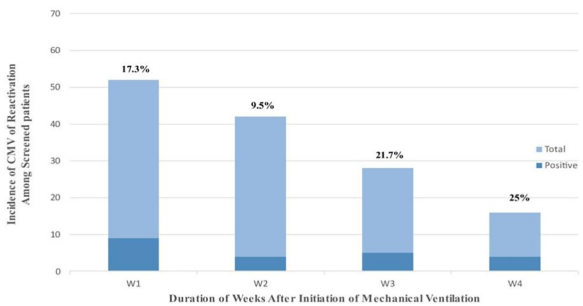


Fig. 1 (abstract 001008) Incidence of CMV reactivation on weekly basis among patients with prolonged mechanical ventilation

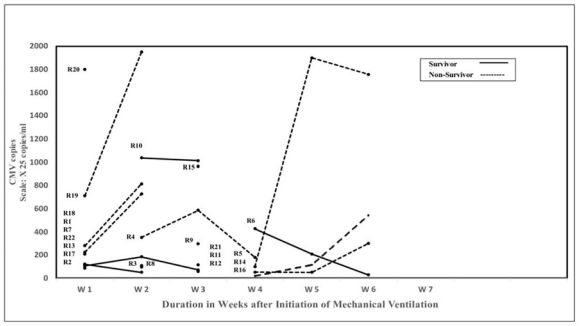


Fig. 2 (abstract 001008) Viral load kinetics among patients with CMV reactivation ($N = 22$)

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4. No Grants were received for this study

Topic: Infections and prevention

001009

Impact of the sulfide donor, diethyl-ammonium tetrathiomolybdate on healthy rats and in a model of haemorrhage–reperfusion

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Introduction: Ischaemia–reperfusion injury (IRI) contributes to significant morbidity and mortality. The reperfusion injury component is largely driven by excessive production of reactive oxygen species (ROS), leading to cellular damage and death. Sulfide donors have shown promise by reversibly inhibiting the mitochondrial electron transport chain, reducing metabolic activity and ROS generation. We identified diethyl-ammonium tetrathiomolybdate (DEATTM) as a slow-release sulfide donor and tested its safety and therapeutic potential in mitigating IRI.
Objectives: To test the safety and pharmacokinetics/pharmacodynamics (PK/PD) in healthy rats, and the therapeutic efficacy of DEATTM in a non-recovery rat model of IRI.
Methods: Under isoflurane anaesthesia, Wistar rats (200–300 g, both sexes) underwent carotid and jugular cannulation, bladder catheterisation, and tracheostomy, and initiation of fluid administration (Ringer's lactate [RL], 10 ml/kg/h). (i) Safety and PK/PD studies: A dose–escalation study of DEATTM (1–100 mg/kg IV bolus) was performed, followed by a second study assessing a 30 mg/kg bolus dose followed by a 90 mg/kg 1-h infusion. Outcomes included survival, cardiorespiratory function, and lactate. Urine output and electrolytes were assessed hourly. Blood samples were collected for PK/PD analyses.
(ii) IRI study: Anaesthetised Wistar rats and following instrumentation (as described above). Ischaemia was induced by withdrawing 40% of circulating blood volume over 15 min, followed by a 90-min ischaemic period; background fluids were ceased during ischaemia. Rats (16 per group; 50% male) were randomised to receive either DEATTM (30 mg/kg bolus at the point of resuscitation) or RL as placebo. Both groups were then resuscitated with the shed blood. Treated animals received a 30-min DEATTM infusion (60 mg/kg, half dose was added with injected blood), while control animals received an equivalent volume of RL. Animals were monitored for 4 h post-intervention, and outcomes were assessed as per the safety studies. Data were analysed using repeated measures one-way or two-way ANOVA, as appropriate, with Dunnett's or Sidak's post hoc tests. Log-rank and Mann–Whitney U tests were also used where relevant. Survival was assessed using Kaplan–Meier analysis.
Results: The DEATTM dose escalation study performed in healthy rats was well tolerated. In the bolus + infusion safety study, a significantly greater diuresis, natriuresis, kaliuresis and chloruresis were observed with DEATTM compared with controls. (Fig. 1). In the IRI study, 4-h survival was higher in the DEATTM group (11/16, 69%) compared to controls (5/16, 31%) ($p = 0.04$) (Fig. 2A). Diuresis was also significantly greater with DEATTM over the first 2 h following reperfusion.
Conclusions: DEATTM was safe in short-term studies in healthy animals; the accompanying diuresis/natriuresis suggests inhibition of the renal tubular Na^+/K^+-ATPase. DEATTM conferred a survival benefit in the IRI model, with short-term diuretic/natriuretic effects.

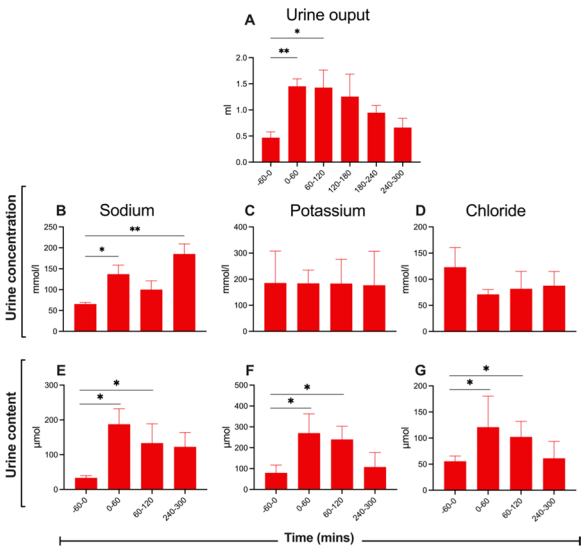


Fig. 1 (abstract 001009) Urine output (A), urinary electrolyte concentrations (B–D) and total excreted content (E–G) in healthy rats given a 30 mg/kg bolus of DEATTM followed by a 90 mg/kg infusion over 1-h (Study 2). Data are presented as mean ± SD. *$p < 0.05$ and 0 **$p < 0.01$ vs. baseline, analysed using repeated measures one-way ANOVA with Dunnett's post hoc test

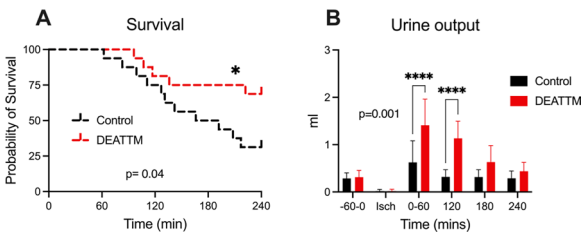


Fig. 2 (abstract 001009) Survival and urine output in the haemorrhage–reperfusion model. (A) Survival probability in control ($n = 16$) and DEATTM-treated ($n = 16$) groups, with equal sex distribution (50% male). Survival was significantly higher in the DEATTM group (69%) vs. control (31%) ($p = 0.04$; Log-rank test). (B) Urine output was significantly higher in the DEATTM group at 60 and 120 min. Data are presented as mean ± SD. *$p < 0.05$, ****$p < 0.001$

Topic: Pharmacology and toxicology/poisoning

001010

Efficacy and safety of cipepofol versus non-cipepofol sedation regimens in mechanically ventilated patients with severe pneumonia

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Intensive Care Medicine Experimental 2025,* 13(1)*:001010

Introduction: Patients with severe pneumonia often present with acute respiratory distress syndrome or serious hypoxemia, necessitating sedation strategies that prioritize maintaining synchrony with mechanical ventilation and reducing oxygen consumption. In addition, patients with sepsis or septic shock exhibit significantly reduced hemodynamic tolerance to sedative agents. So far, optimal sedation strategy remains controversial in mechanically ventilated patients with severe pneumonia.
Objectives: This study evaluated the efficacy and safety of cipepofol versus non-cipepofol sedation regimens in mechanically ventilated adults with severe pneumonia, focusing on clinical outcomes and hemodynamic stability.
Methods: In this single-center retrospective study, 230 patients with severe pneumonia admitted to the Respiratory ICU of Xiangya Hospital, Central South University from February 2023 to December 2024 were included. Patients were divided into the cipepofol (N = 110) and non-cipepofol (N = 120) groups. Baseline characteristics (age, sex, BMI) and sedation/analgesia durations were comparable between two groups, while the non-cipepofol group exhibited higher APACHE II scores than the cipepofol group. Primary endpoint was mechanical ventilation duration (time from intubation/ICU admission to extubation). Secondary endpoints included sedation success (defined as achieving the target sedation level of RASS-1 to -4 in more than 90% of recorded RASS assessments), length of ICU stay, 28-day mortality, and circulatory adverse events (hypotension: SBP < 90 mmHg, DBP < 60 mmHg, MAP < 70 mmHg, or > 30% drop from baseline; bradycardia: HR < 40 bpm or > 30% drop from baseline).
Results: No significant differences were observed in mechanical ventilation duration (67.16 ± 12.59 vs. 65.83 ± 13.36 h, $p = 0.310$), length of ICU stay (387.24 ± 361.10 vs. 367.88 ± 267.59 h, $p = 0.643$), or 28-day mortality (56.4% vs. 60.0%, $p = 0.595$) between the cipepofol and non-cipepofol groups. Sedation success rate and mean sedation compliance rate were comparable between the two groups. Cipepofol demonstrated superior safety profiles with a lower incidence of hypotension within the first hour of sedation (28.6% vs. 46.1%, $p = 0.008$) and reduced bradycardia events (23.8% vs. 38.3%, $p = 0.029$). Vasoactive drug requirements were significantly lower in the cipepofol group (total norepinephrine dose 174.02 ± 208.18 vs. 242.64 ± 229.06 mg, $p = 0.026$). The cipepofol group demonstrated no significant increases in serum lipid levels, total bilirubin, or creatinine concentrations as compared to the non-cipepofol group.
Conclusions: Although cipepofol and non-cipepofol regimens showed comparable efficacy in managing sedation and clinical outcomes for severe pneumonia, cipepofol was associated with enhanced hemodynamic stability and reduced vasopressor dependence. These findings position cipepofol as a safer alternative for ICU sedation in mechanically ventilated patients with severe pneumonia.

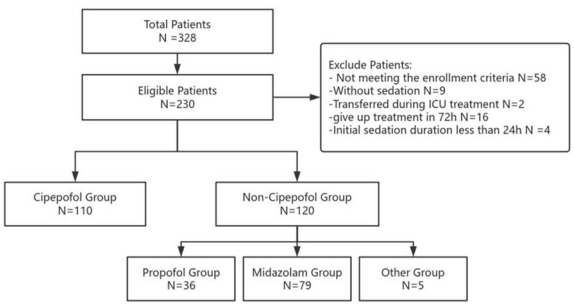


Fig. 1 (abstract 001010) Flow chart of this study

Table 1 (abstract 001010) Demographic characteristics of the enrolled patients

Characteristics	Cipepofol group (N=110)	Non-Cipepofol group (N=120)	*P* value
Age (years)	67.16±12.59	65.83±13.36	0.436
Sex, n (%)			
Male	83 (75.5)	90 (75.0)	0.757
Female	26 (23.6)	30 (25.0)	
BMI (kg/m^2)	22.52±3.01	22.80±4.14	0.666
APACHE II score	17.12±7.39	22.09±8.47	<0.001
Analgesic duration (h)	200.06±154.15	212.39±157.54	0.555
Sedation duration (h)	194.46±143.76	201.55±134.20	0.699

Note. All data are presented as mean ± SD or numbers with percentage.

Table 2 (abstract 001010) Efficacy and safety endpoints of enrolled patients

Endpoints	Cipepofol group (N=110)	Non-Cipepofol group (N=120)	*P* value
Primary endpoint			
MV duration (h)	67.16±12.59	65.83±13.36	0.310
Secondary endpoints			
Sedation success rate, n (%)	71/89 (79.8)	93/105 (88.6)	0.112
Mean sedation compliance rate, (%)	95.34±16.10	93.10±23.05	0.441
Length of ICU stay (h)	387.24±361.10	367.88±267.59	0.643
28-day mortality rate (%)	62 (56.4)	72 (60.0)	0.595
Safety endpoints			
Hypotension in 1st hour (%)	30 (28.6)	53 (46.1)	0.008
Bradycardia in 1st hour (%)	0	2 (1.7)	0.499
Hypotension (%)	94 (89.5)	102 (88.7)	1.000
Bradycardia (%)	25 (23.8)	44 (38.3)	0.029
Duration of vasoactive drugs (h)	154.91±129.18	168.68±141.75	0.471
Dosage of vasoactive drugs(mg)	174.02±208.18	242.64±229.06	0.026

Note. All data are presented as mean ± SD or numbers with percentage.

Abbreviations: MV, Mechanical Ventilation; ICU, intensive care unit.

Vasoactive drugs: Norepinephrine.

Table 3 (abstract 001010) Dynamic changes of blood lipid, liver function and renal function of enrolled patients

Laboratory indicators	Cipepofol Group (N=110)	Non-Cipepofol Group (N=120)	*P* value
Blood lipid			
Triglyceride (baseline, mmol/L)	1.95±1.34	1.92±1.21	0.898
Δ level of triglyceride (post-sedation vs. baseline)	0.48±1.29	0.34±1.14	0.732
Cholesterol (baseline, mmol/L)	3.40±1.29	3.36±1.24	0.820
Δ level of cholesterol (post-sedation vs. baseline)	-0.39±1.53	-0.31±1.37	0.880
LDL (baseline, mmol/L)	2.12±0.81	2.11±0.79	0.941
Δ level of LDL (post-sedation vs. baseline)	-0.05±1.15	-0.19±0.82	0.692
HDL (baseline, mmol/L)	0.80±0.38	0.77±0.30	0.564
Δ level of HDL (post-sedation vs. baseline)	-0.12±0.42	-0.08±0.44	0.738
Liver function			
Total bilirubin (baseline, μmol/L)	16.37±22.24	18.04±27.97	0.619
Δ level of total bilirubin (maximum vs. baseline)	9.36±45.57	8.82±28.27	0.914
Δ level of total bilirubin (post-sedation vs. baseline)	2.81±53.40	1.66±29.40	0.844
Renal function			
CrCl (baseline, mL/min)	145.06±189.07	194.34±221.54	0.071
Δ level of CrCl (maximum vs. baseline)	43.97±127.62	29.26±141.62	0.411
Δ level of CrCl (post-sedation vs. baseline)	-21.89±177.64	-45.74±167.46	0.312

Note. All data are presented as mean ± SD or numbers with percentage.

Abbreviations: LDL, low-density lipoprotein; HDL, high-density lipoprotein; CrCl, Creatinine Clearance.

Reference

1. This research was funded by Beijing Health Alliance Charitable Foundation (S187), National Natural Science Foundation of China (82170041 and 82100099), and National Clinical Research Center for Geriatric Disorders (2023LNJJ08).

Topic: Acute respiratory failure and mechanical ventilation

001011

Peripheral blood leukocyte-based clusters in sepsis: phenotypic characterization and prognostic implications

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Intensive Care Medicine Experimental 2025,* 13(1)*:001011

Introduction: Sepsis is a life-threatening organ dysfunction caused by a dysregulated host response to infection, representing the leading cause of mortality in critically ill patients worldwide. It accounts for approximately 49 million cases and 11 million deaths annually, contributing to nearly 20% of global mortality [1,2]. Peripheral blood leukocytes, as key mediators of immune responses, exhibit phenotypic alterations that may reflect the pathological progression and prognosis of sepsis [3]. Recent studies have revealed significant heterogeneity in the distribution and functional characteristics of leukocyte subsets in septic patients, including increased myeloid-derived suppressor cell phenotypes [4] and lymphocyte exhaustion [5]. These alterations demonstrate potential correlations with disease severity and clinical outcomes. However, systematic investigations into the dynamic clustering patterns and phenotypic signatures of peripheral blood leukocytes in sepsis remain inadequate, particularly regarding their prognostic implications.

Objectives: This study aims to characterize the phenotypic clustering patterns of peripheral blood leukocytes in septic patients, evaluate the correlation between distinct clusters and clinical outcomes, and provide theoretical foundations for risk stratification and immunomodulatory interventions.

Methods: This study identified sepsis patients meeting diagnostic criteria from the Medical Information Mart for Intensive Care-IV (MIMIC-IV) database. Absolute counts of neutrophils, lymphocytes, monocytes, basophils, and eosinophils were obtained from the first peripheral blood test within 24 h of admission. Using expression levels of these five leukocyte subsets, we performed cluster analysis through an integrated approach combining the Elbow Method, Gap statistic, and Silhouette coefficient to determine the optimal number of clusters. The K-means algorithm was then employed for phenotypic stratification of sepsis patients. Prognostic differences among the identified sepsis subtypes were subsequently compared using Kaplan–Meier survival analysis.

Results: Our analysis identified 18,365 sepsis patients from MIMIC-IV who were stratified into three distinct clusters. The cohort distribution revealed: Cluster 1 comprised the majority of cases (n = 10,710; 58.32%), followed by Cluster 3 (n = 6,699; 36.47%), while Cluster 2 represented the smallest subgroup (n = 956; 5.21%). Kaplan–Meier analysis revealed significant inter-cluster survival differences, with Cluster 3 exhibiting the lowest 28-day survival (67%), Cluster 1 demonstrating optimal outcomes (82%), and Cluster 2 showing intermediate prognosis (78%).

Conclusions: We identified three sepsis subphenotypes characterized by varying inflammatory statuses and mortality risks, stratified by leukocyte counts. This stratification could enhance prognostic evaluation and guide tailored therapeutic strategies in sepsis care.

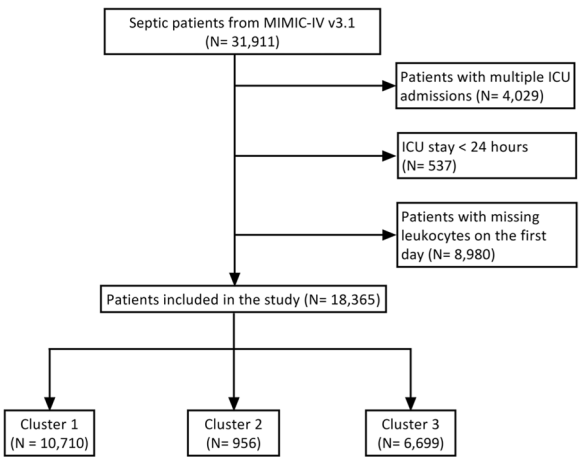


Fig. 1 (abstract 001011) Flowchart of participant exclusion process in the study

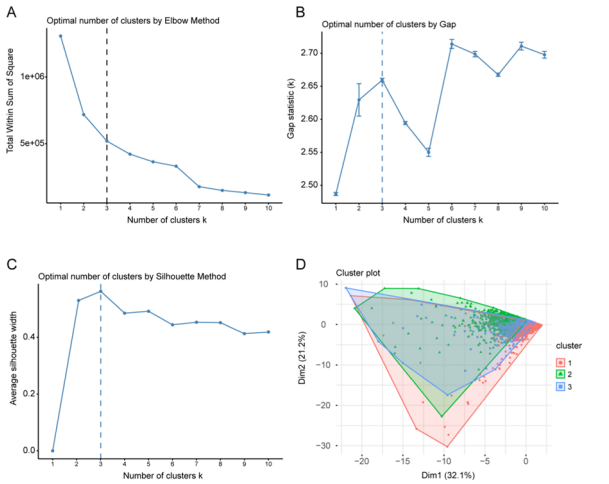


Fig. 2 (abstract 001011) **a** The optimal number of clusters as determined by Elbow Method. **b** The optimal number of clusters as determined by Gap statistic criterion. **c** The optimal number of clusters as determined by Silhouette. **d** Clusters' plot. These two components explain the 53.3% point variability

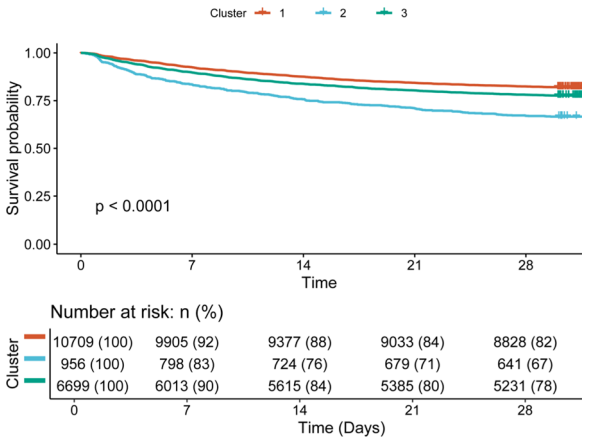


Fig. 3 (abstract 001011) Survival curve of the three clusters by the Kaplan–Meier method

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6. 1.3.5 project for disciplines of excellence, West China Hospital, Sichuan University (ZYGD23012)
7. National Key R&D Program of China (2022YFC2504500)
8. 1.3.5 project for disciplines of excellence, West China Hospital, Sichuan University (ZYJC18006)

Topic: Sepsis

001013

Long-term survival of intensive care patients compared to an age, sex and region of birth-matched general population

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Intensive Care Medicine Experimental 2025,* 13(1):*001013

Introduction: Little is known about long-term survival of patients treated in the intensive care unit (ICU) during the years following ICU care.
Objectives: To investigate long-term survival of ICU patients compared to the general population.
Methods: We retrieved data on patients treated in ICUs in 2005–2022 from the Finnish national intensive care registry. We used the personal identity codes to link each patient to the Causes of Death Statistics, maintained by Statistics Finland, that include the date of death of every deceased Finnish resident. With permission from the Finnish Social and Health Data Permit Authority (Findata) and Statistics Finland, a control population was formed from the Finnish general population by randomly selecting five age, sex and region of birth-matched control subjects for each ICU patient. We compared the survival of ICU patients to that of the control population. The follow-up extended to the end of year 2022.
Results: The total number of ICU patients in the study population was 140,788; of whom 62.9% were male. The median age at the time of ICU admission was 63 years (interquartile range, 50–73 years). The control population included totally 694,271 persons. Among the ICU patients, the survival rates were 86.5% at 30 days, 73.5% at one year, 58.7% at five years, 45.3% at 10 years, and 35.3% at 15 years following ICU admission. After 15 years' follow-up, 66.5% of the control population were still alive. After seven years, the shape of the survival curve of ICU patients was comparable to that of the control group (Fig. 1).
The relative 15-year survival (i.e. the surviving proportion of a group of ICU patients divided by the surviving proportion of the respective control population) differed across diagnostic groups, being highest for the groups "non-operative trauma" (0.76), "intoxication" (0.73) and "post-operative trauma" (0.72), and lowest for the groups "non-operative cardiovascular" (0.38), "sepsis" (0.40) and "non-operative gastrointestinal" (0.41).
Conclusions: Even after the acute critical illness, patients treated in the ICU experienced excess mortality as compared to the age and sex-matched general population for at least seven years. 15 years after ICU admission, one third of the patients were still alive, as compared to two thirds of the control population.

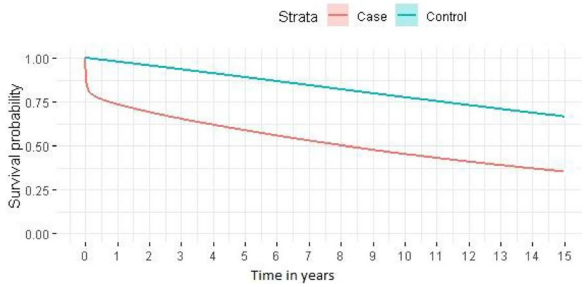


Fig. 1 (abstract 001013) Survival curves for ICU patients (case) and age, sex and place of birth-matched control persons that were randomly chosen from the Finnish general population. Time zero denotes time of ICU admission

Reference

1. The study was supported by State Research Funding in Eastern Finland's Collaborative Area and Government funding for university-level research (TYH 2023405).

Topic: Health services research and outcome

001015

Results of the first decade of experience of the cardiopulmonary resuscitation program in "Juan Ramón Jiménez" Hospital (Spain)

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Intensive Care Medicine Experimental 2025,* 13(1)*:001015

Introduction: Deaths due to in-hospital cardiac arrest (CA) is a clinical indentity with high morbidity and mortality associated with a significant social, economic and health impact. Althoug there is not so much data available in our country, it is estimated around 370000–750000 in-hospital cardiac arrest in USA and 700000 in Europe. Survival from in-hospital CA is poor, but it could be possible to reduce mortality and moribidity if we improve the first response of assistance. For that purpose, we propose four steps in the cardiac chain of survival.
Objectives: The study includes the results of the operation of Cardiopulmonary Resuscitation (CPR) Hospital Plan along seventeen years. Also, the characteristics of those patients who suffer an in-hospital CA in units with non-monitored facilities (HU).
Methods: An observational, prospective study in a cohort of patients who presented in-hospital cardiac arrest along a decade period. HU of a general hospital as a province reference. Patients admitted to a HU from May 2007 until December 2024 after suffering in-hospital CA and treated according to a specific CPR Hospital Plan in order to: (a) decentralize CPR through de training iof the nurses as the first responder capable to perform CPR and early desfibirlation (DF) (less than four minutes); (b) having a specific phone number as hospital alarm of CA and (c) maintenance of the CPR maneuvers by an early intervention of the Resuscitation Team (RT) (less than eight minutes).
Results: A total of 642 patients were included with activation of CA alarma, 85 of them were false alarms, 63% of them were men with an average of 71 years. A total of 80% took place in the medical area, in patients with cardiac or respiratory failure. In 80% of the cases initial heart rhythm was asystolic or electromechanical dissociation and shockable rhythm in 18% of them. The first attending person was a nurse in 77% of the cases, CPR was always iniciated in less than one minute and RT arrive in less than eight minute in the 98% of cases. Finally, in terms of survivance, 52% of the patients survived and 31% of them were dicharged live from the hospital.
Conclusions: The CPR "Juan Ramón Jiménez" Hospital Program is an applicable and effective initiative in our setting. Although another performances related to prevention and security should be necessary to improve in-hospital CA surv¡val.

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2. No grant financing.

Topic: Cardiac arrest

001016

In situ pulmonary thrombosis and pulmonary embolus are distinct thrombotic phenotypes in critically ill patients with COVID-19 ARDS

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Intensive Care Medicine Experimental 2025,* 13(1)*:001016

Introduction: Acute pulmonary embolism (PE) is thought to originate from distal thrombosis. However, in critically ill patients with hyperinflammatory conditions, such as Coronavirus disease 2019 (COVID-19), thrombosis in the lung vasculature may occur outside the context of peripheral thrombosis, denoted as microvascular- or in-situ thrombosis (IST). A hyperinflammatory response with not only upregulation of T helper 1 cells (Th1 cells) but also non-Th1 cell responses have been associated with severe COVID-19. We hypothesize that IST is a result of this immune dysregulation and can be distinguished from PE in the critically ill by specific histology, together with radiologic features and biomarkers of the host response. Therefore, the study aims were to explore differences in serum biomarkers and computer tomography (CT)-imaging between PE and IST, and to explore whether predictive modelling could be used to discriminate between PE and IST.
Methods: In this multicenter case series, critically ill patients who succumbed to COVID-19 and from whom histo-pathological examination of lung tissue was obtained were included. Patients with IST, based on histological characteristics, were compared to patients with proven PE and to control patients without histological proof of any pulmonary thrombosis. Serum biomarkers of inflammation, endothelial activity and hemostasis were selected, based on a thorough literature search, to investigate their potential to differentiate IST from PE. CT imaging and blood samples taken < 7 days before death were analyzed.
Results: 21 patients were included with a mean age of 69 years in the IST group ($n = 6$), 70 years in the PE group (n = 8) and 77 years in the control group of patients without any thrombosis ($n = 7$, NS). The majority in all groups was male. IST patients had higher mean levels of IL-17, IL-18, and IL-33 compared to those with PE and negative controls. A prediction model constructed with least absolute shrinkage

and selection operator (LASSO) followed by cross-validation showed excellent performance, using IL-17, IL-18 and von Willenbrand factor A2 as top three markers, with an area under the receiver-operating characteristic of 0.91 (95% CI 0,79–1.00). Features of IST were also able to be determined, with thrombosis along the vessel wall in smaller arteries and in proximity of pulmonary infiltrates.
Conclusions: Based on the differences in histology, radiology and immune biomarkers, we show that IST and PE are distinct forms of pulmonary thrombosis. IST is characterized by skewing from an effective immune response to upregulation of Th1, Th2 and Th17 cell pathways.

Topic: Transfusion and haemostasis disorders

001017

Identifying potential additional treatment options for COVID-19 ARDS through biomarkers: a preliminary analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001017

Introduction: Unregulated inflammation drives morbidity and mortality in COVID-19 ARDS. Although corticosteroids and IL-6 inhibitors, as standard of care (SoC), have improved survival, mortality remains high, suggesting inadequate control of inflammation and involvement of additional pathways. While several biomarkers have been associated with mortality, previous studies often ignore treatment effects and focus mainly on inflammatory biomarkers. This study compared biomarkers across multiple pathways between survivors and non-survivors receiving SoC to better understand COVID-19 ARDS and inform potential additional treatment strategies.
Methods: Patients with COVID-19 ARDS who received both dexamethasone and IL-6 inhibition as SoC prior to plasma sample collection were included. Baseline was defined as the time of the first plasma collection. Patients who had received high-dose corticosteroids before baseline were excluded. Sixty-one biomarkers across various pathways, including alveolar epithelial injury, coagulation, complement, endothelial integrity and inflammation, were measured using either Luminex or standard laboratory assays. Differences between survivors and non-survivors were assessed using the Mann–Whitney *U* test and Fisher's exact test, with significant biomarkers presented as normalized Z scores. Given the exploratory nature of this study, no corrections for multiple testing were made.
Results: Among the 32 patients, no differences in timing or dosage of anti-inflammatory treatment were observed between survivors and non-survivors (Table 1). Non-survivors showed significantly higher levels of CXCL8, CXCL10, IL-1 beta, IL-4, IL-6, NLR, SP-D and suPAR compared to survivors. Thrombocytes and vWF were lower in non-survivors compared to survivors (Fig. 1).

Table 1 (abstract 001017) Patient characteristics and outcomes under standard of care, stratified by survival

	All patients	Survivors	Non-survivors	*P* value*
N	32	25	7	
Sex—male	27 (84.4)	20 (80)	7 (100)	0.6
Age (years)	61 [52–67]	58 [50–67]	64 [62–71]	0.083
ICU day at first sample collection	5 [4–6]	5 [3–7]	4 [4–5]	0.4
APACHE IV predicted mortality score	0.15 [0.10–0.20]	0.15 [0.09–0.18]	0.22 [0.11–0.37]	0.4
SOFA score	5 [3–6]	3 [2–5]	5 [4–7]	0.2
PaO2/FIO2 (kPa)	33 [22–40]	34 [24–40]	29 [19–32]	0.2
Time between last dexamethasone dose and baseline	1 [0–1]	1 [0–1]	0 [0–1]	0.5
No. of dexamethasone dosages received prior to baseline	4 [3–5]	4 [3–5]	4 [3–5]	0.5
Time between last tocilizumab dose and baseline	5 [3–6]	5 [3–6]	4 [3–5]	0.8

All categorical variables are presented as counts and percentages and all continuous variables as median [IQR]. *Using Fisher's exact test for categorical variables and Mann–Whitney *U* test for continuous variables

Conclusions: Elevated inflammatory and epithelial injury biomarkers in non-survivors despite SoC suggest insufficient suppression of these pathways. This raises the question of whether higher corticosteroid doses, extended treatment duration or additional tocilizumab, might have been beneficial. Additionally, these findings raise the possibility that Anakinra or Imatinib may offer therapeutic benefit. Notably, significant biomarker differences were observed between survivors and non-survivors, whereas PF ratio and disease severity scores did not differentiate between the two groups.

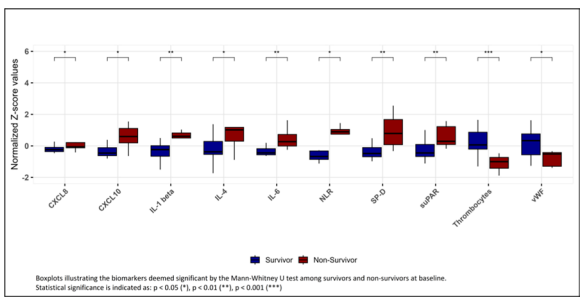


Fig. 1 (abstract 001017) Biomarker profiles in survivors and non-survivors in COVID-19 ARDS
Plasma levels of CXCL8, IL-6, SP-D, and suPAR were significantly higher in non-survivors compared to survivors, while thrombocyte counts and vWF levels were lower. Data are presented as normalized *Z* scores. Mann–Whitney *U* test was used for comparisons; $P < 0.05$ considered statistically significant.

Topic: Acute respiratory failure and mechanical ventilation

001019

Diastolic dysfunction as a predictor of ICU mortality in patients with sepsis and septic shock

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Intensive Care Medicine Experimental 2025,* 13(1)*:001019

Introduction: Diastolic dysfunction is a possible sign of septic cardiomyopathy.1 Unlike systolic dysfunction, which shows high mortality in patients with ejection fraction < 35% or > 60%, the role of diastolic dysfunction as a mortality predictor remains unclear.2–5.
Objectives: To determine whether patients with diastolic dysfunction assessed through filling pressures by E/e' values in the setting of sepsis and septic shock is a predictor of mortality in a cohort of 134 patients in an intensive care unit (ICU) of a high complexity hospital in Argentina.
Methods: We conducted a cross-sectional analysis of 134 patients admitted to ICU to examine associations between diastolic dysfunction and clinical outcomes. Statistical methods included chi-squared and Wilcoxon rank-sum tests for categorical and non-normally distributed variables, t tests for continuous normally distributed variables, and multivariable logistic and linear regressions adjusting for age, sex, and APACHE score. We used Stata v15.
Results: A total of 134 patients admitted to ICU were included. Diastolic dysfunction was present in 45 (45.9%) patients. Sex distribution was similar between groups, with 45.8% of patients with diastolic dysfunction being female, compared to 54.2% among those without. Patients with diastolic dysfunction were significantly older than those without (mean age 72.8 vs. 62.5 years; mean difference − 10.2 years; 95% CI − 15.8 to − 4.7; $p = 0.0004$). ICU mortality was significantly higher in patients with diastolic dysfunction compared to those without (53.3% vs. 18.9%; $\chi^2(1) = 12.76$, $p < 0.001$). In a logistic regression model adjusting for age, sex, and APACHE score, diastolic dysfunction remained independently associated with increased odds of ICU mortality (OR = 3.53, 95% CI 1.35–9.23; $p = 0.010$). No significant association was found between diastolic dysfunction and length of ICU stay. Median ICU days were similar across groups (10.9 ± 11.1 vs. 13.3 ± 15.4 days, in patients with vs. without dysfunction), and neither unadjusted comparisons ($p = 0.39$, t test; $p = 0.66$, Wilcoxon rank-sum test) nor adjusted linear regression ($\beta = -1.10$, 95% CI − 6.96 to 4.77; $p = 0.71$) showed evidence of a relationship. Similarly, no significant association was observed between diastolic dysfunction and site of infection ($p > 0.05$), with intra-abdominal (38.9%) and pulmonary infections (30.2%) being the most common. Maximum troponin T levels were not significantly different between patients with and without diastolic dysfunction ($p = 0.12$, Wilcoxon rank sum test), although levels tended to be higher in the dysfunction group.
Conclusions: Diastolic dysfunction appears to be an independent predictor of ICU mortality but is not associated with length of stay, troponin T levels, or site of infection. These findings highlight the prognostic value of diastolic function assessment in critically ill patients.

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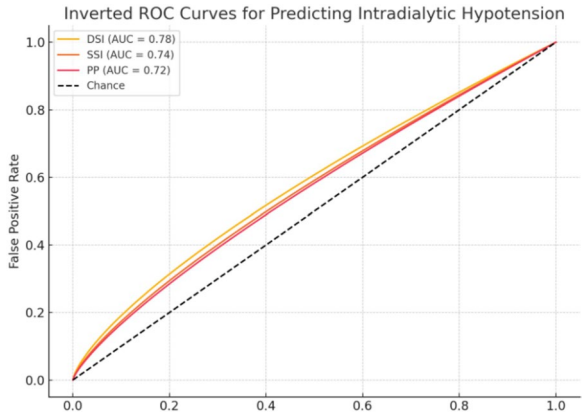
Topic: Sepsis

001020

Shock indices and pulse pressure as predictors of intradialytic hypotension in critically ill patients with acute kidney injury

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Introduction: Intradialytic hypotension (IDH) is a common and clinically significant complication in critically ill patients undergoing intermittent hemodialysis (IHD) for acute kidney injury (AKI). Identifying patients at risk before initiating dialysis remains a major clinical challenge. Simple bedside hemodynamic indices such as the systolic shock index (SSI = heart rate/systolic arterial pressure), diastolic shock index (DSI = heart rate/diastolic arterial pressure), and pulse pressure (PP = systolic – diastolic pressure) may reflect impaired cardiovascular reserve and guide risk stratification.
Objectives: To evaluate the predictive performance of SSI, DSI, and PP for the occurrence of IDH in critically ill patients undergoing their first IHD session.
Methods: In this prospective observational study, adult ICU patients with AKI (KDIGO stage 3) undergoing IHD with ultrafiltration were included. Hemodynamic parameters including heart rate, systolic and diastolic pressures were recorded prior to dialysis. SSI, DSI, and PP were calculated. IDH was defined as a mean arterial pressure (MAP) < 65 mmHg during the dialysis session. Receiver-operating characteristic (ROC) curves were used to assess the predictive accuracy of each index.
Results: Among 187 patients included, 51 (27.3%) developed IDH. Compared with those without IDH, affected patients had significantly higher SSI [0.85 (IQR 0.76–0.96) vs. 0.71 (0.64–0.80); $p < 0.001$], higher DSI [1.25 (1.10–1.40) vs. 1.02 (0.91–1.13); $p < 0.001$], and lower PP [35 mmHg (30–42) vs. 44 mmHg (38–52); $p < 0.001$]. ROC analysis demonstrated good predictive performance for DSI (AUC = 0.78; 95% CI 0.70–0.85), SSI (AUC = 0.74; 95% CI 0.66–0.82), and PP (AUC = 0.72; 95% CI 0.64–0.80). In multivariate analysis, elevated DSI, reduced PP, and preload dependency (via passive leg raising) were independent predictors of IDH. Ultrafiltration rate was not associated with hypotension.
Conclusions: Elevated diastolic and systolic shock indices, along with reduced pulse pressure, are independent and accurate predictors of IDH. These easily obtainable bedside parameters may support early risk stratification and inform individualized dialysis strategies in critically ill patients with AKI.



ROC curve for intradialytic hypotension prediction.

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Topic: Acute Kidney Injury and Haemofiltration

001021

Prevalence and perioperative impact of diastolic dysfunction in liver transplant recipients: a retrospective cohort study

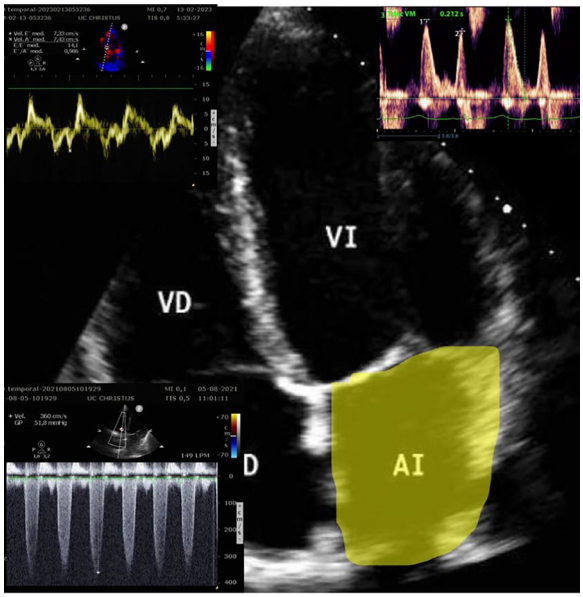
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Intensive Care Medicine Experimental 2025,* 13(1)*:001021

Introduction: Diastolic dysfunction (DD) is a critical factor to consider in patients undergoing major surgery, particularly liver transplantation (LT), owing to the high risk of bleeding, the need for aggressive fluid resuscitation, and frequent blood product transfusion. Cirrhotic cardiomyopathy (CCM) is characterized by systolic and/or DD in patients with advanced liver disease in the absence of pre-existing cardiac disease. CCM with DD is diagnosed when at least three echocardiographic criteria for DD are met.
Objectives: To characterize the prevalence of DD and evaluate its clinical impact during the perioperative period in patients undergoing liver transplantation.
Methods: This retrospective cohort study included 66 patients with advanced cirrhosis who underwent LT in 2023 at the Hospital Clínico Universidad Católica. All patients underwent preoperative echocardiographic evaluation. DD was defined according to the following criteria: tricuspid regurgitant velocity > 2.8 m/s, left atrial volume index (LAVI) > 34 cm^3/m^2, E/e' ratio > 15, and septal e' velocity < 7 cm/s. Clinical outcomes analyzed included acute kidney injury (AKI), days on mechanical ventilation (MV), and length of stay in the intensive care unit (ICU) to assess associations with DD.
Results: Of the 66 patients, 39 (59%) met at least one echocardiographic criterion for DD. Seventeen patients (26%) fulfilled two or more of the DD criteria. The distribution of echocardiographic findings was as follows: LAVI > 34 cm^3/m^2 in 27 patients (40%), tricuspid regurgitant velocity > 2.8 m/s in 28 (42%), septal e' < 7 cm/s in 1 patient (2%), and E/e' > 15 in 1 patient (2%). Patients with two or more DD criteria had significantly longer ICU stays and a trend toward prolonged mechanical ventilation. No significant association was observed with AKI incidence.

Table 1 (abstract 001021) ...

	All *n* = 66	**Normal *n* = 27**	**One criterion *n* = 22**	**Two criteria *n* = 16**	***P* value**
Age, years	55 [47–64]	54 [41–65]	56 [50–63]	57 [47–64]	0.522
Mechanical ventilation, days	1.1[0.8–3.4]	1.1 [0.6–23.2]	0.9 [0.6–1.5]	2.1 [0.9–9.0]	0.077
ICU stay, days	8.8 [5.7–19.6]	9.7 [6.3–23.2]	6.7 [4.0–10.3]	14.9 [5.4–44.5]	**0.035**
Acute kidney injury, n(%)	28 (42)	11 (40)	9 (41)	8 (50)	0.889
Pretransplant echocardiographic variables					
Ejection fraction, %	67 [64–70]	70 [64–72]	65 [62–70]	66 [65–69]	0.083
Tricuspid regurgitant gradient, mmHg	32 [28–35]	28 [24–30]	35 [30–40]	35 [34–40]*	0.159
Left atrial volume index, cm^3/m^2	40 [35–46]	32 [25–33]	38 [36–44]	45 [39–56]*	0.657
E/e' ratio	8.8 [7.5–10.0]	8.0 [6.6–9.0]	9.4 [8.5–10.5]	9.0 [7.8–11]	0.304

Conclusions: There was a high prevalence of echocardiographic markers of DD (59%) in patients undergoing LT. The presence of two or more DD criteria was significantly associated with an increased ICU length of stay, highlighting DD as a clinically relevant comorbidity. Further research is warranted to optimize perioperative hemodynamic and volume management in this high-risk population.



DD criteria.

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Topic: Cardiovascular issues in ICU

001023

Developing effective therapeutic music programs using patient outcome associated electroencephalogram markers developing effective therapeutic music programs using patient outcome associated electroencephalogram markers

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Intensive Care Medicine Experimental 2025,* 13(1)*:001023

Introduction: Therapeutic music enhances recovery environments and evokes positive emotions in patients while decreasing anxiety and delirium [1, 2]. The Vanderbilt Music in the Intensive Care Unit (ICU) program, implemented in 2019, connects student and community volunteer musicians with patients, families, and ICU staff to provide therapeutic music sessions. Our initial qualitative papers demonstrated the therapeutic program's feasibility and appropriateness, with 92% of ICU patients finding music to be a significant part of their lives [1, 2]. These findings indicate a larger scope for implementing therapeutic programs to improve the quality of stay and studying the modifiable physiological effects of therapeutic music.
Objectives: This study aims to identify how therapeutic music conditions influence electroencephalogram (EEG) markers associated with neurophysiological function. These findings may ultimately inform interventions designed to improve patient outcomes in diverse populations.
Methods: Data were collected from fifty adult hospital inpatients receiving at least two hours of EEG monitoring for clinical purposes. Therapeutic sessions consisted of randomized 3-min conditions of live music, recorded music, pink noise, and no music with 2-min "babble" washout periods in between each condition [3]. Live music consisted of jazz and classical genres played on piano, violin, viola, cello, or saxophone. Recorded music and pink noise were delivered through sterilized headphones. De-identified EEG clips were processed and analyzed using MATLAB(R) to determine frequency composition, frequency variability and complexity. The Kruskal–Wallis test was used to compare EEG metrics across music conditions.
Results: Relative alpha power (RAP), relative delta power (rDP), delta variability (SVD), and approximate entropy (ApEn) showed no significant differences across the four music conditions. However, the no music condition showed on average, higher RAP, ApEn, and SVD compared to conditions with auditory stimuli.
Conclusions: This study explored how different music conditions correlate with neurophysiological responses, using EEG markers associated with specific patient outcomes. While the data yielded no significant differences across music conditions for the EEG markers tested, average increases between music and no music conditions in markers associated with healthy brain states (RAP, ApEn, and SVD), suggest music may play a role in influencing these markers and associated outcomes such as delirium. Future studies can explore additional EEG markers and vary length of exposure in the auditory conditions.

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Topic: Health services research and outcome

001025

Optimized intravenous heparin dosing in acute pulmonary embolism: a reinforcement learning approach

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Intensive Care Medicine Experimental 2025,* 13(1)*:001025

Introduction: Pulmonary embolism (PE) is frequent in critically ill patients and represents a leading cause of death in that setting. First-line treatment in acute PE is intravenous unfractionated heparin (IV-UFH), however, the therapeutic margin for IV-UFH is narrow, exposing patients to over- or under-treatment of PE, both of which compound risk [1].
Objectives: Evidence shows that current IV-UFH dose–adjustment protocols are imprecise. Here, we develop a novel approach which leverages reinforcement learning (RL), a type of artificial intelligence which optimizes choices in a defined decision space.
Methods: We identify adult patients with acute PE who were admitted to the ICU at Johns Hopkins from 2013 to 2024 [2]. Clinical variables, laboratory studies, and physiological data are used as inputs to an offline RL model (Q-learning) which is trained to make IV-UFH dose recommendation every 4 h (Fig. 1), with hospital survival as a model reward parameter. The model uses a clustering algorithm to assign patients to one of six latent states, then maps the state to an IV-UFH dosage. By applying this process repeatedly at each decision node, the algorithm optimizes dosages that minimize the risk of

hospital mortality with each new patient trajectory. The treatment gap between the recommendations of the RL policy and the dose that was implemented by the medical team (clinician policy) is then determined by computing the cumulative magnitude of RL policy–clinician policy dosage offset normalized by patient stay duration. The resulting distribution of normalized dosage differences (NDD) is then divided into three bins, and for each bin, and the corresponding 30-day mortality rate is calculated for each bin.
Results: In 757 adult ICU patients diagnosed with acute PE, the dosing policy trained using a static target aPTT range as the model reward showed no statistically significant difference in mortality across the NDD bins. The NDD between the AI and clinician policies correlated inversely with hospital survival, with patients in the lowest NDD bin having the highest survival rate (95.3%), whereas those in the highest NDD bin having the lowest survival 76.3% ($p = 0.006$).
Conclusions: These preliminary findings suggest that an RL algorithm for IV UFH dosing may be effective as an automated tool to personalize IV-UFH treatment in critically ill patients with PE.

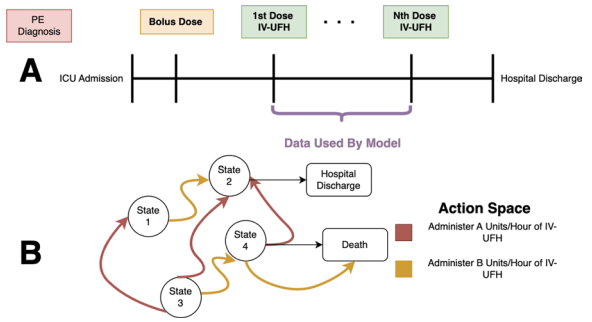


Fig. 1 (abstract 001025) **A** Observation window. **B** Example patient trajectories created through unsupervised clustering of patient data. The final AI policy learns from these trajectories and maps each underlying patient state to one IV-UFH dosage

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2. ohns Hopkins inHealth. PMAP: The Johns Hopkins Precision Medicine Analytics Platform. https://pm.jh.edu/
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Topic: Information systems and data science

001026

Hyperbaric therapy with pure oxygen in carbon monoxide poisoning

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Intensive Care Medicine Experimental 2025,* 13(1)*:001026

Introduction: Carbon monoxide (CO) is an odorless, tasteless, colorless, nonirritating gas formed by hydrocarbon combustion. CO binds to hemoglobin with much greater affinity than oxygen, forming carboxyhemoglobin (COHb) resulting in impaired oxygen transport. CO can precipitate an inflammatory cascade that results in central nervous system (CNS) lipid peroxidation and delayed neurologic sequelae (DNS).
Objectives: Review CO poisoning-related complications and posible neurological sequelae.
Methods: We have carried out a retrospective observational study in an 18-bed ICU of a second level centre. We are a reference centre for hyperbaric oxygen therapy (HOT) in the whole region of Catalonia.
Results: We reviewed patients who underwent HOT for acute CO poisoning between 2012 and 2025. HOT has been performed in a total of 1524 patients of which 41 were admitted to the ICU. 36.59% (15) were women and 63.41% (26) were males. The median age was 60 years. 90.24% (37) were admitted under mechanical ventilation, 100% (15) of women and 88.46% (23) of males. Intubation was used to protect the airway when the Glasgow Coma Scale was lower than 8 or in the presence of soot in the airway.
Reviewing the analytical data, we found that most of the patients had lactic metabolic acidosis with mean lactate levels of 3.117. Elevated cardiac markers have been detected in 46.34% (19) with an average of 105,68 ng/L, a mínimum value of 0.3 and maximum of 20083 ng/L.
The COHb levels ranged between 2.1 and 76% with a mean of 24.85. All were administered the standard adult dose of 5 g iv hydroxycobalamin.
HOT was carried out in all patients using pure oxygen at a pressure of 2,5-3 atmospheres during 60–120 min. Complications arising from therapy were observed in 24.39% (10) as otic barotrauma and 4.87% (2) developed bronchospasm.
The ICU lengh of stay was 5.7 days. The hospital lengh of stay was 11,97 days.
Major acute complications detected in our series were in one case acute respiratory failure caused by PTE and constrictive bronchiolitis, ARDS requiring ECMO and toxic myocarditis. Neurological sequelae included gait disturbance in one patient and basal ganglia leukoencephalopathy with parkinsonism (DNS) in another patient. Two patients developed anoxic coma as a fatal complication of CO.
Mortality in our case series was 7.31% (3).
Conclusions: After reviewing the series of patients admitted to the ICU for CO poisoning, we detected some serious pulmonary or cardiac complications, which have already been described in the literature. We found very few late neurological sequelae and a low mortality similar to that described.
Having reviewed our case series, although small, we believe that HOT performed within the first 24 h of the acute event could reduce short- and long-term sequelae.

Topic: Pharmacology and toxicology/poisoning

001027

A mixed-methods exploration of the impact of musculoskeletal health problems on returning to work and volunteering activities following discharge from ICU

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Intensive Care Medicine Experimental 2025,* 13(1)*:001027

Introduction: Long-term physical disability, decreased health related quality of life (HRQOL), and high healthcare utilisation are common following critical illness (1). Disability can be characterised using the World Health Organisations International Classification of Functioning, Disability, and Health (ICF) framework (2). Return to paid employment or volunteering are important long-term post-ICU outcomes and can be situated within the participation domain of the ICF. Musculoskeletal (MSK) health problems are known to be severe and prevalent

following critical illness, negatively impacting long-term physical function (ref). MSK health problems sit within the body function and structure domain of the ICF, resulting in limitations at the activity and participation domains, including return to work or volunteering. However, return to work or volunteering readiness should also be evaluated considering both personal and environmental factors, which are likely to be richer when explored qualitatively. Therefore, understanding the MSK health problems and experiences of those hoping to return to work will contribute to the development of specific, impairment-focused rehabilitation following critical illness.
Objectives: To explore patients experiences of readiness to return to work and volunteering in patients with severe MSK health problems six month following admission to ICU.
Methods: This study received ethical approval (21/NS/0143) and represents a sub-analysis of a subset of a large UK multicentre observational study which prospectively evaluated MSK health following critical illness (2). Participants were followed-up by telephone six months following admission to ICU where their MSK health and HrQOL were evaluated and details of their return to employment explored. Participants reporting severe disability relating to MSK health were invited to share their experiences of living with MSK impairments during semi-structured interviews. These were audio recorded, transcribed verbatim and thematically analysed.
Results: Eleven participants with severe MSK health related disability were interviewed). Most participants ($n = 9$, 81.8%) presented with multisite MSK problems and poor HRQOL (median EQ5D 40, IQR 35–60). Seven participants were employed prior to their ICU admission, five (71.4%) of those were newly unemployed post-ICU, all of whom worked in manual jobs (4). From the interviews, exemplar quotes included: 'I am a mechanic by trade so with my hand not working, it's not really [possible]; and 'We have got a village studio full of community spirit…So to have you been involved with…I just don't feel able now…. From my back….' These suggest working themes of 'Physical losses impacting work' and 'Lack of self and contribution to community spirit'.
Conclusions: Six months following admission to ICU, of those employed preadmission 71.4% were newly unemployed and all were manual workers. Returning to work and volunteering were considered important milestones following critical illness, with experiences of MSK impairments reducing or preventing participation.

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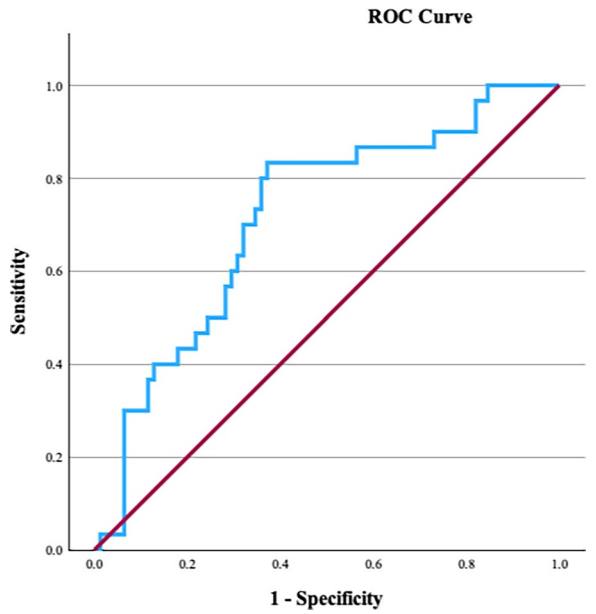
Topic: Nursing care and physiotherapy

001028

Box ratio as a predictor of brain oxygenation improvement after RBC transfusion in patients with acute brain injury

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Intensive Care Medicine Experimental 2025,* 13(1)*:001028

Introduction: During acute brain injury (ABI) low PbtO2 was demonstrated to be independently associated with a significant improvement of brain oxygenation after red blood cells transfusion (RBCT).
Objectives: We aim to identify if BOx ratio (i.e. PbtO2/ PaO2 ratio) can be used as a predictor of this improvement.
Methods: We retrospectively analyzed a cohort study from 2012 to 2020 including three European Intensive Care Units of University Hospitals located in Belgium, Switzerland and Austria, including all patients with acute brain injury, who were monitored with brain tissue oxygenation (PbtO2) catheters and received at least one RBCT. We identified as responders the events associated with an increase > 20% from the baseline value of PbtO2 after transfusion. We collected the PbtO2 and PaO2 values at the time of transfusion and two hours after and calculated the corresponding BOx ratios.
Using a linear mixed model, we then identified the variables independently correlated with the response to transfusions.
Results: We included 69 patients receiving a total of 106 RBCTs. Baseline hemoglobin (Hb) and PbtO2 were 8.0 [7.4-8.7] g/dL and 23 [20–30] mmHg in the nonresponders group and 7.7 [7.1–8.6] g/dL (p 0.137) and 18 [13–22] mmHg (p 0.001) in the responder group; whereas the BOx ratio was, respectively 0.21 [0.15–0.28] in the nonresponders and 0.16 [0.1–0.21] in the responders group (p 0.004).
The generalized mixed model showed that high heart rate (HR) and low BOx ratio at baseline were independently associated with a 20% increase in PbtO2 after RBCT. The area under the receiver-operator curve for the ability of baseline BOx ratio in identifying responder was 0.72 (95% CI 0.61–0.82). The cutoff with the best compromise between sensitivity (80.3%) and specificity (60.3%) was a BOx ratio of 0.183. A BOx ratio of 0.183 had a positive predictive value of 45.5% and a negative predictive value of 90.6%.
Moreover, in the group of responders the BOx ratio showed a statistically significant increase from the baseline to 2 h after the transfusion, going from 0.16 [0.10–0.21] of the baseline to 0.21 [0.16–0.28] after transfusion ($p < 0.001$), while this increase was not found in the group of nonresponders.
Conclusions: Lower BOx ratio values at baseline could predict a significant increase in brain oxygenation after RBCT. Moreover, a significant improvement in BOx ratio values after transfusion was described in the responder group, suggesting a clinical value of this new parameter.



Receiver-operator curve for the ability of baseline BOx ratio in identifying an increase > 20% from the baseline value of PbtO2 after transfusion.

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Topic: Neurointensive care

001029

Comparison of volume support versus pressure support ventilation as a weaning mode in mechanically ventilated patients: An open labelled randomised controlled study

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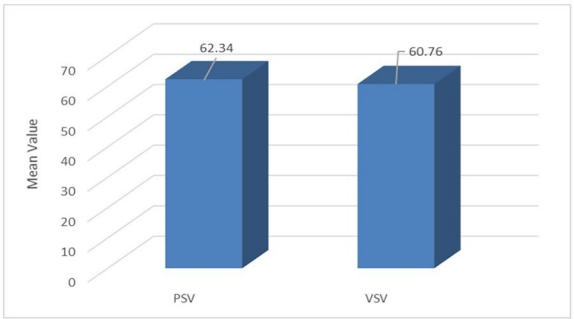
Introduction: Our study aimed to compare the efficacy of the two weaning modes VSV and PSV in terms of weaning success, defined as no requirement of ventilatory support after 48 h of weaning from mechanical ventilation.

Objectives: ·The primary outcome was to evaluate the efficacy of the weaning mode by achieving successful weaning with no requirement of ventilatory support after 48 h of weaning from the ventilator. The secondary outcomes were number of weaning trials given by using each mode and the number of weaning failures in each mode. Respiratory rate of the patient on each mode,evel of PaCo2 on each mode after two hours, four hours, eight hours, twelve hours, and twenty-four hours, comparison of hemodynamic changes in both the groups; and, evaluation of sedation requirement in both the groups to prevent patient ventilator asynchrony.

Methods: We conducted an open labelled randomized control trial with 82 patients and compared the efficacy of volume support ventilation and pressure support ventilation for weaning in mechanically ventilated patients admitted to the adult intensive care unit of our institute. The weaning mode was selected randomly using a sequentially numbered, opaque, sealed envelope method. Heart rate, systolic, diastolic, and mean blood pressure, respiratory rate, saturation of oxygen and serial ABG values of pH, PaO2, PaCO2, PaO2/FiO2, HCO3—were collected at two, four-, eight-, twelve-, and twenty-four-hour time intervals. The rate of successful weaning, duration of weaning, hemodynamic changes and sedation requirements were compared between the two weaning modes.

Results: The study included 41 patients in each PSV and VSV group. There was no difference in the duration of weaning [(62.34 ± 21.22 h) in PSV and 60.76 ± 23.05 h in VSV) in both the groups. The rate of successful weaning, reintubation, hemodynamic parameters, ABG parameters and sedation requirements were also comparable in both the groups.

Conclusions: Neither of the weaning modes—volume support ventilation or pressure support ventilation—proved to be superior to the other for weaning from mechanical ventilation.



Comparison of duration of weaning among the study population.

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2. None

Topic: Acute respiratory failure and mechanical ventilation

001030

Barriers and opportunities in large-scale record linkage

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Introduction: ICU cohort studies contain rich data, but follow-up often ends at discharge. Linking cohorts with national databases can

extend follow-up and enhance variable depth, creating more robust datasets. However, this requires a clear framework and regulatory guidance, as these data sources are often built for different purposes and created under different governance structures.
Objectives: To describe the feasibility of large-scale record linkage.
Methods: Our base cohort included all ICU admissions in two academic medical centers. This was linked to four national databases: population registry (PR), national cause of death registry (NCDR), Dutch hospital discharge registry (DHDR), and a bacterial culture database (ISIS-AR). Linkage occurred within a secure research environment provided by a governmental institute. For linkage, participants in external databases were assigned a record identification number (RIN) based on a combination of identifying characteristics.
Results: We linked 6,300 ICU patients to PR (27 M records), NCDR (4 M records), and DHDR (44 M) records. Linkage to ISIS-AR is ongoing. Time from applying for data use to successful linkage ranged from 1 to > 9 months.
We identified important barriers. Different institutions gave differing legal advice, despite all following the same privacy laws. Even in the face of the comprehensive GDPR, each institution interprets the law differently. Despite preference from the governmental statistic institute to use citizen service number (CSN) for the most accurate linkage, both academic medical centers did not approve this. We instead used gender, date of birth, postal code, and date of death.
Despite growing support for data sharing, we noticed hesitancy and mixed interpretations of data ownership agreements. For one database of patient data from different institutions, data sharing and linkage was straightforward. For another database with patient data (from partly the same institutions), several participating institutions wanted to re-review the ownership conditions of data that was already shared at the national level.
We also identified many opportunities. Many national databases live in the remote research environment, so participants already have RINs assigned based on CSN, and access to these databases is granted quickly. Uploading external databases to this centralized environment reduces the need to move sensitive data between institutions. While linkage of these external databases is difficult without approval to use CSN, we achieved 94% linkage using unique combinations of variables. To link ISIS-AR, we plan to also use bacterial culture date and hospital admission date.
Conclusions: Data linkage creates valuable datasets, leading to new collaborations and research possibilities. The most important barrier we identified is that each institution interprets the same laws in different ways and thereby puts up different barriers. A framework for data federation and clear regulatory guidelines would reduce the burden of record linkage.

References
1. Funded by ZonMw project 10150022310012

Topic: Information systems and data science

001031
Predicting functional decline in acute ischemic stroke patients treated with thrombectomy
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Introduction: Mechanical thrombectomy has become the cornerstone in the management of acute ischemic stroke due to large vessel occlusion. Despite advances in care, many patients experience poor functional outcomes. Identifying predictors of outcome may support timely interventions and better patient selection.
Objectives: This study aims to identify early predictors of poor functional outcomes in stroke patients treated with mechanical thrombectomy (MT) via the emergency stroke pathway.
Methods: A retrospective cohort study included all patients admitted through the emergency room stroke pathway and treated with MT between January 2022 and December 2024. We included patients with a previous modified Rankin score (mRS) ≤ 2 and wake-up strokes or stroke onset within 4.5 h. The outcome was dichotomised as good (mRS 0–2) vs. poor (mRS 3–6) functional status at hospital discharge. Univariable logistic regression was first conducted to identify candidate predictors, followed by a multivariable model that included those with the strongest associations.
Results: A total of 190 patients were included, with 63% ($n = 121$) presenting poor functional outcomes at discharge (mRS 3–6), including death ($n = 35$).
In Table 1, we presented the variables studied and their association with poor outcomes.

Variable	Total ($n = 190$)	Poor outcome ($n = 121$)	Crude OR (95% CI)	Univariable *p* value
> 65 years old, n(%)	145 (76.3%)	98 (80.1%)	1.994	0.047
Male Gender, n(%)	87 (45.8%)	56 (46.3%)	1.056	0.875
HBP, n(%)	140 (73.7%)	93 (76.9%)	1.555	0.190
DM, n(%)	54 (28.8%)	37 (30.6%)	1.347	0.383
Obesity, n(%)	47 (24.7%)	28 (23.1%)	0.792	0.500
Tobacco use, n(%)	19 (10.0%)	12 (9.9%)	0.975	0.960
Wake-up stroke, n(%)	52 (27.4%)	36 (29.8%)	1.403	0.330
Thrombolysis, n(%)	89 (46.8%)	52 (43.0%)	0.652	0.158
Time to MT, median (IQR)	158 (129–191)	152 (127–191)	0.999	0.828
Previous mRankin, median (IQR)	0 (0–0)	0 (0–1)	2.051 per point	< 0.001
NIHSS, median (IQR)	11 (7–16)	19 (15–22)	1.187 per point	< 0.001

HBP high blood pressure, *DM* diabetes mellitus, *IQR* interquartile range

Variables retained in the final model were higher NIHSS on admission with an adjusted OR = 1.191 (95% CI 1.122–1.264, $p \leq 0.001$) per point and pre-stroke functional status (mRankin) with an adjusted OR = 2.051 (95% CI 1.294–3.254, $p = 0.002$).
The final model performed significantly better than the null model ($p < 0.001$), with a Nagelkerke R^2 of 0.362. It demonstrated good discrimination (AUC = 0.815) and accurate classification overall (76.8%). Sensitivity was 86.8%, and specificity was 59.4%.
Conclusions: Baseline neurological severity and pre-stroke functional status are strong, independent predictors of poor functional outcomes following mechanical thrombectomy. These results underscore the importance of incorporating NIHSS and pre-stroke mRS into early triage and decision-making tools. Future protocols and predictive models should systematically include these variables to better guide patient selection, tailor post-acute care strategies, and optimise resource allocation.

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Topic: Neurointensive care

001033

Outcome of status epilepticus admitted in a neurointensive care unit

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Intensive Care Medicine Experimental 2025,* 13(1)*:001033

Introduction: Status epilepticus is a medical emergency with an incidence of approximately 20–40 per 100,000 and a global mortality rate of 10–20%, which can rise to 80% after anoxic events.
Objectives: To analyse the morbidity and length of hospital stay in patients admitted to a Neurocritical Care Unit with status epilepticus.
Methods: Longitudinal, retrospective study in a Neurocritical care unit for adult patients performed from January 2014 to January 2020. Demographic variables, type of seizure, GCS at admission, etiology, clinical presentation, modified Status Epilepticus Severity Score (mSTESS), administered treatment, duration of invasive mechanical ventilation (IMV), length of stay in the intensive care unit (ICU) and hospital, and major complications during admission were collected (acute renal failure, arrhythmias, metabolic acidosis,haemodynamic complications, infections, critical illness polyneuromyopathy, rhabdomyolysis and cerebral edema). Poor outcome was defined as death or Glasgow Coma Scale (GCS) score $\leq$ 13 at hospital discharge**.**
Categorical variables are expressed as frequencies and percentages and continuous variables as mean and standard deviation (SD) when the data followed a normal distribution, or as median and interquartile range (IQR = 25th—75th percentile) when the distribution deviated from normality. Percentages were compared, as appropriate, by the Chi-square test or Fisher's exact test, means by the *t* test and medians by the Wilcoxon test for independent data. Statistical significance was set at $p < 0.05$. The data were analyzed with the R package, version 4.2.1 (R Development Core Team, 2022).
Results: Out of the 47 patients, 32 exhibited a good outcome (68%). Mortality was 19% (9 patients). The mean age was 50 years ($\pm$ 23.1), with 66% of patients being male. No significant differences were found in demographic variables or etiology of status epilepticus between the two groups. Univariate analysis revealed significant differences in haemodynamic complications; 9 patients (60%) in the poor outcome group vs 6 patients (18.8%) in the good outcome group. In addition, statistical differences were found in the duration of IMV, with a median of 14 days (5; 36) in the poor outcome group compared to 3.5 days (1.8; 16.5) in the good outcome group. Finally, the poor outcome group had a statistically significant higher score on the mSTESS prognostic scale, with a median of 4 (3; 5) points as compared to a median of 3 (2; 3.2) points in the good outcome group.

Table 1 (abstract 001033) Results

	Overall (*N* = 47)	Good outcome (*N* = 32)	Poor outcome (*N* = 15)	*p* value
Age (years)	50.0 ± 23.1	51.7 ± 16.6	46.4 ± 33.5	0.47
Sex male	31 (66.0)	24 (75.0)	7 (46.7)	0.056
Death	9 (19.1)	0	9 (60.0)	–
Arrhythmias	5 (10.6)	2 (6.2)	3 (20.0)	0.309
Haemodynamic complications	15 (31.9)	6 (18.8)	9 (60.0)	0.008
Infections	24 (51.1)	17 (53.1)	7 (46.7)	0.68
mSTESS	3 (2; 4)	3 (2; 3.2)	4 (3; 5)	0.039
IMV duration (days)	5 (2.5; 25.5)	3.5 (1.8; 16.5)	14 (5; 36)	0.01

Data are means ± SD, frequencies (%) and medians (IQR)

Table 2 (abstract 001033) Multivariate logistic regression for bad prognosis

	p value	Odd ratio (95% CI)
Haemodynamic complications	0.005	6.500 (1.665–25.376)

Conclusions: Haemodynamic complications was identified as an independent risk factor for developing a poor outcome.

Topic: Neurointensive care

001034

Can one question reflect it all? Correlation between FS-ICU 24R and a single-item satisfaction score

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Introduction: Family satisfaction is a key indicator of quality in intensive care units (ICUs), especially after the discharge of critically ill patients. The FS-ICU 24R questionnaire is one of the most widely used tools to assess family satisfaction with care and involvement in decision-making. Understanding how family members perceive the care received can guide improvements in patient-centered and family-centered care models. Moreover, the use of simpler measures, such as a single-item question on the likelihood of recommending the ICU, may represent a practical alternative for overall satisfaction assessment.
Objectives: To evaluate family satisfaction after ICU discharge using the FS-ICU 24R questionnaire and to verify the correlation between its overall satisfaction score and a single-item question on the likelihood of recommending the ICU.
Methods: This longitudinal study included family members of patients who stayed $\geq$ 48 h in the ICU of a tertiary hospital in São Paulo, Brazil. Data were collected after the patient's ICU discharge while they remained hospitalized. Family satisfaction was measured using the FS-ICU 24R includes 24 items and generates three scores: satisfaction with care, satisfaction with decision making, and overall satisfaction (combining both domains). Scores range from 1 to 5 and were rescaled to 0–100 scale for comparability ([raw score-1) $\times$ 25]). A single-item question, based on the Net Promoter Score (NPS) methodology, assessed the likelihood of recommending the ICU (0 = not at all likely to 10 = extremely likely). Sociodemographic data were also collected.
Results: We evaluated 62 family members, median age was 59 [47.5–70.5] years, 69.4% were females. Most were spouses (45.2%) or children (33.9%) of the patients; and most 61.3% lived with the patient and 38.7% lived in a different city. A university-level education was

reported by 74.2%. Mean rescaled satisfaction scores were: 85.3 for care, 84.3 for decision making, and 84.0 for overall satisfaction. Sociodemographic variables, such as relationship to the patient and education level showed no significant association with overall satisfaction, suggesting others factors may play a larger role in family perceptions. The single-question score about the likelihood of recommending the ICU to others had a median of 10 [9–10]. This score showed a moderate and significant correlation with the FS-ICU24R overall score, with Spearman's test ($r = 0.516$; $p < 0.01$).
Conclusions: Family satisfaction with care and decision-making after ICU discharge was high in this cohort. The moderate correlation between the FS-ICU 24R overall score and a single-item question suggests that simplified tools may be valid and useful for assessing general satisfaction in critical care settings.

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2. We are deeply grateful to the families who generously shared their time and experiences. This work would not have been possible without you.

Topic: Health services research and outcome

001037
Analysis of mortality in patients with spontaneous intracerebral hematomas in a tertiary-level ICU
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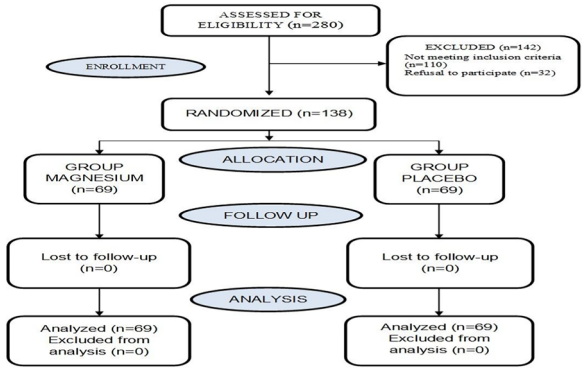
Introduction: The development of spontaneous intracerebral hematomas is a condition with increasing frequency in our setting and a growing reason for ICU admission. The therapeutic management of these patients and their prognosis have been changing in recent years, leading to an increase in the number of patients in critical care.
Objectives: To analyze the mortality of patients admitted to the ICU due to spontaneous intracerebral hematomas between the years 2019 and 2024 based on different prognostic variables.
Methods: A retrospective and analytical study was conducted with patients who developed spontaneous intracerebral hematomas and required ICU admission between January 2019 and June 2024. Demographic variables, therapeutic approach, and final clinical outcomes were collected. Descriptive statistics were performed using measures of central tendency and dispersion for quantitative variables, and frequency analysis for qualitative ones. Statistical analysis was conducted using the independent samples Student's t test. Statistical significance was established at $p < 0.05$.
Results: A total of 215 patients were included between January 2019 and June 2024. Of these patients, 69 died in the ICU or during hospitalization (32%), and 146 survived (67.9%). The average age of the surviving patients was 57 years, while that of the deceased was 62 years. The average APACHE II score of deceased patients was 21, compared to 15 in surviving patients. The average ICU stay for deceased patients was 3.9 days, compared to 20.71 days for survivors. Among the deceased patients, 7 underwent emergency surgery, while 60 of the survivors underwent surgery.Statistically significant differences were found regarding APACHE II score on admission ($p < 0.0001$), ICU length of stay ($p < 0.0001$), and age ($p < 0.01$). Significant differences were also found regarding the performance of emergency surgery in relation to mortality, with an odds ratio (OR) of 0.16.
Conclusions: The analysis of these patients shows that those who died had greater severity upon admission, were older, and had a shorter average ICU stay. Undergoing emergency surgery appears to be a protective factor regarding patient mortality. Further studies are needed to assess outcomes in larger samples.

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Topic: Neurointensive care

001039
The impact of magnesium on the clearance of lactate in patients presented to emergency department with sepsis: a randomized clinical trial
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Introduction: We investigated the impact of magnesium on the clearance of lactate in patients who were diagnosed with sepsis in the emergency department.
Methods: In this randomized trial, 138 adult patients with sepsis with serum lactate levels > 2 mmol/L presented to the emergency department were randomized into the magnesium (M) group and placebo (P) group. The individuals in group M were administered 2 g of magnesium sulphate infusion diluted in 50 ml of normal saline over 2 h for three days. The individuals in group P were administered an identical volume of normal saline for three days. We compared time to 20% lactate clearance, changes in lactate clearance, intensive care unit (ICU) duration, hospital stay and 28-day mortality in both groups.
Results: Time to 20% lactate clearance was considerably lower in the M group (5.73 ± 2.19 h) when compared with the P group (8.54 ± 2.72 h), $p < 0.001$. The mean increase in lactate clearance was markedly more significant in the M group than the P group on day 1 (18.88 ± 1.80% vs 12.61 ± 1.94% respectively, $p < 0.001$), on day 2 (30.02 ± 4.30% vs 23.34 ± 4.76% respectively, $p < 0.001$) and day 3 (50.74 ± 6.06% vs 37.94 ± 4.53% respectively, $p < 0.001$). The M group also had a significantly shorter length of ICU and hospital stay and a lower 28-day mortality than the P group.
Conclusions: Adding magnesium decreases the time required for lactate clearance, shortens the length of ICU and hospital stays, and lowers 28-day mortality rates in patients presented to emergency department with sepsis.



Consort flow diagram.

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2. None.

Topic: Sepsis

001040

Predictors of permanent pacemaker implantation in a TAVI program at a secondary-level hospital

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Introduction: Severe aortic stenosis (AS) is a prevalent condition in the elderly population and is associated with significant morbidity and mortality when left untreated. Transcatheter aortic valve implantation (TAVI) has emerged as the preferred therapeutic option for patients at increased surgical risk, offering a less invasive alternative to surgical valve replacement. Despite its clinical benefits, TAVI is frequently complicated by conduction disturbances, often leading to the requirement for permanent pacemaker implantation (PPMI), which may impact both short- and long-term outcomes.
Several baseline electrocardiographic abnormalities, such as right bundle branch block (RBBB) and atrial fibrillation (AF), have been reported as potential predictors of post-TAVI PPMI, although the findings have been inconsistent across studies. Moreover, the need for pacemaker implantation following TAVI varies widely between centers, influenced by patient characteristics, procedural factors, and device type.
In this single-center prospective study, we aimed to identify pre- and post-procedural predictors of PPMI in patients undergoing TAVI. We also evaluated the clinical profile and outcomes of extremely elderly patients in this cohort, with the goal of improving risk stratification and guiding clinical decisions in this increasingly common intervention.
Objectives: The primary objectives were to identify the predictors of new permanent pacemaker implantation in patients with aortic stenosis (AS) undergoing transcatheter aortic valve implantation (TAVI). The secundary objectives were to study the characteristics, and outcomes of transcatheter aortic valve implantation (TAVI) among extreme elderly.
Methods: We conducted a prospective observational cohort study at a secondary-level in Granada (Southern Spain) between 2021 and 2024. A total of 160 consecutive patients with severe aortic stenosis (AS) who underwent transcatheter aortic valve implantation (TAVI) were evaluated. Patients with a prior permanent pacemaker ($n = 15$) and those with missing data for key variables ($n = 5$) were excluded, resulting in a final cohort of 140 patients for the primary analysis.
Baseline clinical characteristics, laboratory tests, 12-lead ECG, and transthoracic echocardiography were recorded. Variables assessed included left ventricular ejection fraction (LVEF), atrial fibrillation (AF), right bundle branch block (RBBB), atrioventricular block (AVB), prior coronary artery disease, and previous valvuloplasty. Postprocedural ECG findings such as new RBBB and complete AV block were also analyzed.
The primary outcome was the need for permanent pacemaker implantation within 30 days after TAVI. Statistical analysis was performed using multivariate logistic regression. Two models were built: one including only preprocedural variables and a second incorporating postprocedural ECG changes. Age and baseline creatinine were excluded due to lack of statistical significance. The results were expressed as odds ratios (OR) with 95% confidence intervals (CI), and a p value < 0.05 was considered significant.
Results: The mean age was 82 years, and 54,4% were females. 80.2% had LVEF > 50%, 71.2% did not have coronary disease. Among the 140 eligible patients, 31 (22,1%) underwent pacemaker implantation ≤ 30 days following TAVI. 7 (4,8%) died during hospital admission and 13 (8,9%) during 1 year follow up. On multivariable analysis, right bundle branch block (OR 6,456, 95% CI 2,316–17,991) and atrial fibrillation at baseline (OR 3,185, 95% CI 1,226–8,272) were predictors of pacemaker implantation. Female sex protected (OR 0,403, 95% CI 0,164–0,99) against pacemaker implantation. Right after the TAVI implantation, complete atrioventricular block (OR 4,097, 95% CI 1,391–12,069) and right bundle branch block (OR 4,384, 95% CI 1,552–12,384) were strong predictors of pacemaker implantation.
Conclusions: In our current study, atrial fibrillation and right bundle branch block have shown to be pre procedure predictors of pacemaker implantation, as right bundle branch block and atrioventricular block after the procedure. Female sex protects against pacemaker implantation.

Variable	OR (Exp B)	95% CI Lower	95% CI Upper	p-value
Female sex	0.403	0.164	0.990	0.047
Atrial fibrillation	3.185	1.226	8.272	0.017
Right bundle branch block (RBBB)	6.456	2.316	17.991	<0.001

Interpretation: Female sex was associated with a decreased risk of permanent pacemaker (PPM) implantation. Atrial fibrillation and pre-procedural RBBB significantly increased the risk of PPM implantation.

Female sex was associated with a decreased risk of permanent pacemaker (PPM) implantation. Atrial fibrillation and pre-procedural RBBB significantly increased the risk of PPM implantation.

Variable	OR (Exp B)	95% CI Lower	95% CI Upper	p-value
Right bundle branch block (RBBB)	4.384	1.552	12.384	0.005
Complete AV block post-TAVI	4.097	1.391	12.069	0.011

Interpretation: Both pre-procedural RBBB and post-procedural complete AV block were strong predictors of the need for a permanent pacemaker after TAVI.

Both preprocedural RBBB and postprocedural complete AV block were strong predictors of the need for a permanent pacemaker after TAVI.

Variable	Category	Frequency	Coding
LVEF <40%		12	1.000
LVEF 40–50%		14	1.000
LVEF >50%		114	0.000
Previous valvuloplasty	Yes	16	1.000
Previous valvuloplasty	No	124	0.000
Previous CAD	Yes	43	1.000
Previous CAD	No	97	0.000
Pre-intervention ECG rhythm	AF	35	1.000
Pre-intervention ECG rhythm	Sinus	105	0.000
Pre-intervention RBBB	Yes	22	1.000
Pre-intervention RBBB	No	118	0.000
Pre-intervention AV block	Yes	22	1.000
Pre-intervention AV block	No	118	0.000
Sex	Female	78	1.000
Sex	Male	62	0.000

Categorical predictive variables with their coding and frequency. Note: In addition to these categorical variables, continuous variables such as age and baseline creatinine were also included, but were excluded from the models due to lack of statistical significance.

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Topic: Perioperative care

001041

Clinical and demographic profile of ICU patients with epileptic disorders: a 3-year historical cohort study

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Introduction: Epileptic disorders, are neurological emergencies defined by prolonged or recurrent seizures without full recovery, often requiring intensive care unit (ICU) admission due to its life-threatening nature [1]. Management is time-sensitive and involves multiple drugs including anesthetics and a continuous monitoring [2–3]. Despite advances, these disorders remain a major cause of ICU resource use and mortality [4].
Objectives: To describe the clinical and demographic characteristics, therapeutic strategies, type of EEG monitoring, and outcomes of patients admitted to an ICU with epilepsy disorder over a 3-year period.
Methods: This retrospective cohort study included all adult patients admitted to our ICU between January 2021 and December 2023 with a diagnosis of epileptic disorders at admission or during their ICU stay. Collected data included demographic, severity scores (SAPS II), EEG modality, therapeutic interventions, mechanical ventilation, length of stay, Clinical Frailty Score (CFS) at discharge, and mortality (ICU, 30-day, 60-day).
Results: A total of 112 patients (70 men, 42 women) were included, with a mean age of 59.3 years (range 26–86). Mean SAPS II was 49.3. Mechanical ventilation was required in 92 patients (82.1%), with a mean duration of 11.7 days. Average ICU stay was 15.3 days (range 1–99). Among the cohort, 9 patients (8%) were classified as NORSE. In terms of treatment strategy, 36% of patients received benzodiazepines antiepileptic drugs (AEDs) and 64% nonbenzodiazepine antiepileptic drugs as first-line therapy. In second-line therapy, 21.95% were administered benzodiazepines AEDs and 78.05% nonbenzodiazepine AEDs. Third-line regimens involved benzodiazepines AEDs in 26.92% and nonbenzodiazepine AEDs in 73.08% of cases. Anesthesic drugs were required in 47 patients (42%) for seizure control or to facilitate mechanical ventilation. Continuous EEG monitoring was performed in 27 patients (24.1%), and intermittent EEG in 85 (75.9%). ICU mortality was 31 patients (27.7%). In addition, 7 patients (6.25%) died within 30 days of ICU discharge, and 7 (6.25%) within 60 days. The median CFS at discharge was 4(range 2–8).
Conclusions: The identification of NORSE cases in 8% of patients and the use of sedative drugs in 42% reflect the high clinical complexity of seizure management in the ICU setting.The meadian moderate-low level of dependency observed in most patients after ICU discharge can be interpreted as a favorable prognosis.
This study contributes real data on our epileptic disorders ICU population management and outcomes, reinforcing the need for a multidisciplinary approach. This investigation is a beginning for future studies aimed, for example, at identifying prognostic markers to improve care for these patients.

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Topic: Neurointensive care

001042

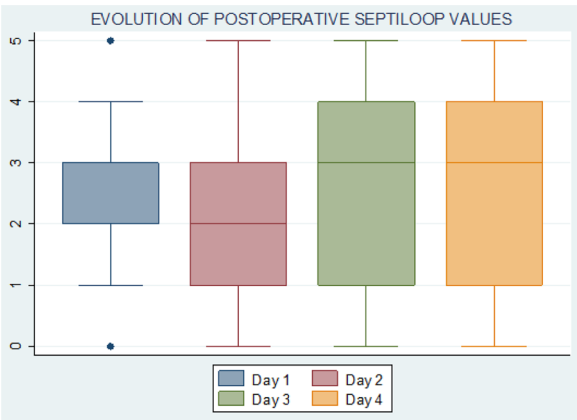
Endotoxin tolerance after abdominal surgery and risk of postoperative infection

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Introduction: SeptiLoop is a new in vitro diagnostic test that uses a lipopolysaccharide antigen to stimulate cells in heparinised whole blood. The detection of tumour necrosis factor-alpha (TNF-α) by lateral flow assay (LFA) is used to identify in vitro responses to the antigen that are associated with bloodstream infection and sepsis. This phenomenon when inhibited is known as endotoxin tolerance (ET).

Objectives: The aim of this study was to describe the postoperative ET rate (Septiloop levels 0 or 1) and TNF-α levels after exogenous stimulation in the first 4 days after postoperative major abdominal surgery. As a secondary objective, we compared the rate of postoperative infection in patients with lower vs higher levels of TNF-α.
Methods: We designed a prospective observational study.
All patients scheduled for abdominal surgery with a high risk of intra-abdominal infection (IAI) who gave informed consent for the study were consecutively selected.
To interpret the test results, it should be noted that the lateral flow strip developed by Loop Diagnostics is designed to detect the presence of TNF-α in a blood sample after stimulation with LPS. Detection of this biomarker is indicative of the endotoxin tolerance (ET) status of the patient's immune cells. To illustrate the results of TNF-α detection in the sample, the strip has two positions where a red band may appear upon contact with the sample: a control position, indicated by a letter 'C', and a test position, indicated by a letter 'T'. A scoring table on a scale of 0 to 5 of the possible intensities that the test line could show was included. The intensity of the strip is proportional to the TNF-α levels.
The test was performed once a day during the first 4 postoperative days. Variables related to the patient, the surgical intervention and the postoperative evolution were collected. The diagnosis of postoperative infection was considered according to international criteria (CDC.gov).
For descriptive analysis, quantitative variables were expressed by mean and standard deviation if they follow a normal distribution, otherwise by median and interquartile ranges. Qualitative variables were expressed by absolute number and percentage. For comparative analysis between populations (Septiloop negative and positive) Student's *t* test (for quantitative variables) or its corresponding parametric and Chi-square (for qualitative variables) were used.
Results: 120 postoperative major abdominal surgery patients (colorectal surgery (77.6%), pancreatectomy (9.2%) and gastrectomy (13.2%)) were collected.
The median Septiloop value was 2 on the first two postoperative days and 3 on the third and fourth day. 53.5% patients had ET defined as Septiloop of 0 or 1.
The overall postoperative infection rate was 15.8%. 64.4% had IAI, 36.8% had surgical site infection and 10.5% had urinary tract infection. Regarding severity of infection, 52.6% had local infection as compared to 47.4% who developed sepsis, septic shock or multiorgan dysfunction syndrome.
The infection rate in patients with Septiloop values 0–1 on any of the first 4 postoperative days was 28.13% versus 1.79% in patients with values > 1 ($p < 0.001$).
Conclusions: Postoperative high-risk major abdominal surgery was associated with alterations in immune response the first 4 postoperative days. Patients with lower TNF-α levels after exogenous toxin exposure had a higher postoperative infection rate.
Septiloop is a simple, noninvasive test with a high potential to predict the risk of infection in the postoperative period after abdominal surgery.



Evolution of postoperative septiloop values.

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Topic: Infections and prevention

001043

Primary versus secondary decompressive craniectomy in traumatic brain injury (TBI)

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Introduction: Intracranial hypertension (ICH) worsens TBI prognosis and may require barbiturates or decompressive craniectomy (DC) when refractory to medical therapy1-4. Although DC reduces ICP and improves cerebral perfusion5,6, its prognostic value remains controversial, especially in the absence of a mass lesion7–13. Trials such as DECRA14 and RESCUEicp15 report reduced mortality, but with greater functional disability. Most studies do not distinguish between primary and secondary DC10,13,16–27. The timing may influence outcomes 10, 12, 28, although evidence remains inconsistent 11,12,17,26,28–30.
Objectives: To compare clinical and epidemiological characteristics of TBI patients undergoing primary vs secondary DC in a single-center cohort.
To develop a prognostic scoring system based on these variables to identify candidates for primary DC without the need for invasive confirmation of refractory ICH.
Methods: This was a single-center retrospective observational study including TBI patients admitted to the ICU at Hospital Clínico San Carlos (2014–2024), who underwent primary(prophylactic) or secondary(therapeutic) DC. Cases requiring secondary DC after a prior primary procedure were excluded. Clinical, epidemiological, and radiological variables were collected. Statistical analysis included univariate tests (Kolmogorov–Smirnov, Chi-square, Student's *t* test or Mann–Whitney *U*), survival analysis (Log-Rank test), binary logistic regression, and ROC curve analysis performed using SPSS v15.0.
Results: Of the 312 patients, 72 required DC: 45 primary and 33 secondary. Patients undergoing primary DC showed greater clinical severity at admission (GCS 3vs10; APACHEII 22vs18; $p < 0.0001$), higher mydriasis (55.6%vs22.2%; $p = 0.006$), hemodynamic instability (31.1%vs7.4%;p = 0.019), and mortality (ICU 42.2%vs14.8%; in-hospital 46.7%vs22.2%). Radiological findings in the primary DC group included more frequent midline shift (86.7%vs44.4%), ventricular collapse (68.8%vs29.6%), and perimesencephalic cistern compression (68.2%vs22.2%) (all $p < 0.0001$). Subdural hematomas were larger in primary DC (10 mm vs 5 mm; $p = 0.006$) In contrast, cerebral contusions were more common in secondary DC (81.5% vs 48.9%; $p = 0.006$). Secondary DC was performed at a median of 35 h from admission (range 1–312 h).A logistic regression model was developed to predict the indication for primary DC. Independent predictors included perimesencephalic cistern compression (OR4.73; 95% CI 1.39–17.1), midline shift (OR4.7; 95% CI 1.25–17.6), and hemodynamic instability (OR4.89; 95% CI 0.89–26.7). The model showed good discriminatory capacity (AUC 0.821; 95% CI 0.72–0.92; $p < 0.0001$) (Fig. 1).

Conclusions: Primary DC patients showed more severe clinical and radiological findings at admission, which may justify earlier intervention despite higher mortality, likely reflecting initial injury severity. The predictive model showed strong discriminatory power and may help identify candidates for primary DC without requiring invasive ICP monitoring.

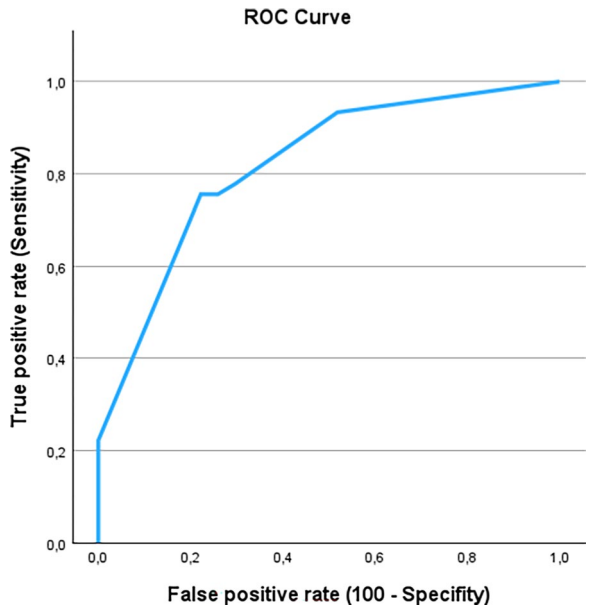


Fig. 1 (abstract 001043) ROC curve used to evaluate the discriminatory performance of the predictive model

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Topic: Trauma

001044

Cerebral ischemia and transfusion strategies in acute brain injury patients: a post hoc analysis of the TRAIN study

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Introduction: Acute brain injury (ABI) is associated with high mortality and long-term disability. Cerebral ischemia is an important mechanism of secondary brain injury, resulting from impaired oxygen delivery due to reduced cerebral blood flow, low arterial oxygen content, or metabolic uncoupling (1). The aim of this study was to evaluate predictors of cerebral ischemia in ABI patients and whether a liberal transfusion strategy would influence the occurrence of such event.

Methods: This is a post hoc analysis of the TRAIN study (2). Cerebral ischemia was reported by local investigators according the presence

of a new (e.g. occurring after randomization) ischemic lesion visible on brain imaging (e.g. either CT-scan or MRI). The primary outcome was to identify the predictors of cerebral ischemia. Secondary outcomes included the association of transfusion strategy (liberal vs. restrictive) on its occurrence and the impact of cerebral ischemia on functional outcome at 6 months, assessed by the Glasgow Outcome Scale–Extended (GOSE, unfavorable outcome = GOSE 1–5).
Results: Out of the 820 included patients, 92 (11.2%) developed cerebral ischemia after randomization. Patients with ischemia were more frequently female (75% vs. 42%, $p = 0.001$) and had more often a subarachnoid hemorrhage as initial ABI (70% vs. 17%, $p = 0.001$). Cerebral ischemia occurred more frequently in patients randomized to the restrictive strategy (62% vs. 50%, $p = 0.04$) compared to liberal one. In an unadjusted analysis, liberal transfusion was associated with a reduced risk of ischemia (OR 0.62, 95% CI 0.40–0.97); however, in a multivariable logistic regression analysis adjusted for age, ABI, GCS at randomization, hemoglobin at randomization, and elevated ICP requiring second-tier therapy, liberal strategy was not significantly associated with a reduced risk of cerebral ischemia (adjusted OR 0.65, 95% CI 0.41–1.03). Patients with cerebral ischemia had significantly higher rates of unfavourable functional outcome (85% vs. 65%, $p = 0.001$) than others. In a multivariable analysis, cerebral ischemia was independently associated with unfavorable functional outcome (adjusted OR 2.65, 95% CI 1.39–5.07).
Conclusions: In this post hoc analysis of the TRAIN study, cerebral ischemia occurred in 11% of patients with ABI and was independently associated with worse functional outcome. Although a liberal transfusion strategy was associated with a reduced incidence of cerebral ischemia in univariate analysis, this association could be influenced by other confounders.

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Topic: Neurointensive care

001045

Tissue macrophages stem sepsis induced altered organ repair

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Introduction: Sepsis is the most severe form of infections. It is both frequent and severe. Awareness regarding long-term consequences of sepsis, after ICU discharge, is rising. Sepsis survivors face an increased risk of developing organ failure, such as chronic kidney disease or heart failure. Although numerous studies investigated the early immune mechanisms involved during sepsis, the pathophysiology of those long-term phenomenon has been poorly investigated.
Methods: We developed a mouse model of sublethal sepsis using cecal ligature punction (CLP) model. Multiparametric Flow cytometry, FateMapping experiments and scRNAseq were used together with spatial transcriptomic analyses to unravel the origin, kinetic and profile of intrarenal and intracardiac macrophages following sepsis and relation with long-term outcome. We later used a two-hit model combining CLP and angiotensin-2 infusion to test cardiorenal resilience to subsequent immune chalenge.
Results: Our results showed that sublethal sepsis causes transient and reversible renal and heart failure but induces a durable increase in tissue resident macrophages. Fate mapping study showed that the rise in macrophages numbers was mainly due to recruited monocyte-derived macrophages. scRNAseq and spatial transcriptomics analyses of heart and kidney showed that monocyte-derived macrophages had a distinct transcriptomic signature with pro-inflammatory and pro-fibrotic features that is associated with proinflammatory environment. This change in tissue macrophage landscape is associated with poor resilience to secondary hits with an increase in mortality and tissue fibrosis observed when septic mice are undergoing an angiotensin-2 challenge.
Conclusions: Our findings suggest that macrophages stem sepsis-induced altered organ repair and could represent a therapeutic target to improve septic patient long-term outcomes.

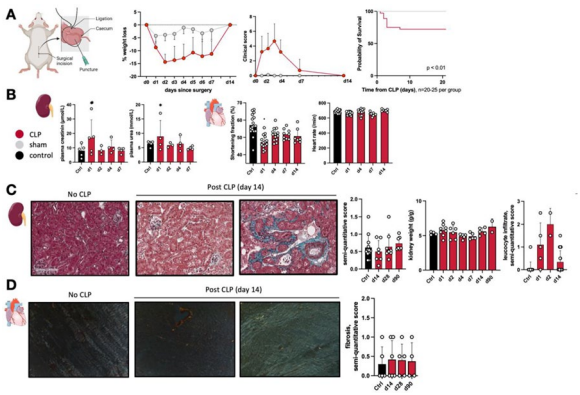


Fig. 1 (abstract 001045) Sepsis is associated with transient and reversible organ dysfunction. **A**Diagram of sub-lethal cecal ligature punction model. Weight loss and behavioral changes were returned to normal values among survivors by day 14. Survival curves confirmed the sub-lethal nature of our model **B** Diagram of plasma urea and creatinine following sepsis as well as echocardiographic constatations. **C** Histology analyses (Masson Trichrome) of kidney after CLP, fibrosis was assessed using semi-quantitative score by blinded physician, tubular atrophy was assessed by monitoring kidney weights at various time-points. **D** Histology analyses (Sirius red) of cardiac fibrosis after sepsis, fibrosis was assessed using semi-quantitative score by blinded physician. *$p < 0.05$; $n = 2–10$, 1-way
ANOVA followed by Tukey's multiple comparisons test. The data are mean ± SEM.

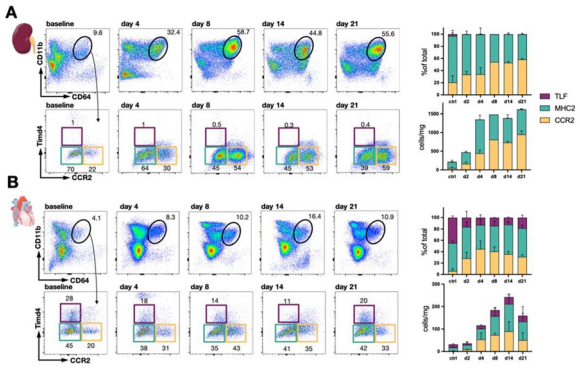


Fig. 2 (abstract 001045) Sepsis induces profound and durable alterations of intra-organ macrophages number and subsets. Heart **A** and kidney **B** tissues were isolated from adult wild-type mice and single-cell suspensions were prepared for flow cytometry. Macrophages were identified as live + lin-CD45 + CD64 + CD11b + later stratified based on expression of TIMD4 and CCR2. For complete gating strategy see Supplementary Figure S1. *$p < 0.05$; $n = 2–6$; the data are mean ± SEM

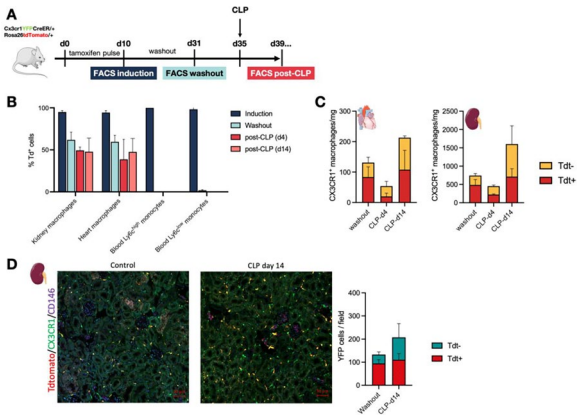
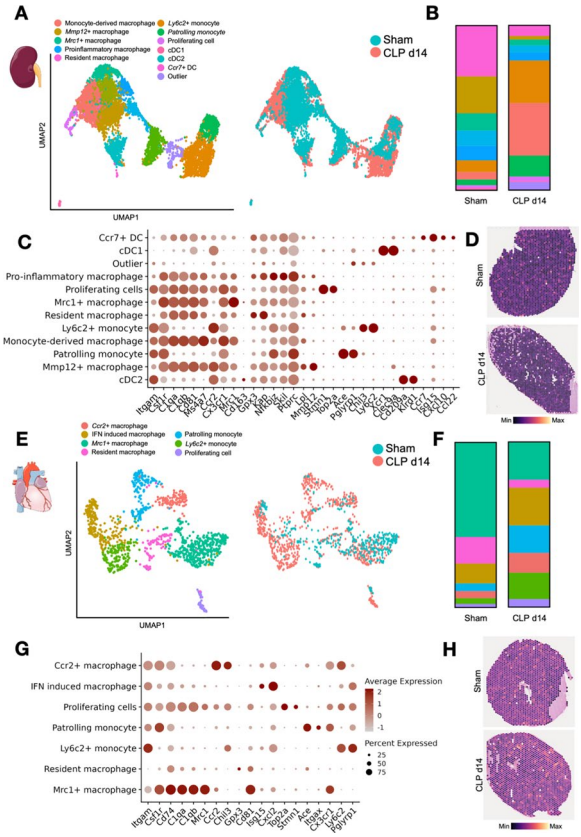


Fig. 3 (abstract 001045) Fate mapping analysis identifies monocytes-derived macrophages as the main source of tissue macrophages expansion during sepsis. **A** 6–10-week-old c57Bl6 Cx3Cr1YFP-CreER/ + Rosa26Tdtomato/ + mice were fed with tamoxifen-containing chow for 10 days. By day 10, we confirmed by flow-cytometry the complete induction of Cre Recombinase. After a period of washout of 21 days (confirmed by flow cytometry), mice were subjected to cecal ligature punction. Flow cytometry was used at different timepoints to assess abundance and Tdt + retention of intra-organ macrophages. **B** Percentage of Td + cells in tLy6Chi monocytes, Ly6Clo monocytes, kidney and heart after induction, after washout or at different timepoints following sepsis. **C** For each timepoints, total number of intra-organ macrophages was assessed and Tdt + retention was computed. **D** Representative immunofluorescence staining of EYFP (green), Tdtomato (red) and CD146 (violet) in of adult Cx3Cr1YFPCreER/ + Rosa26Tdtomato/ + mice at day 14 after sham or CLP, × 20 magnification, Quantification of the proportion of Tdt + in macrophages was performed by blinded physician ($n = 2–3$)



(abstract 001045) Single cell characterization of myeloid cells in the septic organs. scRNA-seq analysis of identifies seven heart monocyte and macrophages cell types, with dynamic changes in the proportion and transcriptome of each cell type observed across the septic model. **A** tSNE plot of 7642 pooled myeloid cells from kidney from each time point, annotated by cell type and condition. ($n = 3$ per time point). **B** Relative proportions of each cell type at each time point. **C** Dotplots showing the expression levels of selected marker genes in each cluster. **D** Spatial transcriptomic analyses revealed few kidney spots containing macrophages based on canonical markers **E** tSNE plot of 943 pooled myeloid cells from heart for each time point, annotated by cell type and condition. ($n = 3$ per time point). **F** Relative proportions of each cell type at each time point. **G** Dotplots showing the expression levels of selected marker genes in each cluster. **H** Spatial transcriptomic analyses revealed few kidney spots containing macrophages based on the canonical markers

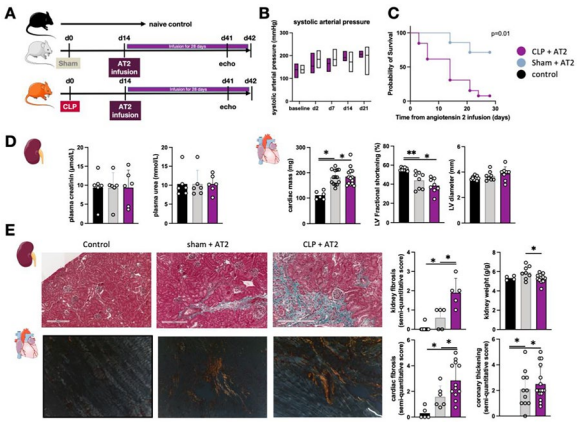


Fig. 7 (abstract 001045) Sepsis causes altered organ repair after second hit. **A** C57bl6 WT mice were randomly assigned to receiver either CLP or sham operation. After complete recovery from the septic episode (day 14), sepsis-surviving mice and sham operated mice were subjected to continuous angiotensin (AT) 2 infusion (800 ng/kg/min) combined with salty drinking water (NaCl 0.2%) for 28 days. Echocardiographic evaluation was performed by blinded physician just before sacrifice. **B** AT 2 infusion induced hypertension as confirmed by arterial pressure monitoring, appearing from day 2 **C** Survival curves of WT mice when exposed to AT2 demonstrates an important mortality among sepsis survivor mice when exposed to AT 2 as compared to sham operated mice **D** Plasma urea and creatinine did not differ with baseline after AT 2 infusion. Echocardiography revealed increased cardiac mass and reduction of fractional shortening consistent with AT 2 induced cardiac hypertrophy **E** Weighting of kidney was in favor of tubular atrophy in CLP mice after AT2 infusion. Histological analyses of kidney (Masson trichrome) revealed fibrosis in both conditions, with a strong increase among sepsis-surviving mice. Heart analyzes (Sirius red) revealed coronary thickening, consistent with intense sheer stress induced by AT 2 infusion. Fibrosis was present in both conditions; it was more important in sepsis survivors as compared with sham operated mice. Coronary thickening and fibrosis were assessed using semi-quantitative score by a blinded physician; *t* test was performed; *$p < 0.05$; **$p < 0.01$; data are mean ± SEM

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Topic: Sepsis

001048

Trend of midodrine use in the neurocritical care unit

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Introduction: Midodrine, an oral alpha-1 agonist, has been increasingly used as an adjunct to reduce the need for intravenous vasopressors in critically ill patients. However, its application in neurocritical care remains underexplored.
Objectives: This study aimed to describe the trends in midodrine use at a high-complexity neurocritical care center, including its impact on blood pressure and vasopressor requirements.
Methods: We conducted a retrospective observational study reviewing medical records of adult patients who received midodrine between January 1, 2013, and July 31, 2024, at a neurocritical care unit (NCCU). Data collection included demographic characteristics, hospitalization details, midodrine indications, hemodynamic parameters, vasopressor use, and adverse events. Statistical analysis included paired *t* tests, Wilcoxon signed-rank tests, and logistic regression, with significance set at $p \leq 0.05$.
Results: A total of 84 patients were included, with a mean age of 57.3 years (SD ± 20.2), and 52.4% ($n = 44$) were male. The primary indications for midodrine were dysautonomia (50%, $n = 42$) and stroke-related conditions (36.9%, $n = 31$). The median time to midodrine initiation was 4 days (IQR: 1.0–11.25). Mean arterial pressure (MAP) increased from 80 mmHg (± 18) to 86 mmHg (± 15) at 24 h post-initiation ($p = 0.25$), while norepinephrine dose decreased from 0.025 ± 0.07 µg/kg/min to 0.01 ± 0.01 µg/kg/min ($p = 0.023$). One patient required discontinuation due to symptomatic bradycardia. The median length of NCCU stay was 7 days (IQR: 2–17.5), and total hospital stay was 13.5 days (IQR: 6–29). No significant correlation was found between midodrine dose and vasopressor reduction ($p = 0.383$).
Conclusions: Midodrine was associated with reduced vasopressor requirements and stable hemodynamic parameters in neurocritical ill and neurovascular patients, supporting its role as a potential adjunct for blood pressure management. The low incidence of adverse events reinforces its safety profile in our population.

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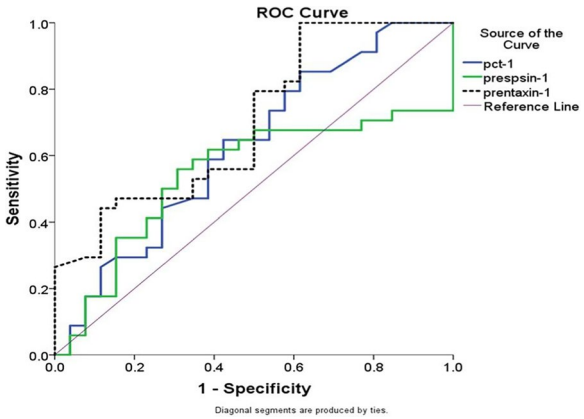
Topic: Neurointensive care

001049

Utility of pentraxin-3 and presepsin in prognosis of sepsis in critically ill patients

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Introduction: Sepsis is a clinical syndrome, triggered by a systemic infection and often resulting into successive organ failure and lethal outcome. Early diagnosis and identifying of patients with sepsis is therefore crucial as, early treatment and therapeutic interventions likely to improve it. The need for the hour is to have an inflammatory marker that predicts sepsis rapidly and effectively in order to initiate appropriate treatment as soon as possible. Although procalcitonin is found to be better than the inflammatory markers used earlier, reliability is still an issue. Hence, there is considerable space for searching new sepsis markers such as pentraxine 3 and presepsin. These biomarkers have shown significant potential of early diagnosis of sepsis in various studies worldwide. In the only study done on the Indian population, presepsin was found superior over procalcitonin in diagnosing sepsis. There have been no prior studies observing the relationship between Pentraxin-3 and sepsis in an Indian population.
Methods: In this prospective cohort study, adult patients (≥ 18 years age) having clinical features suggestive of sepsis as defined by Sepsis-3 definition (2016) at the time of ICU admission were enrolled. Blood sample was taken from the patient for the purpose of serum procalcitonin estimation at this time (day 1-D1). The test for presepsin and pentraxin-3 were done from the same sample. These tests were repeated on day 3 (D3), day 7 (D7) and at the time of discharge from Intensive care unit/death (Dd). We studied changes in pentraxin-3 and presepsin levels in patients with sepsis during first week of ICU admission. We also correlated levels of these markers with prognosis of patients.
Results: The study comprised 60 patients who satisfied the inclusion criteria. There was a serial decrease in all the 3 biomarkers values in patients who were discharged from the ICU and serial increase in the values in patients who died. On day 1, prentaxin-3 was the only marker found to have a significant predictive ability for ICU deaths [AUC 0.702; 95% CI 0.569–0.836, $p = 0.008$]. Using Youden's index method, the ideal cutoff is found to be 2.36 ng/mL, where the sensitivity was found to be 97.1% and specificity is 38.5%.
Conclusions: The use of procalcitonin, presepsin and pentraxin is good for screening of sepsis in intensive care unit. These can improve the outcome of sepsis by early institution of aggressive therapy in patients with high values of these markers thus potentially improving the mortality rates in sepsis. Out of all these 3 sepsis biomarkers, pentraxin has a high sensitivity for prediction of ICU mortality which shows that it is a significant marker of mortality is sepsis.



ROC curve of PCT, presepsin and pentraxin values on Day 1 against outcome to prognosticate 28 day mortality.

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10. Intramural Grant was received for this project.

Topic: Sepsis

001051

Angiotensin II and platelet count in patients with septic shock: a case series

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Intensive Care Medicine Experimental 2025,* 13(1)*:001051

Introduction: Thrombocytopenia is frequently observed in patients with sepsis. Angiotensin II (Ang II) is increasingly used in patients with septic shock. However, concerns exist regarding Ang II-associated thrombocytopenia and the increased potential for bleeding and thrombotic complications (1, 2).

Objectives: To investigate platelet count trajectories and possible adverse reactions associated with Ang II administration in patients with septic shock.
Methods: Adult patients with septic shock admitted to the medical intensive care unit (ICU) of the University Hospital Centre Zagreb were included in the study. We analyzed data from patients who required Ang II application for the treatment of septic shock regardless of platelet count. Patients signed informed consent at the beginning of the study. At admission, we recorded demographic data, comorbidities, SOFA score, and platelet count. We analyzed platelet trends and associated clinically significant bleeding and thrombotic events.
Results: Six patients were included (age: 71 ± 10 years, SOFA score: 13.3 ± 2.66). Patient data are presented in Table 1. Notably, 5 out of 6 patients had active malignant disease, and 4 out of 6 had ongoing therapy for these conditions. Platelet counts were recorded on the first, second, and third day. Patients that died within the first two days ($n = 2$) were excluded from the third day calculations. The one patient who received platelet transfusions was excluded from general platelet change calculation, but was observed individually for platelet dynamics. The mean platelet count decreased from 73.0 on Day 1 to 58.7 × 10^9/mL on Day 2. For the patients with Day 3 data available ($n = 3$), the mean platelet count change from Day 1 to Day 3 was -39.7 × 10^9/mL. While a decrease in platelet count was observed in most patients during the study period, with the majority (5/6 patients) progressing to severe thrombocytopenia (< 50 × 10^9/mL), none experienced clinically significant bleeding. In one patient receiving platelet transfusions during the study, we observed an adequate increase in platelet values without any thrombotic or other adverse effects. No thrombotic events were noted in this patient series. Patient outcomes differed with two patients (patients 2 and 6) being discharged alive from the ICU, while four patients died.
Conclusions: Thrombocytopenia in these patients is likely due to a combination of factors, including sepsis, malignant disease, and potentially vasopressor therapy. Despite observed platelet changes with Ang II use in refractory septic shock, this small case series suggests that clinically significant bleeding and thrombotic events may be uncommon in this specific cohort, even in the context of an underlying malignant disease. These findings warrant further investigation in larger, prospective studies to fully assess the safety profile of Ang II and to identify potential risk factors for thrombotic and bleeding complications.

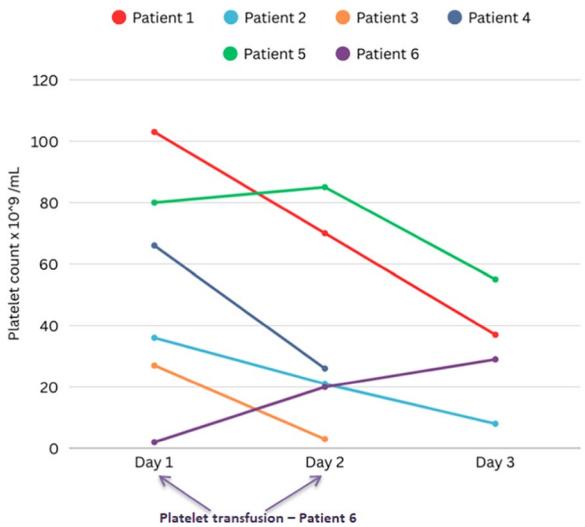


Fig. 1 (abstract 001051) Platelet count changes by day for each patient. Arrows pointing to days when platelet transfusion was administered to Patient 6

Patient Number	Sex	Age (years)	SOFA Day 1	AH	Malignant disease	Platelets Day 1 (x10^9/mL)	Platelet transfusion	Acute RRT	MV	ICU survival
1	F	75	12	-	+	103	-	+	+	-
2	M	61	12	+	+	36	-	-	-	+
3	M	70	12	+	+	27	-	-	+	-
4	M	70	18	-	+	66	-	-	+	-
5	M	66	15	+	-	80	-	+	+	-
6	F	55	11	-	+	2	+	-	-	+

M male, *F* female, *SOFA* Sequential Organ Failure Assessment, *AH* arterial hypertension, *RRT* renal replacement therapy, *ICU* intensive care unit, *MV* mechanical ventilation

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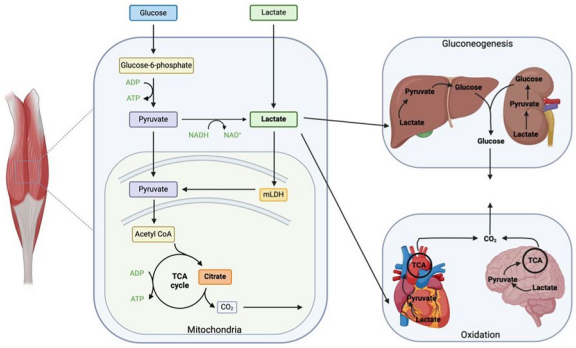
Topic: Sepsis

001052

Lactate as a predictor of citrate accumulation in patients undergoing continuous renal replacement therapy?

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Intensive Care Medicine Experimental 2025,* 13(1)*:001052

Introduction: Regional citrate anticoagulation (RCA) is the preferred strategy for continuous renal replacement therapy (CRRT). However, impaired citrate metabolism, observed in patients with liver failure, mitochondrial dysfunction, and/or shock, can result in potentially lethal citrate accumulation (CA). We aimed to evaluate the ability of elevated lactate levels to predict CA in critically ill patients undergoing RCA-CRRT.
Methods: We performed a comprehensive search in PubMed and Embase databases for studies involving adult critically ill patients who underwent RCA-CRRT, where both CA and lactate levels were assessed. The primary outcome was lactate levels in relation to patients with and without CA. The certainty of the effect estimates for each outcome and the quality of the included studies was assessed.
Results: We included seven observational studies comprising 1,573 critically ill patients undergoing RCA-CRRT. Five were deemed good quality evidence and two poor to answer the research question. We found a significant mean difference (MD) in baseline lactate levels (MD: 0.87, 95% CI [0.04; 1.70] $p = 0.04$, six studies, 1485 patients) between the CA and the non-CA group with very low confidence in the estimate. This difference was persistent between the two groups when using peak lactate levels (MD: 6.05, 95% CI [0.06; 12.03], $p = 0.05$, three studies, 271 patients), and the CA group had an overall higher mortality risk (OR: 5.24, 95% CI [1.05; 26.25], $p = 0.04$, five studies 1438 patients).
Conclusions: The evidence is very uncertain but elevated lactate may be associated with an increased risk of CA in critically ill patients undergoing RCA-CRRT.



Hypothesized mechanism of lactate in prediction of citrate accumulation. The whole-body lactate metabolism during exercise in healthy humans. Left side illustrates the intracellular pathway of lactate metabolism in muscle cells. Here lactate may be the end product of glycolysis and is either transported into the mitochondria where it is converted to pyruvate which is a substrate in tricarboxylic acid cycle or out of the cell. If lactate is transported out of the muscle cell, it can be used as a substrate for mitochondrial respiration in the brain and heart or transported to the liver and kidney for gluconeogenesis. Therefore, lactate can be considered as a surrogate marker of mitochondrial function and if mitochondrial function is impaired due to critical illness, citrate cannot be metabolized and will accumulate. *Acetyl CoA* acetyl coenzyme A, *mLDH* mitochondrial lactate dehydrogenase, *TCA cycle* tricarboxylic acid cycle. Adapted from Iepsen et al. 2022 and based on Brooks GA 2018.

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Topic: Acute kidney injury and haemofiltration

001053

Optimising sedation practice in a Scottish tertiary intensive care unit using a quality improvement approach

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Introduction: Background: Sedation is widely used in intensive care units (ICUs). However, inappropriate sedation is associated with adverse outcomes including prolonging mechanical ventilation and delirium. Therefore, national quality recommendations (1) advocate for daily sedation holds (SH) to optimise patient sedation.
Problem: Post-COVID-19, we observed issues implementing daily SHs in our 42-bed mixed level-2 and level-3 tertiary combined medical and surgical ICU; the largest ICU in Edinburgh. This led to low off-sedation neurological assessment rates and became an issue highlighted by national quality surveillance processes.
Objectives: Identify reasons for suboptimal sedation management and implement measures to improve sedation holds and off-sedation neurological status assessment rates.
Methods: Led by an Advanced Critical Care Practitioner (ACCP), a Quality Improvement (QI) project was designed using the Model for Improvement approach and implemented over several PDSA (Plan, Do, Study, Act) cycles. The project team assembled includes all identified MDT stakeholders (nurses, doctors, physiotherapists and a former ICU patient). The current sedation practice and barriers were identified through questionnaires. The results were fed back via pareto and fishbone charts. Discussions within the nursing team informed an empathy map. A data analyst helped support automated data extraction via the electronic patient record to allow evaluation of changes to sedation practice via an XmR chart.
Results: 1. Barriers Identified: Questionnaires and staff interviews identified uncertainty in decision-making, organisational factors and education gaps as the main themes obstructing optimum sedation management in our unit (Fig. 1).
2. Implementing Improvement Interventions: Identifying drivers to the above factors (Fig. 2) allowed implementation of targeted improvement measures over several PDSA cycles. Improvement measures included: 1) A tailored sedation hold guideline; 2) Improved medical staff induction; 3) Targeted nursing education including simulation and 'World Delirium Day' teaching.
3. Tracking Consequences of Interventions: An XmR chart (Fig. 3) continuously evaluated effects of interventions. Accounting for nonrandom variations after medical-staff turnover, we identified a sustained post-stabilisation shift after improvement interventions (run > 12 points above previous system mean) in off-sedation neurological assessment from a mean of 74.6% to a new sustained mean of 93.5%; establishing a 'New Standard System'.

Key Learning Points and Challenges:

- A multidisciplinary and motivated team to drive quality improvement is paramount.
- Presenting data visually and encouraging feedback and discussions from all staff groups is vital for buy-in.
- Data collection challenges during implementation of a new ICU electronic patient record system were managed with data-analyst support.

Conclusions: We demonstrated that an ACCP-led project, using robust QI methodology and involving several PDSA cycles, with involvement of the whole MDT, improves awareness of sedation practice and leads to a positive sustained shift in off-sedation neurological assessment.
Next Steps: The project continues with ongoing focus now on: (i) improving senior staff support and; (ii) increasing relative and patient involvement.

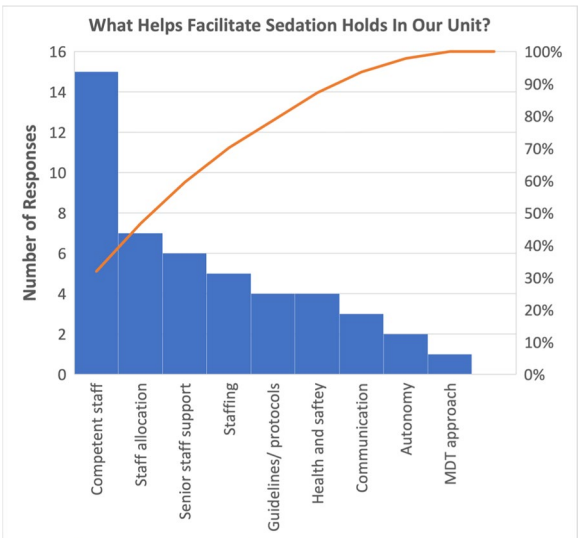


Fig. 1 (abstract 001053) Pareto chart identifying the key barriers preventing optimal sedation management in our ICU

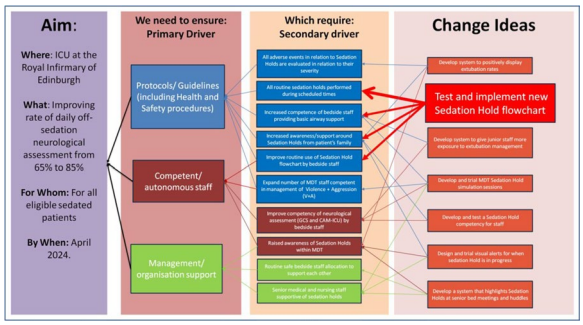


Fig. 2 (abstract 001053) Driver diagram identifying key drivers feeding into barriers

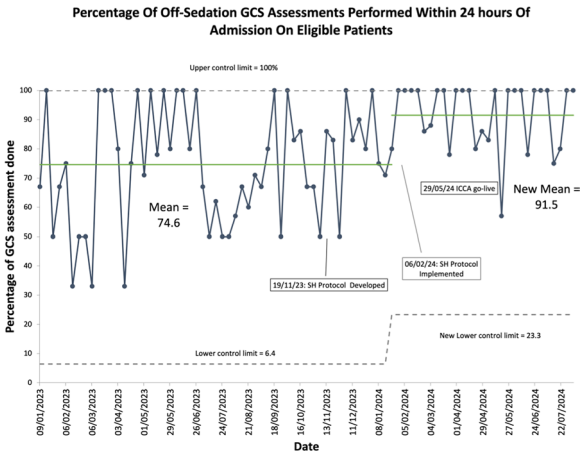


Fig. 3 (abstract 001053) XmR chart tracks and identifies improvements in off-sedation assessments following improvement interventions

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Topic: Sedation, analgesia and delirium

001054

Differences in mortality in critically ill patients between the use of electrical impedance compared with other forms of end-expiratory pressure titration: living systematic review

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Intensive Care Medicine Experimental 2025,* 13(1)*:001054

Introduction: Invasive mechanical ventilation (IMV) is one of the most common therapies in intensive care units (ICU), its objective is to partially and transiently replace respiratory function (1) Acute respiratory distress syndrome (ARDS) is a theoretical and practical challenge for IMV. Ventilatory strategies, such as tidal volume limitation, plateau pressure control and driving pressure in safe ranges have evidence for improving clinical outcomes in ARDS. However, evidence is limited for positive end-expiratory pressure (PEEP) titration, one of the ubiquitous components during IMV (2) The emergence in the last decade of electrical impedance tomography (EIT), introduced a new method for titrating PEEP and thus a new uncertainty (3).
Objectives: To identify differences in mortality in critically ill patients under IMV when PEEP is titrated by EIT compared with other titration methods.
Methods: A living systematic review of the literature was performed in the following databases: PubMed/Medline, Embase, Google Scholar and Cochrane following PRISMA 2020 guidelines. The search was restricted in time from the start of operation of the databases until April 1, 2025. The search focused on randomized controlled clinical trials (RCTs), with three reviewers. A thematic advisor and a methodological advisor accompanied the conduct of the review. RCTs were included that evaluated EIT as a method for PEEP titration and compared it with other techniques: pressure–volume curve, PEEP/FiO2 chart, esophageal manometry and distensibility. Complete texts in English and Spanish about humans were included. (Fig. 1) The authors were not contacted. The importance of the outcomes was defined according to the GRADE methodology by a panel of three subject matter experts. Bias analysis was performed with the ROB 2.0 tool (Fig. 2).
Results: The summary of the included studies is shown in Table 1. After the search, 125 studies were identified, of which 119 were discarded due to title and abstract. Six full texts were evaluated, from which four RCTs were selected that met the eligibility criteria, with low risk of bias and good GRADE quality. These trials evaluated mortality although for Hui-Ju Hsu et al. (4) it was a secondary outcome limiting the estimation of the effect and dose response, in addition the sample calculated for the protocol was not reached, however, the result was favorable for the EIT. The study by Huaiwu He et al. (5) did not identify significant differences between the two groups for 28-day mortality. In turn, the studies by Yuan et al. (2023) (6) and Wong et al. (2024) (7) are ongoing trials evaluating 28-day mortality as the primary outcome with better sample sizes ($N = 376$ and $N = 680$ respectively) (summary of results in Table 1).
Conclusions: This systematic review has found a clear trend in favor of PEEP titration by EIT since it seems to be associated with an improvement in outcomes such as 28-day mortality, (without sufficient power to establish significance), this is consistent with the available evidence in favor of EIT for physiological outcomes (respiratory mechanics and oxygenation). Owing to the fact that two studies with a larger sample power are being carried out, we have decided to leave the review alive and when the outcomes are available, we will propose a meta-analysis with their respective sequential analysis of clinical trials.

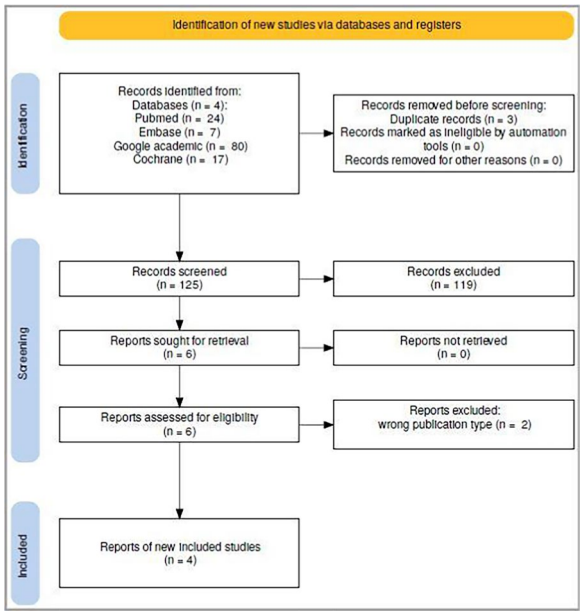


Fig. 1 (abstract 001054) Study flow diagram

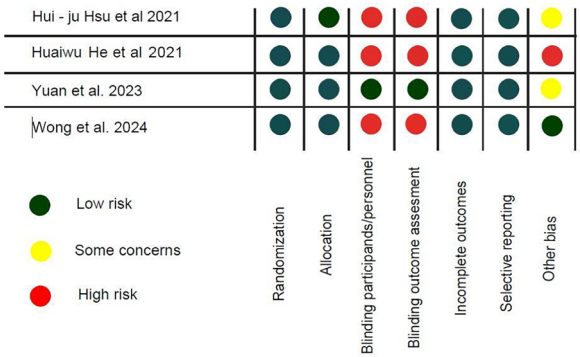


Fig. 2 (abstract 001054) Risk of bias analysis

Table 1 (abstract 001054) Summary of included studies

Reference	Design	Age (EIT vs Control)	Population	PEEP Test	*n*=	Mortality Outcome	Risk Estimate
Yuan et al. (2023)	Multicenter RCT (protocol)	≥18 y (mean not reported)	Moderate to severe ARDS (<72 h diagnosis)	EIT: EIT-guided PEEP Control: Low FiO2-PEEP table	376 (188 per group)	28-day (ongoing)	Not available
Wong et al. (2024)	Multicenter, open-label RCT	≥18 y (mean not reported)	ARDS (Berlin definition), on MV	EIT: EIT-guided PEEP + RM Control: Low FiO2-PEEP table	680 (340 per group)	28-day survival (ongoing)	Not available
Hsu et al. (2021)	Single-center RCT	EIT: 55.7±16.6 y Control: 62.2±15.3 y	Moderate to severe ARDS	EIT vs PV curve (max hysteresis)	87 (42 EIT, 45 PV)	69% vs 44.4%, p=0.02	HR 2.1 (1.1–3.9)
He et al. (2021)	Single-center RCT	EIT: 61 y (44–68) Control: 66.5 y (50–73)	ARDS (mild to severe), non-COVID	EIT (24h) vs Low FiO2-PEEP table	117 (61 EIT, 56 control)	21% vs 27%, p=0.634	RR 0.78 (0.41–1.47)

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Topic: Acute respiratory failure and mechanical ventilation

001055

Thyroid dysfunction in critically ill patients with sepsis and septic shock: a prognostic study

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Intensive Care Medicine Experimental 2025,* 13(1):*001055

Introduction: In addition to the macrocirculation and microcirculation consequences, sepsis and septic shock are associated with endocrine dysfunction(s) that may affect the outcome of critically ill patients. The literature data investigating the prognostic impact of thyroid dysfunction in critically ill patients with severe infection are scarce.
Objectives: To evaluate the impact of thyroid dysfunction on the 28-day mortality in critically-ill patients with sepsis and septic shock.
Methods: Retrospective study conducted between 01.01.24 and 31.03.25 in the intensive care units (ICUs) of two tertiary hospitals. All patients admitted with sepsis or septic shock and who had a thyroid function test collected within the first 48 h of admission were screened for inclusion. We excluded all patients with known thyroid disease, pregnancy and those with an underlying malignancy and an expected survival $\leq$ 30 days. Two groups were compared: 28-day survivors and 28-day nonsurvivors.
Results: Ninety-five patients were included. Median [Quartiles] age was 69 [59–79] years. Sex ratio (M/F) was 1.5. Diabetes and hypertension were the main recorded comorbidities (62.1% and 64.2%, respectively). SAPSII score calculated within the first 24 h of admission was 50 [36–64] and SOFA score was 11 [8–13]. Median [Quartiles] FT3, FT4 and TSH levels were 1.8 [1.4–2.4] pg/ml, 0.98 [0.83–1.3] ng/dl, and 1.8 [0.98–3.1] uIU/ml, respectively. Vasopressors were initiated for 72 (75.8%) patients and 61 (64.2%) patients required mechanical ventilation for 1- [3–22] days. Twenty-four (25.3%) patients developed acute kidney injury requiring renal replacement therapy. The source of sepsis was community or hospital acquired pneumonia in 45 (47.4%) patients, urinary tract infection in 23 (24.2%) patients, abdominal

sepsis in 9 (9.5%) patients, wound infection in 8 (8.4%) patients, and catheter-related blood stream infection in 6 (6.3%) patients. The sepsis was related to Gram negative bacilli in 59 (62.1%) patients. Twenty-eight patients (29.5%0 died by day-28.
Nonsurvivors had significantly lower FT3 serum levels (1.3 [1.1–2.4] pg/ml vs 1.9 [1.7–2.4] pg/ml; $p = 0.014$) whereas Ft4 and TSH were comparable between survivors and nonsurvivors (0.9 [0.8–1.2] ng/dl vs 1 [0.9–1.3] ng/dl; $p = 0.065$, and 2.1 [1–4.1] uIU/ml vs 1.6 [0.9–3] uIU/ml; $p = 396$, respectively). Nonsurvivors had also significantly higher SAPSII (57 [49–68] vs 42 [33–63]; $p = 0.002$) and higher SOFA score (13 [10–17] vs 10 [7–13]; $p = 0.001$). There were significantly more patients requiring mechanical ventilation (85.7% vs 55.2%; $p = 0.005$) and renal replacement therapy (42.9% vs 17.9%; $p = 0.011$) in the nonsurvivors group.
In multivariate analysis, only SOFA score on admission was identified as an independent factor predicting 28-day mortality (OR = 1.3 95% CI [1.1–1.5]; $p = 0.001$).
Conclusions: Sepsis and septic shock are associated with deranged thyroid function tests in critically ill patients. Low FT3 serum level was associated with higher 28-day mortality in the univariate analysis but not in the multivariate analysis.

Topic: Metabolism, endocrinology, liver failure and nutrition

001056

Performance of general and specific prognostic scores in acute decompensation of liver cirrhosis admitted to intensive care

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001056

Introduction: In Portugal, liver cirrhosis accounts for nearly 6 000 annual hospitalizations and 1 000 annual deaths (1). Acute decompensation events are responsible for 2,3–4,5% of all intensive care units (ICUs) admissions and are associated with high rates of short-term mortality (2). Prognostic assessment of these patients is essential to guide therapeutic decisions, prioritize resources, and discuss prognosis within the healthcare team and with the patient/relatives.
Objectives: To describe acute decompensation events in liver cirrhosis admitted to an ICU and evaluate the performance of general and specific prognostic scores in this population.
Methods: Retrospective cohort study of all cases of acute decompensation of liver cirrhosis without criteria for acute-on-chronic liver failure (ACLF) admitted to the ICU of a secondary care hospital between January 2022 and December 2023. The discriminative power of the prognostic scores [Child–Pugh (CP), Model for End-Stage Liver Disease Sodium Score (MELD NA), Acute Physiology and Chronic Health Evaluation (APACHE II), Simplified Acute Physiology Score (SAPS 2) and Chronic Liver Failure Consortium Decompensation Score (CLIF-C AD)] was evaluated by receiver-operator characteristics (ROC) curve analysis.
Results: A total of 99 patients with liver cirrhosis were evaluated, of whom 61% ($n = 60$) presented with acute decompensation of liver cirrhosis. This group had a mean ± SD age of 55 ± 8 years, 78% were males ($n = 47$), and alcohol was the most common etiology (93%, $n = 56$). The most frequent decompensating factor was hypertensive gastrointestinal bleeding (70%, $n = 42$). In 40% of patients ($n = 24$), the current episode was their first decompensation. Stratification through the CP score revealed, 35% ($n = 21$) of patients in CP class A, 43% ($n = 26$) in class B, and 22% ($n = 13$) in class C. The median (IQR) MELD NA score was 15 (11–19), the median (IQR) SAPS II score was 25 (18–37), the median (IQR) APACHE II score was 14 (9–18), and the median (IQR) CLIF-C AD score at admission was 53 (49–61).
Mortality in ICU, in hospital, at 28-days and at 1-year was 10% ($n = 6$), 17% ($n = 10$), 17% ($n = 10$) and 28% ($n = 17$), respectively. The overall performance of the scores is showed in Table 1.

Table 1 (abstract 001056) Overall performance of prognostic scores

AUROC curve (95% CI)				
Score	**ICU mortality**	**Hospital mortality**	**28-days mortality**	**1-year mortality**
Child–Pugh	0.500 (0.255–0.745)	0.681 (0.485–0.877)	0.681 (0.485–0.877)	0.657 (0.504–0.809)
MELD-NA	0.846 (0.643–1.000)	0.758 (0.559–0.957)	0.758 (0.559–0.957)	0.770 (0.627–0.914)
SAPS II	0.937 (0.874–0.999)	0.848 (0.666–1.000)	0.848 (0.666–1.000)	0.776 (0.624–0.928)
APACHE II	0.921 (0.830–1.000)	0.805 (0.645–0.965)	0.805 (0.645–0.965)	0.765 (0.627–0.902)
CLIF-C AD	0.765 (0.534–0.997)	0.500 (0.302–0.698)	0.500 (0.302–0.698)	0.500 (0.337–0.663)

Conclusions: In our population, SAPS II, APACHE II and MELD NA showed a better discrimination power in predicting short and long-term mortality. The more specific scores like Child–Pugh and CLIF-C AD were not useful in that prediction.

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Topic: Metabolism, endocrinology, liver failure and nutrition

001057

Predictors and clinical outcomes in patients undergoing TAVI at a secondary level hospital: a descriptive study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001057

Introduction: Transcatheter aortic valve implantation (TAVI) has become a widely accepted alternative to surgical aortic valve replacement, particularly in elderly and high-risk patients. As the indication for TAVI extends to intermediate- and high-risk populations, understanding the real-world characteristics and outcomes of patients undergoing this procedure is crucial. This study presents a descriptive analysis of a TAVI program initiated in 2021 at a secondary-level hospital, focusing specifically on patients admitted to the intensive care unit (ICU).
Objectives: To evaluate the anesthetic conditions under which TAVI was performed and to characterize the clinical profiles and short- and mid-term outcomes in this setting.
Methods: We conducted a retrospective observational study including all patients with severe aortic stenosis who underwent transcatheter aortic valve implantation (TAVI) between 2021 and 2024 in a secondary-level hospital in southern Spain.

Patients were not stratified by post-procedure conduction outcomes; instead, the entire cohort was considered as a single descriptive population. Data collected included demographics (age, sex), comorbidities (baseline creatinine, coronary artery disease), echocardiographic parameters (left ventricular ejection fraction), procedural sedation and anesthesic strategies, and the occurrence of peri- and postprocedural complications.

Complications were classified into vascular access-related, infectious, hemorrhagic, and others. Mortality was recorded both in-hospital and at one-year follow-up. Statistical analysis included descriptive measures.

Anesthetic strategies evolved from deep sedation and intubation in 2021, with routine use of central venous and radial access and bladder catheterization, to high-flow nasal oxygen and conscious sedation from 2022 onward. This transition marks a step forward toward minimally invasive procedural standards in our hospital.

Results: A total of 150 patients underwent TAVI between 2021 and 2024. The mean age was 78.9 years, and 67 patients (44.7%) were male. The mean baseline creatinine was 1.09 mg/dL. Regarding cardiac function, 122 patients (81.3%) had a preserved left ventricular ejection fraction (LVEF > 50%), while 12 (8.0%) had moderately reduced function (LVEF 40–50%), and 13 (8.7%) had severely reduced LVEF (< 40%). Coronary artery disease was documented in 40 patients (26.7%).

As for complications, 30 patients (20%) experienced vascular access-related issues. Infectious complications related to bladder catheterization were observed in 10 patients (6.7%), including 6 urinary tract infections and 4 cases of hematuria. Three patients (2.0%) had pericardial effusion as a hemorrhagic complication. Moderate to severe post-TAVI aortic regurgitation was found in 2 patients (1.3%), severe post-TAVI aortic regurgitation was found in 2 patients (1.3%).

Anesthetic management varied over time. Initially, all procedures in 2021 were performed under deep sedation with orotracheal intubation (17 patients, 11.3%). From 2022 onwards, most patients (141, 94.0%) received high-flow nasal oxygen therapy with conscious sedation. The most commonly used sedatives were propofol (n = 9), remifentanil (n = 38), and dexmedetomidine (n = 101), with 3 cases (2.0%) of bradycardia associated with the latter.

In terms of outcomes, in-hospital mortality was 4.7% (7 patients), while one-year mortality reached 8.7% (13 patients). There were also 4 intra-procedural cardiac arrests (2.7%), one of which resulted in death.

Conclusions: TAVI is a feasible and safe therapeutic strategy in secondary-level hospitals. Our experience confirms that most patients present with preserved LVEF and moderate comorbidity. Over time, we observed a clear trend toward minimally invasive strategies in anesthesia, vascular access, and avoidance of urinary catheterization, improving patient outcomes. Complication rates, particularly infections and bleeding, were relatively low. Based on our findings, institutional protocols were updated to eliminate routine bladder catheterization, orotracheal intubation and radial artery catheterization, reducing the risk of associated adverse events.

Integrated Summary Table - TAVI Program

Section	Variable / Item	n (%)
Section	Variable / Item	n (%)
Baseline Characteristics	Age (mean)	78.9
	Creatinine (mean)	1.09
	Male sex	67 (44.7%)
	LVEF >50%	122 (81.3%)
	LVEF 40–50%	12 (8.0%)
	LVEF <40%	13 (8.7%)
	Coronary artery disease	40 (26.7%)
Complications	Vascular access-related	30 (20.0%)
	UTI (related to catheter)	6 (4.0%)
	Hematuria (related to catheter)	4 (2.7%)
	Pericardial effusion	3 (2.0%)
	Moderate-severe aortic regurgitation	2 (1.3%)
Management & Outcomes	Orotracheal intubation (2021)	17 (11.3%)
	HFNO (2022 onward)	141 (94.0%)
	Propofol	9 (6.0%)
	Remifentanil	38 (25.3%)
	Dexmedetomidine	101 (67.3%)
	Bradycardia (Dexmedetomidine)	3 (2.0%)
	In-hospital mortality	7 (4.7%)
	1-year mortality	13 (8.7%)
	Intra-procedural cardiac arrest	4 (2.7%)

This table summarizes the main clinical and procedural characteristics of patients undergoing transcatheter aortic valve implantation (TAVI) in a secondary-level hospital. It includes baseline variables, complication rates, and management strategies used during the study period. Notably, the shift toward high-flow nasal oxygen (HFNO) and conscious sedation from 2022 onward is reflected in the procedural data. Outcomes, such as in-hospital and one-year mortality, as well as anesthesia-related events, are also detailed.

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Topic: Perioperative care

001058

The effect of a sleep-promoting protocol on sleep and delirium in ICU patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001058

Introduction: Poor sleep quality in intensive care units (ICU) is an important contributor to prolonged length of stay, higher incidence of delirium and mortality and is often the result of environmental, medical and psychological factors. The Society of Critical Care Medicine Clinical Practice Guidelines for Management of Pain, Agitation, Delirium, Immobility, and Sleep (PADIS) recommend implementing a sleep-promoting protocol of pharmacological and non-pharmacological interventions for sleep quality improvement in critically ill patients. The purpose of this study was to assess the quality of sleep and incidence of delirium in ICU before and after the implementation of a sleep-promoting protocol.

Methods: A prospective cohort study was conducted at Intensive Care Medicine Unit at University Medical Centre Ljubljana over 1-year period from July 2023 to July 2024, in which the sleep quality of admitted patients was assessed using a Richards–Campbell Sleep Questionnaire (RCSQ) and the incidence of delirium using CAM–ICU. The study period was divided into two parts: before and after the implementation of a sleep-promoting protocol, comprised of pharmacological and non-pharmacological interventions.

Results: 1043 questionnaires were obtained from 420 patients, 145 (34.5%) were female. The median RCSQ score was 55.0 mm. Higher noise levels had significant effect on sleep, with decreased sleep quality across all five categories of RCSQ (depth, latency, awakenings from sleep, ability to return to sleep and quality). Patients with delirium (143/880, 16.3%) had inferior sleep quality as compared to nondelirious patients (p < 0.001). After the implementation of protocol, reported noise levels were significantly reduced and sleep quality improved in all five categories (p < 0.001). There was no difference in the incidence of delirium. Before the introduction of the

protocol, fewer patients received at least one sleep-promoting agent (421/728, 57.8%) versus after (225/315, 71.4%). The most prescribed sleep-promoting agents were melatonin (265/1043, 25.4%) and dexmedetomidine (290/1043, 27.8%), with higher melatonin prescription after the implementation of the protocol (20.3% vs. 37.1%). Melatonin improved sleep latency, awakenings from sleep, and ability to return to sleep as compared to patients receiving no sleep-promoting agent ($p < 0.05$), but had no effect on the incidence of delirium.
Conclusions: Implementation of a sleep-promoting protocol, comprising of pharmacological and nonpharmacological interventions, was associated with significantly improved sleep quality in our ICU patients, further reinforcing the importance of sleep quality interventions in the ICU. Noise reduction, especially, presents an efficient and cost-effective intervention, emphasising the need for a structured approach to nonpharmacological sleep-promoting protocol.

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Topic: Sedation, analgesia and delirium

001059

Impact of a clinical pharmacist on the achievement of PK/PD targets in ICU: significant results of a comparative study on ceftazidime

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Introduction: The European Society of Intensive Care Medicine (ESICM) is devoting more and more attention to the clinical pharmacist (1) in the intensive care unit (ICU). Indeed, their presence is associated with a reduction in mortality and length of stay, in particular due to their expertise in pharmacovigilance and pharmacological optimization, including in multiorgan failure (1).
Objectives: From 2023, a pharmacist was present in our ICU 3 days a week. We wanted to assess the impact of this change in practice on the achievement of ceftazidime PK/PD targets compared with other ICUs in the same time periods.
Methods: This was a retrospective study comparing the achievement of PK/PD targets for ceftazidime in a ward where a pharmacist was present (test unit) with 5 other ICUs (control units). This study also compared the achievement of targets before/after the arrival of the pharmacist (period 1: historical cohort between November 2019 and November 2021/period 2: January 2023 to August 2024). Doses were performed in the same laboratory as part of routine therapeutic drug monitoring in all ICUs (target values: 35–80 mg/L).
Results: A total of 136 patients were included, 86 in the control units (64 and 26, respectively for periods 1 and 2) and 46 in the test unit (26 and 20, respectively). There were no significant differences in CKD-EPI at baseline, age, weight, body mass index, SOFA score, mortality, length of stay and ceftazidime doses between test and control units for each time period. Between periods 1 and 2, target achievement in the test unit increased significantly to 85% at the last measurement compared to 34,6% in period 1 ($p < 0.01$) (Fig. 1A). In period 2, target achievement in the test unit increased significantly to 85% at the last measurement as compared to 38.5% in the control units ($p < 0.01$) (Fig. 1B).
Conclusions: Before the intervention, target achievement was similar in the test and control units. Daily exchange between pharmacists and intensivists was associated with a significant improvement in achievement of PK/PD targets for ceftazidime at last measurement, regardless of comparison (historical data or other comparable ICUs in the same time period). However, the clinical impact remains to be assessed, particularly in terms of improvement in SOFA score and length of stay. An opposite trend was observed in the control units: In our recent multicenter study involving all ICUs, it was suggested to increase the ceftazidime dose in overweight patients (2), which may explain this trend. The introduction of an individualized dosing tool available to all could help to improve global practices and an increase in the number of clinical pharmacists in ICUs also seems essential.

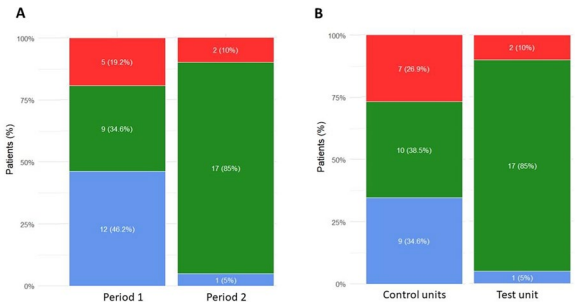


Fig. 1 (abstract 001059) **A** Percentage target achievement in previous standard practice (period 1) and with a clinical pharmacist (period 2) for test unit at last measurement. **B** Percentage target achievement in the test unit (with a clinical pharmacist) and in the control units for the same period at last measurement
Underdosing (concentration below 35 mg/L) in blue, on target in green and overdosing (concentration above 80 mg/L) in red.

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Topic: Pharmacology and toxicology/poisoning

001060

Implementation of nursing rounds in an intensive care unit: a pilot project

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Introduction: Nursing rounds represent a structured, patient-centered approach aimed at improving communication, safety, and the quality of nursing care. Although widely practiced internationally, their systematic implementation in German intensive care units (ICU) remains limited (Kußmaul, 2018). Evidence suggests that structured nursing rounds can enhance clinical outcomes, reduce hospital-acquired conditions (HACs), and improve interdisciplinary communication (Kannappan et al., 2023; Shalman et al., 2024). Furthermore,

the recent research highlights that nursing rounds have a statistically significant effect on improving care quality and planning for process-responsible care in ICU settings (Johnen et al., 2024).
Objectives: The primary goal was to integrate nursing rounds into daily ICU routines during a 3-month pilot phase. Specific aims included enhancing communication among nurses, patients, and families, improving documentation practices, and fostering individualized care planning. Active participation of bedside nurses, patients, and relatives was emphasized to ensure a person-centered approach.
Methods: A working group of five experienced ICU nurses developed criteria for patient selection (e.g., stay ≥ 72 h, no planned discharge within 24 h, complex therapy) and designed a documentation tool. Over 3 months, 12 nursing rounds were planned. Each round involved bedside nurses, working group members, patients, and relatives (when possible), focusing on identifying key nursing problems (e.g., skin integrity, psychological state) and setting individualized care goals. The rounds also facilitated procedural clarifications. Similar approaches have been shown to improve patient safety and communication in ICU settings (Kannappan et al., 2023).
Results: Seven nursing rounds were conducted due to staff shortages and time constraints. Nine patients (2 female, 7 male; aged 46–66 years) participated, with some receiving multiple rounds. A total of 28 nurses were involved in the process. Across all rounds, 53 nursing problems were identified, leading to 74 care goals. Of these goals, 48 were fully achieved, while others showed partial or no progress. Each round lasted approximately 2–3 h and enabled patients to actively contribute to their care planning.
Conclusions: The pilot phase demonstrated that structured nursing rounds can enhance reflective practice and interdisciplinary communication. Common nursing problems identified during the rounds will be mapped to standardized nursing diagnoses (e.g., NANDA-I) to improve care comparability and planning (Herdman et al., 2024). Patient and family inclusion proved effective in promoting a person-centered approach. Furthermore, evidence from Kannappan et al. (2023) highlights the potential of structured nurse rounds to reduce hospital-acquired complications such as pressure injuries and infections. Additional findings reinforce their broader impact, including shortened ICU stays and improved patient outcomes (Shalman et al., 2024).

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Topic: Nursing care and physiotherapy

001061

Predicting survival of prone positioning in patients receiving mechanical ventilation using resupination values: a multicenter cohort study

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Introduction: Prone positioning is a cornerstone of ARDS management, but optimal duration and efficacy remain unclear, with inconsistent mortality prediction based on oxygenation response during proning; however, the clinical significance of resupination parameters remains largely unknown(1). This study uses machine learning to predict survival in mechanically ventilated proned ARDS patients by analyzing respiratory mechanics and oxygenation after resupination, aiming to clarify the clinical relevance of sustained improvements following return to supine position.
Methods: Data were extracted from the COVID-Predict Dutch Data Warehouse, containing full-admission records of 3,464 critically ill COVID-19 patients across 25 Dutch hospitals. Mechanically ventilated ARDS patients who underwent a first supine-prone-supine sequence were selected, and ventilatory variables no more than 4 h from resupination were extracted. Machine learning models, logistic regression, and grid-search optimized XGBoost classifier and decision tree, were then trained on LASSO-selected features to predict 28-day mortality, with performance evaluated using AUC–ROC, precision-recall and F1 scores.
Results: The final cohort included 522 patients, of whom 365 (69.9%) survived and 157 (30.1%) died (Fig. 1, Table 1). The predictive performance of individual clinical parameters for 28-day mortality was generally modest. FiO_2 (AUC 0.681) and physiological dead space (AUC 0.640) showed the best discrimination for 28-day mortality (Fig. 2). In model comparisons, XGBoost, demonstrated the best recall (0.732) and F1 score (0.500) for predicting 28-day mortality, despite lower precision (0.380), and maintained the highest AUC (0.719). Logistic regression had the highest accuracy (0.771) and precision (0.619). Decision tree showed the lowest overall performance (Fig. 3).

Variable	Data availability (%)	Survived (*n* = 365)	Died (*n* = 157)	*P* value
Age, years	100.0	63 [14.0]	70.0 [10.0]	< 0.001
Weight, kg	65.0	90.0 [23.0]	82.1 [20.0]	0.044
Height, m	98.5	1.76 [0.13]	1.73 [0.14]	0.001
BMI, kg/m2	64.5	27.8 [6.3]	27.4 [5.0]	0.309
Gender [male]	99.6	277 (75.9)	118 (75.2)	0.865
Diabetes mellitus, n [%)	69.2	69 (26.2)	22 (22.5)	0.594
Cardiovascular insufficiency, n [%)	66.1	5 (2.0)	3 (3.2)	0.797
Chronic renal insufficiency, n [%)	65.9	12 (4.8)	7 (7.5)	0.448
COPD, n [%)	66.3	24 (9.5)	9 (9.6)	0.999
Cirrhosis, n [%)	66.1	0 (0.0)	0 (0.0)	0.999
Neoplasm, n [%)	66.1	0 (0.0)	2 (2.1)	0.128
Immunodeficiency, n [%)	66.5	16 (6.4)	11 (11.6)	0.162
SOFA score	45.1	6.0 [3.0]	7.0 [5.0]	0.632

COPD—chronic obstructive pulmonary disease. Values are median [IQR] or *n* (%).

Conclusions: This study is the first to use resupination values to predict mortality in prone-positioned patients. To improve patient outcomes and minimize unnecessary interventions, early identification of nonresponders is crucial. Analyzing post-resupination indicators

demonstrates a potential for refined patient selection, offering an alternative to current reliance on intra-proning oxygenation changes (1). Our results suggest this approach may improve patient selection for continued prone therapy. Further optimization of this model is possible.

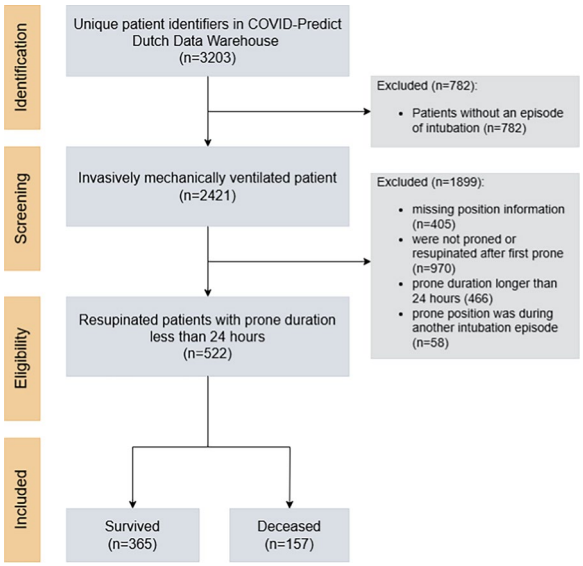


Fig. 1 (abstract 001061) STROBE cohort selection process flowchart

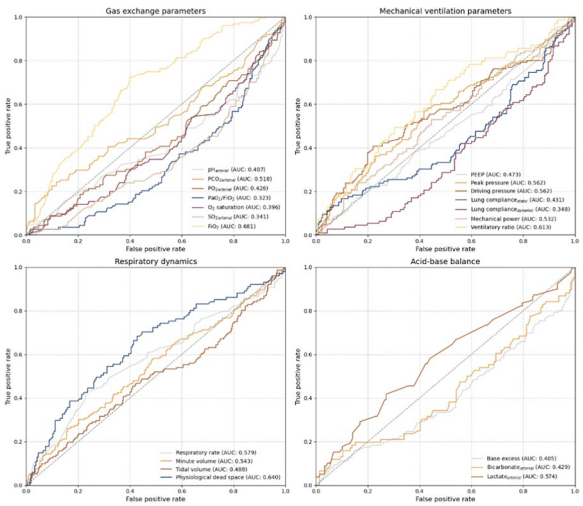


Fig. 2 (abstract 001061) ROC curves for individual respiratory parameters predicting 28-day mortality in ARDS patients. FiO_2 (AUC 0.681) and physiological dead space (AUC 0.640) showed the best discrimination, while traditional markers like PaO_2/FiO_2 ratio performed poorly (AUC 0.332)

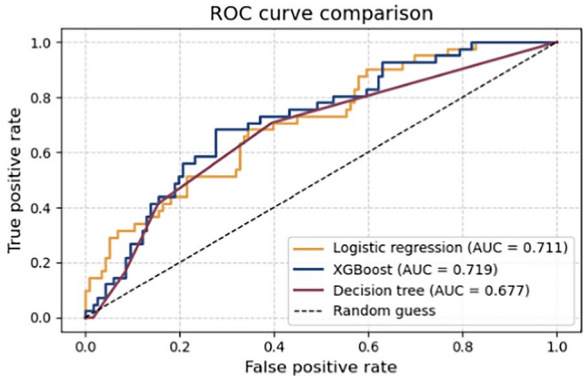


Fig. 3 (abstract 001061) ROC curve comparison of predictive models for 28-day mortality. XGBoost showed the highest performance (AUC 0.719)

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Topic: Acute respiratory failure and mechanical ventilation

001063

Dual-energy CT assessment of ventilation and perfusion during flow-controlled ventilation in experimental acute lung injury

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Intensive Care Medicine Experimental 2025,* 13(1)*:001063

Introduction: Flow-controlled ventilation (FCV) is a novel ventilator mode where the expiratory phase is actively controlled as opposed to the passive expiration in conventional mechanical ventilation. Compared with volume-controlled ventilation (VCV), it has been shown to improve gas exchange while using lower peak inspiratory pressure in healthy lungs (1).
Objectives: To assess any difference between FCV and VCV as to distribution of lung ventilation (V) and perfusion (Q) at the same minute volume ventilation in a model of acute lung injury (ALI).
Methods: Nine anesthetized and paralyzed pigs (29–31 kg) were subjected to either lung lavage injury (30 mL/kg; $n = 2$) or oleic acid injury (0.1 mL/kg; $n = 7$). Optimal PEEP was titrated for the highest compliance then lowest degree of collapse and overdistension, assessed by electrical impedance tomography (Enlight 1800, Timpel Medical, São Paolo, Brazil). Tidal volume (TV) was set to 6–8 mL/kg and respiratory rate (RR) adjusted to normoventilation in VCV (Servo-i, Maquet/Getinge, Sweden) with *I*:*E* ratio 1:2. Tidal volume and RR were kept for FCV (Evone, Ventinova Medical, Eindhoven, The Netherlands). Both VCV and FCV were applied at baseline (BL) and in the computed tomography (CT) laboratory after ALI had been established.
Dual-energy CT (DECT; 80 + 140 kV, SOMATOM Definition Flash, Siemens, Fochheim, Germany) was performed with a fixed table position at the juxtadiaphragmatic level during 20 s of uninterrupted ventilation, (5 mm thick slices). Iodine maps and virtual noncontrast (VNC) images were reconstructed for manual segmentation and quantitative voxel-based analysis in MATLAB (v 2024b, MathWorks, Natick, MA, USA) (Fig. 1).

$\dot{V}$ was calculated from the difference in gas volume (Vgas) between end-inspiration and end-expiration on VNC images. Q, defined as mean pulmonary blood volume (Vb), was estimated from iodine maps by normalizing voxel attenuation to that of aortic blood. To assess spatial distribution, these ventilation and perfusion measures were quantified across ten ventrodorsally distributed lung regions.

Results: At BL, the median PaO_2 was 15.9 kPa for FCV and 17.0 kPa for VCV. Following induction of ALI, values were 14.6 and 15.1 kPa, respectively. Median $PaCO_2$ at BL was 6.4 kPa for FCV and 5.6 kPa for VCV, and after ALI 6.7 respective 5.8 kPa. Hemodynamics and respiratory mechanics, except expiratory flow, did not differ between FCV and VCV. DECT image derived $\dot{V}$, Q and $\dot{V}$/Q in the entire slice of the lung or in the ventrodorsal segments did not differ between the ventilator modes (Table 1, Fig. 2).

Table 1 (abstract 001063) DECT derived variables (expressed as Median [IQR])

	VCV	FCV
Vgas exp (mL)	39.8 [36.6–42.5]	42.4 [40.4–42.9]
Vgas insp (mL)	45.6 [43.2–48.0]	47.7 [46.1–48.9]
$\dot{V}$ = Vgas (insp-exp) (mL)	5.8 [5.0–8.5]	5.6 [5.2–6.4]
Q = Vb (mL)	14.2 [13.0–16.3]	14.2 [13.3–20.8]
$\dot{V}/Q$ ratio	0.42 [0.33–0.50]	0.32 [0.26–0.40]

Conclusions: In this experimental series with lung injury, FCV did not alter total or regional (ventrodorsal) DECT-derived $\dot{V}/Q$ compared to VCV.

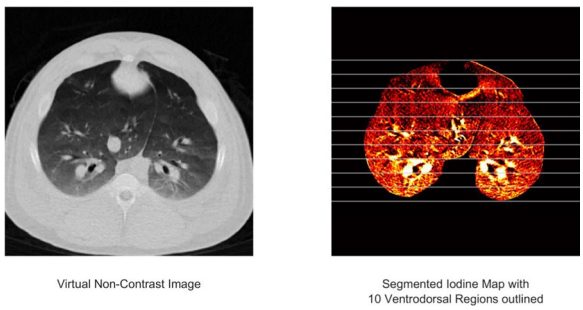


Fig. 1 (abstract 001063) Example of VNC and Iodine Map after post-processing and segmentation

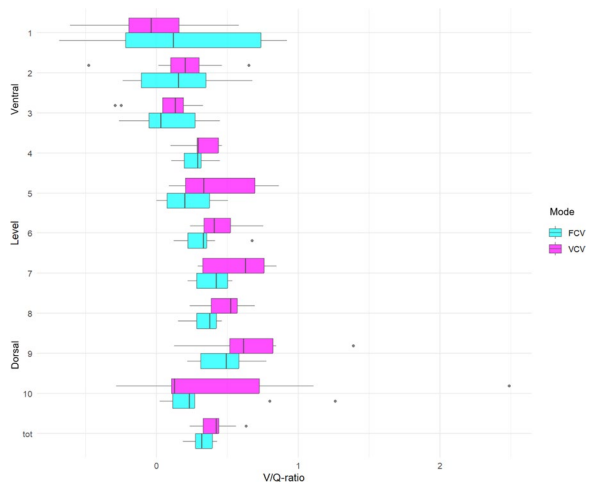


Fig. 2 (abstract 001063) Boxplots representing $\dot{V}/Q$ ratio for 10 superimposed ventrodorsal sections of the lung

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Topic: Acute respiratory failure and mechanical ventilation

001065

No code digital transformation of intensive care unit (ICU) induction: a feasibility study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001065

Introduction: Resident doctors in the UK frequently rotate between specialties, often finding themselves in unfamiliar environments. Increasingly doctors without a background in critical care are rotating into the high-stakes, high-pressure setting of the ICU. Timely, accessible and up to date induction is vital. Often, local induction is delivered by specialty trainees, as there is evidence to suggest that near-peer induction is effective and preferred over consultant-led induction (1). In our UK Hospital Trust, ICU induction is supported by a small paper-based guide covering clinical tips and orientation. However, this format contributes to cognitive overload during induction. There is growing evidence that digital resources, such as web-based mobile applications (apps) are emerging as effective tools in medical education. They offer flexible, self-directed learning (2) and are well aligned with the technology-enhanced education preferences of today's medical workforce.

Objectives: To assess the feasibility and benefits of digitalising an existing paper-based ICU induction guide into a smartphone app. This project aimed to reduce reliance on printed material, improve ease of access and enhance usability. It also sought to assess whether the app enhances confidence, preparedness and the overall ICU experience for resident doctors.

Methods: A URL-based app was developed using Glide (3), a free no-code platform, allowing rapid deployment without specialist coding knowledge or app store hosting costs (Figs. 1–3). This development took roughly 16 person hours. Retrospective surveys were conducted amongst doctors who had previously used the paper guide to evaluate its usefulness, accessibility and openness to a digital alternative. Prospective surveys were distributed to doctors currently using the app to assess usability, confidence before ICU shifts and impact on their ICU experience.

Results: Retrospective data revealed that several doctors (n = 8) had an outdated copy, had lost or never received the paper guide. Many relied heavily on it early in their rotation and supported the idea of a digital format. Initial prospective survey results indicate that users (n = 8) found the app intuitive, reported feeling more prepared for ICU shifts and would recommend it to peers. Feedback also suggested it served as a useful on-the-go reference.

Conclusions: This project demonstrates the feasibility and impact of leveraging existing digital tools for medical education. A mobile app is a practical and effective tool for ICU induction, offering flexible, on-demand support that complements traditional teaching. Although not a replacement for clinical judgement or textbook learning, it enhances orientation and encourages active, self-directed learning. The limitations of free no-code platforms include restricted customisation. Future directions could include coding a bespoke platform to enable all critical care departments to make an induction guide based on a template, negating requirements for programming knowledge.

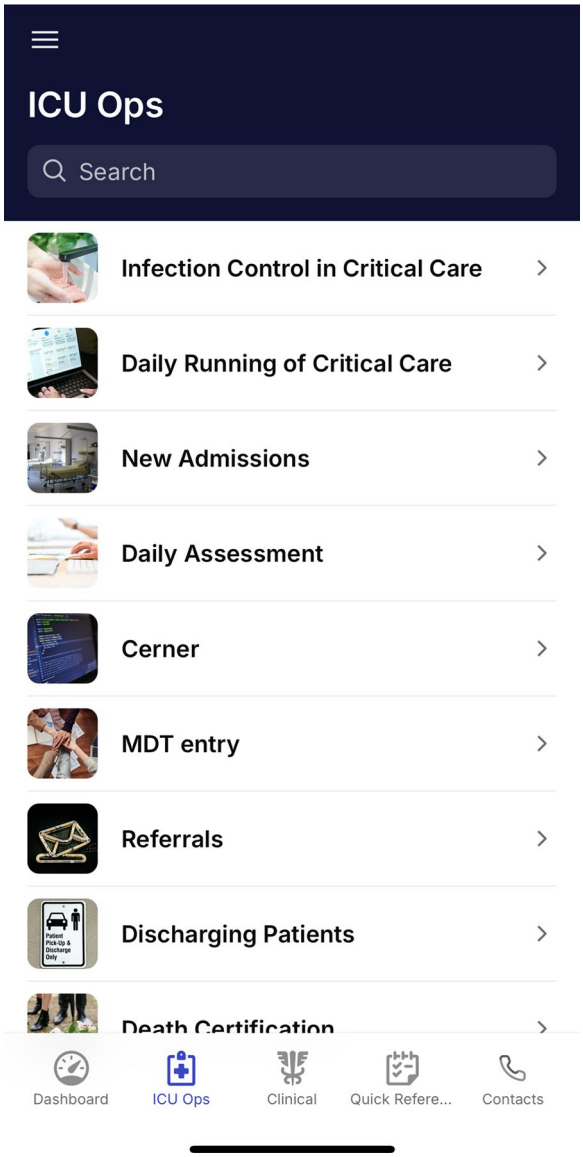


Fig. 1 (abstract 001065) ICU operations screen

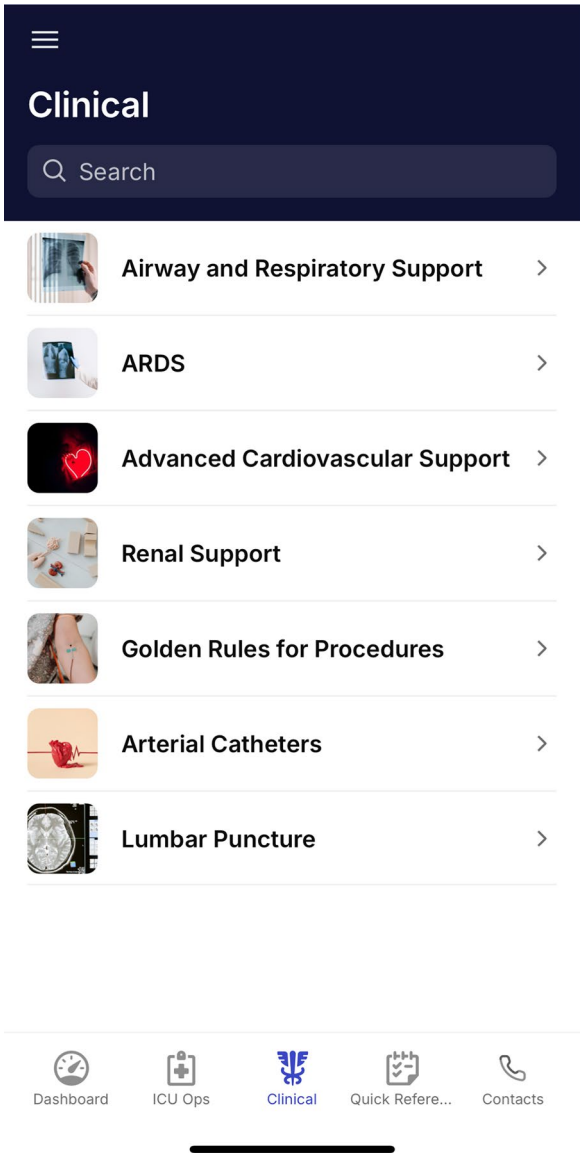


Fig. 2 (abstract 001065) Clinical information screen

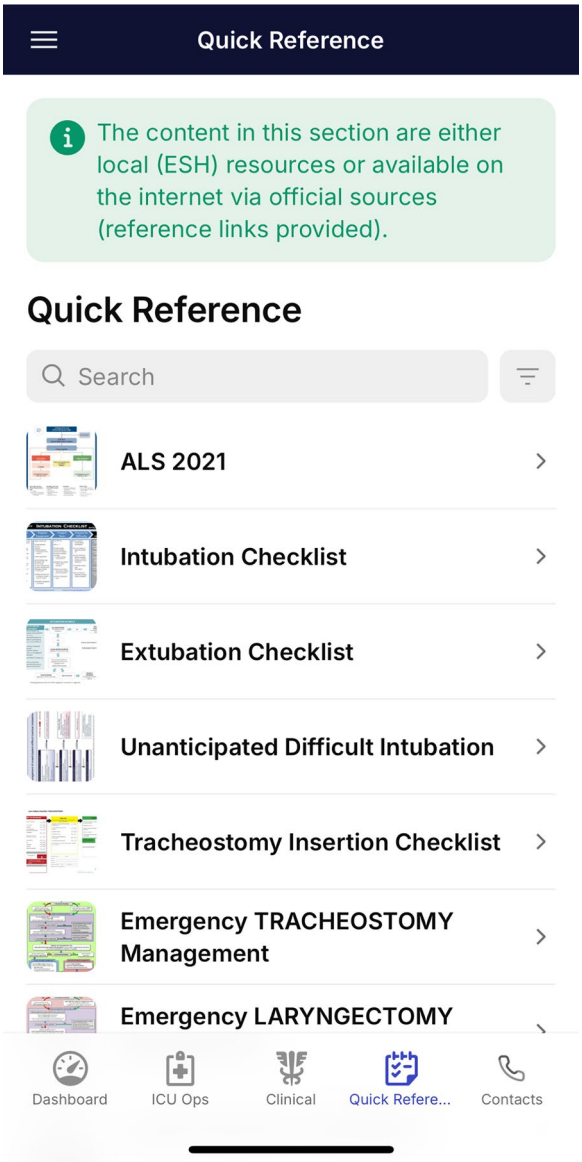


Fig. 3 (abstract 001065) Quick reference screen

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4. Not applicable

Topic: Information systems and data science

001067

Audit of airway management records in a Portuguese intensive care unit: Still a long way to go

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Intensive Care Medicine Experimental 2025,* 13(1):*001067

Introduction: Accurate and accessible clinical records are essential in medical practice, particularly in intensive care units (ICUs) where patients are in critical condition. Detailed records of procedures such as intubation and extubation are critical to ensure continuity of care, prevent complications, and support clinical decision making. Lack of adequate documentation can compromise patient safety and quality of care.
Objectives: This audit aimed to assess the quality and integrity of electronic medical records related to airway management, particularly intubation and extubation procedures, in critically ill patients admitted to an intensive care unit (ICU) between January and June 2024.
Methods: The audit included 374 patients, of whom 174 required intubation and mechanical ventilation. The main parameters assessed for intubation records included endotracheal tube (ETT) size, type of laryngoscope and blade used, grade of Cormack–Lehane laryngoscopy, medications administered, and any complications or difficulties encountered. Regarding extubation, medical records were evaluated according to the mention of planned or accidental extubation, complications, and respiratory support used after extubation.
Results: The results revealed significant gaps in documentation: 42.9 percent of intubated ICU patients had no records/descriptions of the approach to airway management and less than half of the records provided minimal or insufficient details. In addition, 28.6 percent of extubation records lacked detailed information on post-extubation support, and 30 percent of reintubation events were not adequately documented. Despite these missing data, records of tracheostomy procedures were complete in all cases.
Conclusions: The results highlight the need for improved documentation practices, emphasizing the application of standardized checklists and targeted training for the ICU team. Detailed documentation will not only improve patient safety and continuity of care, but also support continuous quality improvement efforts in ICUs.

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Topic: Health Services Research and Outcome

001070

Heterogeneous treatment effects in traumatic brain injury patients receiving norepinephrine

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Intensive Care Medicine Experimental 2025,* 13(1)*:001070

Introduction: Targeted physiologic resuscitation to prevent secondary brain insults is a treatment priority in the early management of patients with severe traumatic brain injury (TBI). Evidence indicates that optimizing cerebral perfusion pressure (CPP) can lead to improved clinical outcomes; however, hemodynamic strategies used for CPP-targeted therapy present considerable risk and are not uniformly effective. Here, we implement unsupervised and causal machine learning methods in a large ICU dataset to explore treatment effects in TBI patients receiving norepinephrine (NE) to achieve a CPP target. We hypothesize that distinct TBI subphenotypes can be identified and that the latter exhibit heterogeneous treatment effects (HTE) as shown by differentiable outcomes when administered NE.
Methods: Adult patients admitted to the ICU with TBI were identified in the MIMIC-IV critical care database. Demographics, physiological time-series data including ICP and CPP, and medication administration details were preprocessed with a comprehensive pipeline involving outlier removal, scaling, time-series imputation, and transformation into a day-wise longitudinal dataframe. The primary outcome variable was in-hospital mortality. To identify candidate clusters, K-means was applied on data accrued in the first 24 h and the 7 days following ICU admission. Cox models were used to stratify 7-day ICU mortality risk and assign cluster weights based on hazard ratios. Dimensionality reduction techniques and Kaplan–Meier survival analysis were used to visualize the subgroups spatially and in their clinical trajectories, respectively.
Results: Of 3,503 ICU-admitted TBI patients, 1809 (51.6%) received NE during their ICU stay (mean infusion duration: 18.4 h). Clustering on 24-h and 7-day averaged physiological data (e.g., heart rate, oxygen saturation, mean arterial pressure, temperature, serum sodium, glucose, and GCS scores) revealed four distinct groups. The 24-h mortality rates for clusters 0 through 3 were 4.8%, 26.9%, 3.4%, and 27.4%, respectively; the corresponding 7-day mortality rates were 5.9%, 50.5%, 3.6%, and 100%, respectively." Hazard ratio-weighted clustering further stratified mortality risk with final in-hospital mortality rates of 21.5%, 75.7%, 2.7%, and 100% (log-rank $p < 0.05$). High-mortality clusters were characterized by elevated ICP and lower GCS motor/verbal scores. Cluster 3—with the highest mortality (7-day: 100%)–had the lowest average day 1 CPP (44.1 $\pm$ 27.7 mmHg), despite having the highest proportion of patients receiving NE (42.4%).
Conclusions: Using a data-driven ML modeling framework, we identified discrete severe TBI subphenotypes that may have differentiable clinical features, clinical trajectories, CPP, outcome, and responses to NE administration. Ongoing work is evaluating the causal impact of interventions, such as NE on CPP and outcomes. With validation, such a framework could guide clinicians in the early management of patients with severe TBI.

Topic: Neurointensive care

001072

Sepsis-induced acute respiratory distress syndrome after major surgery

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Intensive Care Medicine Experimental 2025,* 13(1)*:001072

Introduction: Sepsis-induced acute respiratory distress syndrome (ARDS) is a severe and often fatal complication in surgical patients. It frequently develops after major operations complicated by postoperative sepsis and is associated with high rates of mechanical ventilation, multiorgan failure, and mortality. Despite modern intensive care approaches, outcomes remain poor, with mortality exceeding 50% in some cases. Early identification of patients at risk is essential, yet data on specific predictors of ARDS in the postoperative setting are limited.
Objectives: To assess the impact of postoperative sepsis-induced ARDS on mortality in patients undergoing extensive surgical interventions and to identify the most significant risk factors.
Methods: This secondary analysis included 428 adult patients ($\geq$ 18 years) admitted to the surgical ICU between December 2009 and February 2025 after major surgery. All met SEPSIS-3 criteria for postoperative sepsis or septic shock and were evaluated for ARDS based on the Berlin definition (2012). Inclusion required microbiologically confirmed sepsis and $\geq$ 24 h of invasive ventilation; patients without microbiological confirmation or with shorter ventilation were excluded. All patients received lung-protective ventilation (tidal volume 6–8 ml/kg, PEEP 6–8 cm H_2O, recruitment maneuvers as needed) and were managed according to international ICU protocols: early pathogen identification, targeted antibiotics, individualized fluid resuscitation, norepinephrine for MAP < 65 mmHg, hemoglobin targets of 7–10 g/dL, sedation, analgesia, and stress ulcer prophylaxis (IV omeprazole 20 mg). Decisions on tracheostomy and weaning were made clinically. Severity was assessed by SOFA and APACHE II scores within 24 h of ICU admission. Biomarkers (lactate, procalcitonin, LDH, creatinine), cultures, and arterial blood gases were measured serially. The data were analyzed using medians and interquartile ranges for continuous variables, and percentages for categorical data. Group comparisons used Mann–Whitney U and χ^2 tests. Risk factors were identified via multivariate logistic regression (Wald method), and survival was assessed with Kaplan–Meier curves and log-rank tests.
Results: ARDS predominantly developed in 56 (13.1%) patients with more severe illness. The ARDS group had significantly higher rates of septic shock (92.9% vs 69.1%; $p = 0.0041$), elevated SOFA scores (median 9.2 vs 8.3; $p = 0.0052$), higher APACHE II scores (17 vs 15; $p < 0.001$), and increased levels of lactate (6.4 vs 2.8 mmol/L; $p < 0.001$) and procalcitonin (25.7 vs 8.6 ng/mL; $p < 0.001$). Pneumonia (44.6% vs 22.0%; $p < 0.001$) and abdominal infections (76.8% vs 58.1%; $p = 0.002$) were more frequently diagnosed in this group. ARDS was associated with significantly prolonged mechanical ventilation (12.5 vs 4.3 day; $p < 0.001$), longer ICU stays (19.6 vs 9.2 days; $p < 0.001$), and higher 60-day mortality (62.5% vs 32.0%; $p < 0.001$). Independent risk factors for ARDS identified in multivariate analysis included higher SOFA score (OR = 1.2; 95% CI 1.1–1.3; $p = 0.021$) and elevated lactate levels (OR = 2.0; 95% CI 1.3–2.8; $p = 0.003$). Independent predictors of 60-day mortality included the presence of ARDS (OR = 2.8; 95% CI 1.2–6.4; $p = 0.023$), chronic kidney disease (OR = 4.1; 95% CI 1.3–13.8; $p = 0.025$), increased LDH levels (OR = 1.8; 95% CI 1.2–2.8; $p = 0.014$), and APACHE II score > 16 (OR = 2.8; 95% CI 1.4–5.5; $p = 0.005$).
Conclusions: The development of ARDS in patients with postoperative sepsis markedly elevates 60-day mortality and demands heightened vigilance from intensive care teams. Major risk factors include elevated severity scores (SOFA, APACHE II), increased lactate levels, and the presence of pneumonia or abdominal infections. Introducing early risk prediction tools and strengthening postoperative monitoring in septic patients may help lower the incidence of ARDS and enhance clinical outcomes.

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Topic: Acute respiratory failure and mechanical ventilation

001074

Outcomes of mechanical thrombectomy using the flowTriever system in acute pulmonary embolism: a national retrospective analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001074

Introduction: Catheter directed intervention (CDI) should be considered in high-risk pulmonary embolism (PE) when first-line treatment with systemic thrombolysis (ST) is contraindicated or has failed, as well as in select cases of intermediate-high risk PE [1]. Mechanical thrombectomy (MT) using the FlowTriever® System (FT) was introduced in Sweden in 2021 and has since then been the predominant CDI technique. This study aimed to assess the outcome among patients treated with MT and patients treated with ST during the recent years in Sweden.
Objectives: The aim of this retrospective national multicenter study was to evaluate the effectiveness and safety of MT in acute PE with comparison to ST.
Methods: We included all adult patients with verified PE treated with FT in Sweden from January the year FT was introduced in the respective hospitals until December 2023. A comparison group was comprised of patients treated with ST from the same hospitals. The primary outcome was a composite of death within 30 days or severe bleeding within 7 days. Secondary outcomes included incidence and time to all-cause mortality within 30 days, severe bleeding within 7 days, intracranial bleeding, change in RV/LV ratio, cardiac arrest, and length of stay in the intensive care unit or intermediate care unit, as well as in the hospital.
Results: Among 132 patients included in 7 hospitals, 61 patients were treated with FT only (FT group) and 61 with ST only (ST group); 10 patients received both treatments. The two groups were similar with respect to patient characteristics and clinical presentation. The mean age was 66.8 (SD 15.0) in the FT group and 67.5 (SD 14.0) in the ST group, with 57% and 51% females, respectively. High-risk PE was present in 32 (52%) patients in the FT group and 38 (62%) in the ST group. The other patients all had intermediate-high risk PE. Cardiac arrest before treatment occurred in 9 (15%) patients in the FT group and 12 (20%) patients in the ST group. The number of primary outcome events was significantly lower following Bonferroni–Holm adjustment in the FT group compared with the ST group (Fig. 1), 6 (10%) vs. 17 (28%), adjusted OR 0.19 (95% CI 0.05–0.69). Five (8%) patients in the FT group and 13 (21%) in the ST group died within 30 days (OR 0.33; 95% CI 0.11–0.99). Among the patients with high-risk PE and the patients with intermediate-high risk PE in the FT group, 4/32 (12%) and 1/29 (3%) were deceased after 30 days. For the patients treated with ST, the corresponding numbers were 11/38 (29%) and 2/23 (9%). One severe bleeding occurred after FT and 7 after ST (OR 0.18; 95% CI 0.03–1.10), including 5 intracranial hemorrhages of which one fatal. The right to left ventricular diameter before treatment was 1.7 ± 0.5 in both groups and decreased by 0.63 ± 0.47 after FT and 0.69 ± 0.47 after ST. No statistically significant differences were observed for any secondary outcome.
Conclusions: Mechanical thrombectomy using the FlowTriever system, for intermediate-high and high-risk pulmonary embolism seemed effective and possibly safer than treatment with systemic thrombolysis as it was associated with a lower composite endpoint of early death or severe bleeding.

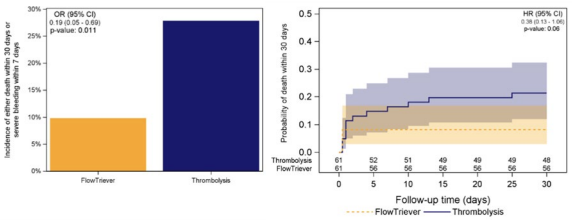


Fig. 1 (abstract 001074) Left panel illustrates proportional incidence of the composite primary endpoint in the two groups. Right panel describes survival over time until 30 days for the two groups. *OR* odds ratio, *HR* hazard ratio

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4. Region Västra Götaland

Topic: Transfusion and hemostasis disorders

001075

Evaluation of brain damage after cardiorespiratory arrest in ICU patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001075

Introduction: The study, prevalence and concern about knowledge of neurological assessment has allowed us to improve the identification of the neurological status of our patients after a fatal event, highlighting cardiorespiratory arrest. This advance will allow us to improve the care necessary for a better recovery, even to reduce the rate of the

greatest negative event such as the death of this type of patient and to be able to balance the pessimistic prognosis. The main cause of death in these patients is due to the decision to limit or adapt life-sustaining treatment (ALST). The current guidelines recommend a strategy of combining several predictors of poor prognosis included in the examination and complementary tests (EEG, neuroimaging and biomarkers).
Objectives: Analyze neuro-prognosis taking the Glasgow Outcome Score as a reference (3–5: good, 1–2: bad).
Analyze the role of enolase as a predictor of neurological prognosis.
Methods: Observational, retrospective, single-center study. Patients admitted: recovered CRP since January of 2019, > 18 years are included. We excluded patients with head trauma.
Results: N 122 patients (31.1% women and 68.9% men), mean age 61.98 years (minimum age 21 and maximum age 87). 49.6% occurred in the hospital and 50.4% out-of-hospital settings. Cause: 32.0% due to ACS, 22.1% due to respiratory causes, 4.9% poisoning, 32.8% arrhythmia, 5.7% hemorrhage and 2.5% surgical complication. 32.2% had a good neurological prognosis, with recovery, with the remaining 67.8% having a poor prognosis (of these, 54.5% died performed in the ICU, 5.0% died in the ward and the rest had sequelae: 6.6% had mild sequelae and 1.7% severe sequelae). We analyzed enolase in 65 of those 122 patients, 29 had a good prognostic and 36 had a bad prognostic (death, mild sequelae or severe sequelae). In those 36 with bad prognosis 25 had ALTS for neurological involvement and 11 died due to multiple organ failure. Average limitation time was 3.64 days. To make this decision, different predictors of poor prognosis were combined, without being able to establish a clear pattern. We analyzed the maximum determination recorded in all patients during their evolution, with a general mean of 64.48, this mean being 92.76 in patients with a poor prognosis and 29.37 in patients with a good evolution. We performed ROC Curve with area under the curve of 0.784 (CI 95% 0.671–0.896) so we can conclude that high enolase values can be used to evaluate neurological involvement (Fig. 1).
Conclusions: Enolase can be a good predictor of poor neurological outcome, so together with the clinical examination (GOS) and other complementary tests such as EEG, N20 and neuroimaging, it can facilitate the decision making of ALST in patients with poor outcome.

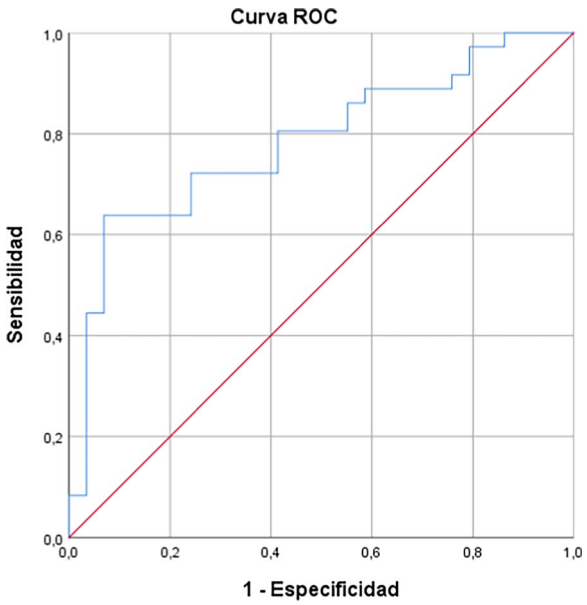


Fig. 1 (abstract 001075) ROC curve with area under the curve of 0.784 (CI 95% 0.671–0.896)

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Topic: Neurointensive care

001076

Iron metabolism trajectories associate with delirium risk following cardiac surgery

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Intensive Care Medicine Experimental 2025,* 13(1)*:001076

Introduction: Postoperative delirium frequently complicates cardiac surgery and leads to adverse outcomes. Although iron homeostasis is crucial for cognitive function, its role in postcardiac surgery delirium remains poorly understood.
Objectives: This study aims to compare iron metabolism trajectories between patients who develop postoperative delirium and those who do not, from the preoperative period through the postoperative phase, potentially offering new insights for prevention and clinical intervention strategies.
Methods: This single-center retrospective study of 193 cardiac surgery patients examined perioperative iron metabolism profiles and their association with postoperative delirium. Iron metabolism parameters were measured preoperatively and on postoperative days 1, 3, and 7. Trajectory analysis, logistic regression, and mediation analyses were performed.
Results: Twenty-seven patients (14.0%) developed delirium. The delirium group showed higher preoperative ferritin (391 vs. 156 ng/mL, $p = 0.001$) and transferrin saturation, with lower iron binding capacity, along with elevated inflammatory markers (hs-CRP: 20 vs. 1 mg/L, $p < 0.001$; NSE: 44 vs. 26 ng/ml, $p = 0.001$) and decreased lymphocyte counts. These disturbances persisted postoperatively. Trajectory analysis identified two distinct ferritin patterns—a persistently high trajectory and a relatively lower trajectory with gradual postoperative increase—the former being associated with higher delirium risk (25.4% vs. 7.4%, $p = 0.001$) and worse clinical outcomes, including longer hospital stays and increased tracheostomy rates and 28-day mortality. Mediation analyses revealed ferritin's influence through direct effects (62.2%) and indirect pathways via inflammatory (CRP, 21.8%) and neuronal injury (NSE, 16.0%) markers. Preoperative ferritin > 325 µg/L emerged as a significant risk threshold for delirium development.
Conclusions: Perioperative iron metabolism disturbances, characterized by elevated preoperative ferritin levels and persistent postoperative trajectories, are associated with post-cardiac surgery delirium through direct and inflammatory-immune mediated pathways.

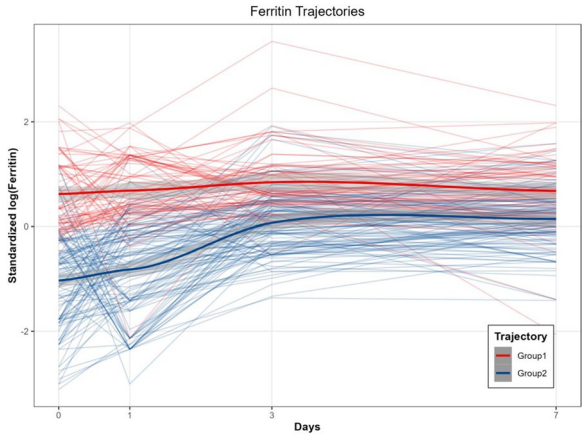


Fig. 1 (abstract 001076) Ferritin trajectories over 7 days following cardiac surgery

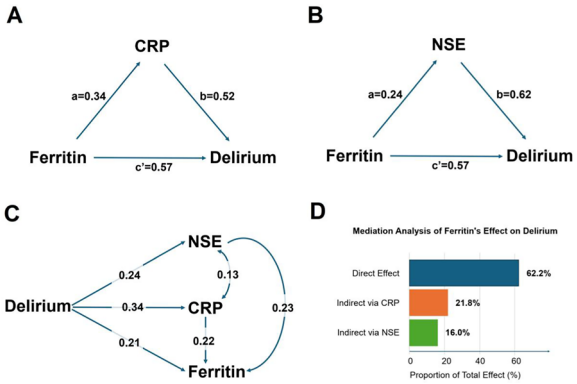


Fig. 2 (abstract 001076) Mediation analysis of the relationship between ferritin and postoperative delirium

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Topic: Sedation, analgesia and delirium

001077

ICU readmission or in-hospital mortality of patients discharged from ICU: risk factors and validation of a new prediction model, the Worse outcome score

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Intensive Care Medicine Experimental 2025,* 13(1)*:001077

Introduction: Intensive Care Unit (ICU) readmission and in-hospital mortality are critical indicators of patient outcomes following ICU discharge. Patients readmitted to the ICU often experience worse prognoses, increased healthcare costs, and prolonged hospital stays. Various risk factors, including patient demographics, comorbidities, illness severity, and ICU complications, contribute to these adverse outcomes.
Objectives: To indentify the risk factors for ICU readmission and in-hospital mortality, develop a predictive model for worse outcomes, and validate its clinical utility and reliability.
Methods: The study consists of two phases: (1) a retrospective observational study conducted in a mixed medical-surgical ICU to identify risk factors associated with ICU readmission and in-hospital mortality, and (2) a prospective validation phase assessing the predictive performance of a newly developed predictive score the Worse Outcome Score (WOScore). The data were collected from electronic hospital records, including patient demographics, ICU admission characteristics, severity scores (SAPS II, SAPS III, APACHE II, SOFA), interventions, and discharge conditions. Logistic regression was used to determine independent predictors of ICU readmission and in-hospital mortality. The predictive model was validated prospectively on ICU survivors to assess its accuracy.
Results: Among 1.190 ICU survivors analyzed, 126 (10.6%) were readmitted to the ICU, and 192 (16.1%) died in the hospital after ICU discharge. The key risk factors for ICU readmission included diabetes mellitus, SAPS III at admission, and ICU-acquired infections (ventilator-associated pneumonia VAP and catheter-related blood stream infections, CRBSI). As predictors of in-hospital mortality were indentified, the medical admission, high SAPS III and high lactate level at ICU admission, tracheostomy and reduced GCS at discharge, and blood transfusion, and AKI during ICU stay. The WOScore, based on the the above analysis, demonstrated a strong predictive ability (AUC: 0.886), with a cut off of 20 distinguishing high-risk patients (sensitivity: 88.1%, specificity: 73.0%).
Conclusions: ICU readmission and in-hospital mortality after ICU discharge are influenced by patient severity, underlying comorbidities, and ICU-related complications. The WOScore provides an effective risk stratification tool for identifying high-risk patients and guiding post-ICU interventions. Implementing structured ICU discharge protocols and targeted follow-up for high-risk patients may improve outcomes and optimize resource allocation. Further multicenter studies are needed to validate the model in diverse healthcare settings.

Topic: Health services research and outcome

001078

Safety and feasibility of early postoperative spirometry after esophagectomy

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Intensive Care Medicine Experimental 2025,* 13(1)*:001078

Introduction: Esophagectomy is a high risk procedure, 1 with pulmonary complications in up to 60% of cases and contributing significantly to morbidity and mortality.2,3 Although spirometry may help detection of pulmonary complications, the current guidelines advise against its use due to concerns regarding safety and feasibility.4 A recent systematic review conducted by our group (manuscript not yet published) revealed a lack of scientific evidence supporting this standpoint.
Objectives: To assess the feasibility and safety of spirometry in the first week after esophagectomy.
Methods: We conducted a prospective cohort study of adults undergoing elective esophagectomy at our hospital. Handheld spirometry was performed preoperatively and on postoperative day (POD) 2 and 7. Predicted values were based on the age, sex and height. Feasibility was assessed by comparing handheld to outpatient laboratory spirometry and measuring test duration. Safety was evaluated by monitoring vital signs (saturation and heart rate), pain scores (Numeric Rating Scale), and spirometry-related adverse events.
Results: In our prospective study, preliminary data from 21 patients showed good agreement between preoperative laboratory and handheld spirometry measurements (median vital capacity (VC) 92% versus 97% and Forced Expiratory Volume in 1 s (FEV1) 102% and 90% of predicted, respectively). Median spirometry test duration was 13.3 (10–15) minutes. During spirometry, oxygen saturation and heart rate demonstrated stable trends, with only minor fluctuations of 1% (0.5–3.0) and 3 beats per minute (0.5–7.0). One patient developed a pneumothorax with subcutaneous emphysema, first noted immediately after surgery prior to spirometry measurements, and worsening during the first postoperative week. Patients reported no change in their NRS (median change 0 [IQR 0–0]). Lung function declined substantially from baseline by POD2 (median VC 57% and FEV1 50% of predicted) and showed partial recovery by POD7 (median VC 85% and FEV1 73% of predicted) (Figs. 1 and 2).
Conclusions: Spirometry after esophagectomy appears feasible, and no evidence was found to support current recommendations discouraging its use following surgery. Our ongoing study aims to confirm these findings and to explore possible usefulness of spirometry in prediction and early diagnosis of postoperative pulmonary complications.

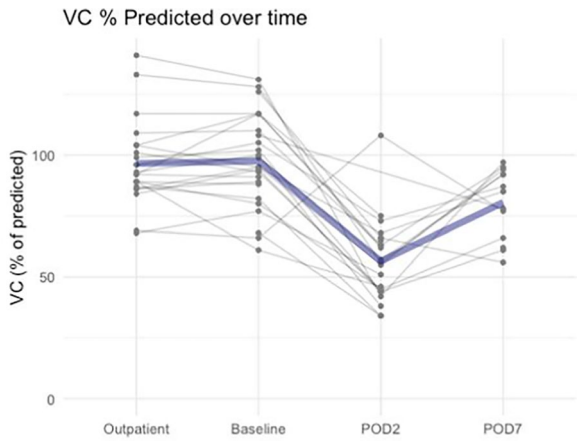


Fig. 1 (abstract 001078) Plot of VC over time with mean trend line in blue

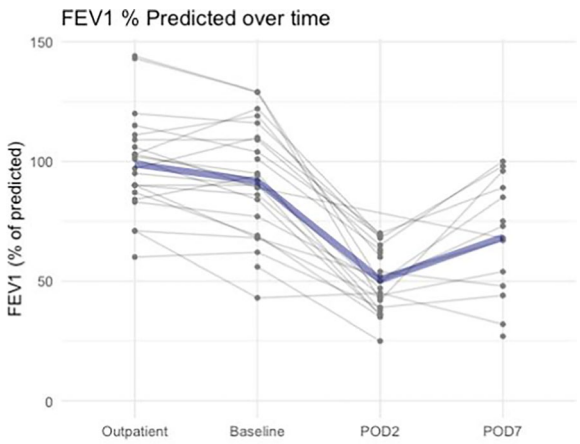


Fig. 2 (abstract 001078) Plot of FEV1 over time with mean trend line in blue

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Topic: Perioperative care

001079

High-flow nasal oxygen versus noninvasive ventilation for acute respiratory failure in solid organ transplant recipients: a randomized controlled trial

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Intensive Care Medicine Experimental 2025,* 13(1)*:001079

Introduction: Solid organ transplant (SOT) recipients with acute respiratory failure (ARF) face poor outcomes and complex decisions regarding respiratory support. Given the preference for noninvasive respiratory support in this population, we compared high-flow nasal cannula (HFNC) versus noninvasive ventilation (NIV) as initial strategies to evaluate their impact on intubation-free survival.
Methods: In this single-center, randomized controlled trial, we enrolled 60 SOT recipients with acute respiratory failure. Patients were randomly assigned to receive either HFNC or NIV. The predefined primary outcome was days alive before intubation or death within 28 days (DABID-28), defined as the time interval from randomization until intubation or death, whichever came first. Secondary outcomes included 28-day mortality, intubation rate, and duration of respiratory support.

Results: Sixty patients were randomized (30 per group). The mean DABID-28 was 24 ± 9 days in the HFNC group versus 19 ± 12 days in the NIV group (difference, 5 days [95% CI −1 to 10]; $P = 0.085$). The 28-day mortality was significantly lower in the HFNC group (10% vs 40%; relative risk 0.25 [95% CI 0.08–0.80]; $P = 0.015$). The duration of allocated respiratory support was longer in the HFNC group (median 6 vs 3 days; $P = 0.013$). No significant differences were found in intubation rates or length of stay.
Conclusions: Among SOT recipients with acute respiratory failure, HFNC was associated with lower 28-day mortality as compared to NIV, although the difference in intubation-free alive days did not reach statistical significance. These findings require validation in larger multicenter trials.

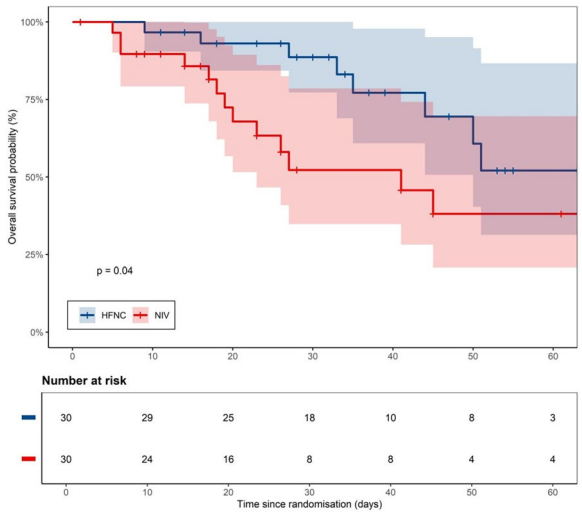


Fig. 1 (abstract 001079) Kaplan–Meier estimates of survival in the HFNC and NIV groups

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Topic: Acute respiratory failure and mechanical ventilation

001080

Trauma in secondary care hospital: insights from the emergency department and intensive care unit admissions

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Intensive Care Medicine Experimental 2025,* 13(1)*:001080

Introduction: Trauma remains a leading cause of morbidity and mortality worldwide, placing a significant burden on emergency healthcare systems (1). Understanding the characteristics of trauma patients arriving at secondary care hospitals is essential to optimize resource allocation and improve clinical outcomes (2). The need for intensive care unit (ICU) admission among some of those patients reflects the complexity and severity of their condition (3). Although much of the literature focuses on the data from tertiary care centers, there is a relative paucity of information regarding trauma cases managed in secondary care settings.
Objectives: This study aims to characterize the trauma population admitted to the emergency department of a secondary hospital, with a particular focus on those requiring ICU care.
Methods: This was a retrospective study including all consecutive patients admitted to the emergency department of a secondary care hospital due to traumatic injury, between November 1, 2022, and July 31, 2023. Patients were characterized based on the baseline demographics, relevant medical history, type of traumatic injury, need for ICU admission, and clinical course during ICU stay. In-hospital mortality was also assessed. Descriptive and inferential statistical analyses were performed as appropriate.
Results: A total of 42 trauma patients were included; 69% were male, with a mean age of 61 ± 20 years. The mean Charlson Comorbidity Index was 2.57 ± 2.4. The average Revised Trauma Score (RTS) was 7 ± 1.27 (range: 2.63–7.84), the mean Injury Severity Score (ISS) was 18.17 ± 13, and the mean Trauma and Injury Severity Score (TRISS) probability of survival was 86%.
The most common injury type was thoracic trauma (47.6%), followed by traumatic brain injury (TBI) (28.6%). Among TBI cases, subdural hematoma was the most frequent finding (14.3%).
Most injuries resulted from blunt trauma (88.1%, $n = 37$), with burns accounting for 9.5% ($n = 4$). Road traffic accidents were the leading cause of trauma (35.7%).
Overall, 35.7% of patients required invasive mechanical ventilation and ICU admission. Among ICU patients, thoracic trauma (84%) and TBI (54%) were the predominant injuries. Nearly half (47.6%) of ICU patients were transferred to tertiary care centers. The most common complication was nosocomial pneumonia (9.5%). In-hospital mortality among the study population was 21.4%.
Conclusions: This study highlights the high mortality rate (21.4%) among trauma patients admitted to a secondary care emergency department, with the most severe cases requiring ICU admission. Thoracic and traumatic brain injuries were the predominant causes of critical illness, with a notable proportion of ICU patients requiring transfer to tertiary care hospitals. These findings emphasize the need for targeted interventions to reduce mortality, improve early identification of high-risk patients, and enhance resource allocation in secondary care settings.

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Topic: Trauma

001081

Impaired mitochondrial respiratory capacity and exacerbated lactate release in response to exercise with experimentally induced sepsis in humans

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Introduction: In sepsis-induced multiorgan failure hyperlactatemia is prognostic for mortality and related to disease severity [1]; yet, lactate release plays an integral role in healthy exercise metabolism, where it is recognized as a substrate for oxidative phosphorylation [2]. Experimentally induced sepsis via purified lipopolysaccharide (LPS) from *E. coli* endotoxin provokes lactate release from the muscle at rest [3], although not reflective of the systemic catabolic response in clinical sepsis. Skeletal muscle mitochondrial respiratory chain enzyme activity and ATP content are reduced in critically ill septic patients [4,5]; whether this explains hyperlactatemia is unknown.
Objectives: 1. Investigate the influence of hyperlactatemia on mitochondrial respiratory capacity in the context of the acute pathophysiologic response to early sepsis (via LPS infusion) in healthy volunteers; and 2. utilize exercise to exacerbate skeletal muscle lactate release in the context of LPS.
Methods: $n = 8$ healthy adults (6/2 male/female, respectively) completed this placebo-controlled crossover study involving two experimental trials separated by > 8 weeks: 1. LPS (2 ng × kg-1); and 2. saline infusion (0.9%; PLACEBO). Following a resting biopsy (*m. vastus lateralis*) and insertion of catheters (brachial artery, femoral vein, muscle interstitial microdialysis) (PRE), LPS or saline was infused via an antecubital I.V. At peak lactate release (3 h) [3] a biopsy was taken (LPS). Thereafter, subjects completed two intensities of single leg knee extension exercise (4-min stages at 50% and 60% of max) with a biopsy taken immediately postexercise (EX). Mitochondrial respiratory capacity in permeabilized muscle fibers was measured via high-resolution respirometry (Oroboros Instruments, Austria).
Results: Interstitial lactate was threefold higher at 3-h post-LPS infusion at rest (Δ 1.1 mmol × l-1, 95% CI [0.4, 1.8], $p = 0.017$). The lactate/pyruvate ratio—a marker of impaired oxygen utilization—was increased by 28%, [−15, 71] ($p = 0.078$) at 1-h post-LPS infusion versus PRE. The venous-arterial lactate difference during the last stage of exercise was 1.5-fold higher during LPS (LPS vs. PLACEBO: Δ 0.7 mmol × l-1, [0.5, 0.9], $p < 0.001$). There was no effect of acute LPS per se on mitochondrial respiration at rest. As expected, complex-II respiration was increased at EX by 16%, [6, 27] ($p = 0.019$) versus PRE during the placebo trial. Complex-II respiration was *reduced* post-exercise by 18%, [−22, −14] ($p = 0.003$) during LPS. Maximal electron transport system (ETS) respiratory capacity showed the same impairment with LPS exercise (PLACEBO: + 25% [6, 43], $p = 0.029$; LPS: −15% [−27, -3], $p = 0.032$).
Conclusions: These data indicate that LPS-induced sepsis provokes impaired skeletal muscle respiratory capacity during exercise which coincides with exacerbated lactate release. Whether mitochondrial impairment precedes hyperlactatemia in established sepsis remains to be elucidated.

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Topic: Sepsis

001083

Diagnostic performance of pancreatic stone protein in identifying ICU-acquired infections: a nested case–control study in critically ill trauma patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001083

Introduction: Pancreatic stone protein (PSP) is a new pro-inflammatory biomarker used in the detection of sepsis. Identifying infections after trauma is challenging, as conventional pro-inflammatory markers are typically elevated due to resulting sterile inflammatory processes.1 Although previous studies suggest that PSP levels remain unchanged after trauma, PSP levels increase in patients who develop infections.2,3 This suggests that PSP may differentiate infection from sterile inflammation.
Objectives: This study evaluates PSP's diagnostic performance in critically ill trauma patients with and without ICU-acquired infections.

Methods: Using incidence density sampling, this nested case–control study matched ICU-acquired clinician-diagnosed infectious episodes (cases) to episodes without suspected infection (controls) (Fig. 1). PSP levels were compared between cases and controls, with procalcitonin (PCT) measured at infection onset (T0) as a proxy for infection. PSP concentrations were measured at 72 h before (T-72) and at T0. An exploratory analysis was performed to investigate the diagnostic performance of PSP to differentiate between three post hoc defined groups of patients suspected of infection (cases): those with microbiologically confirmed infection, those with unconfirmed infection, and those in whom infection was ruled out.
Results: We included 100 case- and 200 control-episodes from 202 patients. PSP and PCT levels in cases and controls showed no differences on T-72 or T0 (Fig. 2 and 3) Delta PSP levels between T-72 and T0 were 20 (−13 to 98) for cases and 11 (9–23 – 60) ng/ml for controls ($p = 0.09$). PSP levels at T0 for microbiologically confirmed infections as compared to controls with never suspected infection, unconfirmed and ruled-out infections were 291 (148–487), 174 (107–288), 171 (121–320) and 143 (98–216) ng/ml, respectively ($P = 0.002$). Using a PSP cut off of 100 ng/ml to distinguish between microbiologically confirmed infection and unconfirmed and ruled-out infection, sensitivity was 86% (95% CI 68–96%) and specificity was 20% (95% CI 12–31%).
Conclusions: Despite showing no signal in clinician-diagnosed cases versus control periods that were not suspected of infection, PSP may help distinguish microbiologically confirmed infection from sterile inflammation. These findings should be validated in a prospective cohort study to assess clinical utility.

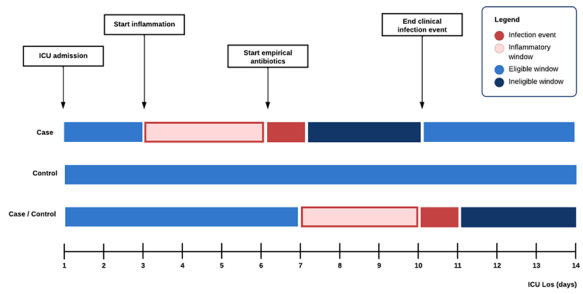


Fig. 1 (abstract 001083) Case/control matching scheme. Infection event: date of onset infection, i.e. day of start therapeutical antimicrobial therapy (T0). Inflammatory window: 3-day assessment period for clinical inflammation criteria starting at T-72 h to onset of infection. Eligible window: eligible as control event. Ineligible window: ineligible as control. ICU: Intensive Care Unit. Los: length of stay

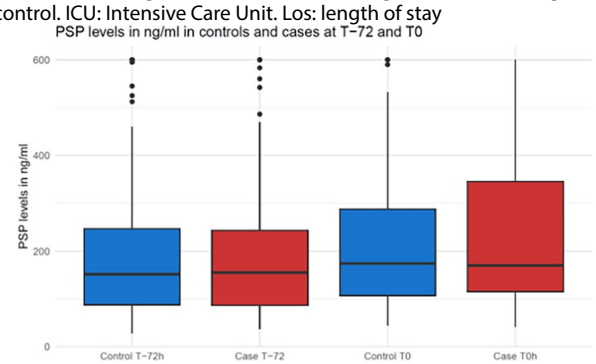


Fig. 2 (abstract 001083) PSP levels in controls and cases, all values are in ng/ml

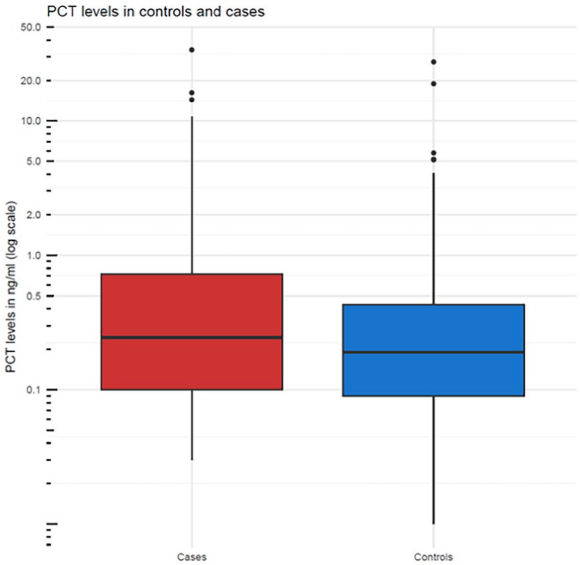


Fig. 3 (abstract 001083) PCT levels in controls and cases, all values are in ng/ml

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Topic: Infections and prevention

001084

A prospective observational study to evaluate the efficacy of HACOR SCORE in predicting NIV failure in ICU setting of a tertiary care centre

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Intensive Care Medicine Experimental 2025,* 13(1):*001084

Introduction: The use of noninvasive ventilation (NIV) in critically ill patients reduces the work of breathing in acute respiratory failure, thereby reducing the need for intubation and associated complications.
Although NIV is frequently used in patients with respiratory failure, its failure rate remains high (25–59%) indicating that not all patients benefit from this treatment. And delayed intubation is associated with increased hospital mortality.
Previous studies have reported that patients who experience NIV failure have a higher heart rate, lower pH, Lower Glasgow Coma Scale (GCS) score, lower oxygenation, and higher respiratory rate. However, the predictive Power of NIV failure is low when based only on a single Variable. Hypothesizing that a combination of these variables has

to potential to increase the predictive HACOR score combined several variables that were easily obtained by simple bedside measurements in patients with acute respiratory failure to develop a scale for the prediction of NIV failure.

Objectives: The primary objective of the study is to determine whether HACOR score can help identify patients at risk of NIV failure and to compare the effectiveness of HACOR score at 1 h and 6 h in predicting NIV failure. The secondary objective of the study is also to determine the association of a higher HACOR score and length of hospital stay.

Methods: This prospective observational study which was conducted for a period of one year from April1, 2023 to Mar 31, 2024. Sample size of 130 patients has been calculated based on an earlier study.

•Inclusion criteria: Patients age > 18yrs requiring NIV patients initiated on NIV in our hospital.

•Exclusion criteria: Patients on home CPAP/NIV patients in DNR (EOLC) status.

Appropriate NIV settings for the patient were initiated based on the patient characteristics and the etiology of acute respiratory failure.

Patient were reevaluted after 1st hour of keeping NIV and after 6 h of initiating NIV and by recording the variables like heart rate, pH, GCS, PaO_2/FiO_2 and respiratory. HACOR score was calculated at these hours. These patients were then be followed up till discharge and outcomes were recorded. The outcome of NIV failure was defined as need for intubation and mechanical ventilation and NIV success when patient improved with NIV and was discharged.

The HACOR score and NIV success or failure was then correlated by statistical analysis.For continuous variables, we shall report median value with interquartile range (IQR) or mean value and standard deviation (SD) when appropriate. For categorical variables, we shall report numbers and percentage. Unpaired Student's *t* test was used to analyze the normally distributed continuous variables and Mann–Whitney *U* test was used to analyze the non-normally distributed continuous variables. Chi-square test or Fisher's exact test will be used to analyze the categorical variables when appropriate. All statistical analysis for the study was performed using statistical software Statistical Package for the Social Sciences (SPSS).

Results: At 1 h, HACOR score had a good predictive accuracy with a cutoff value of >5 having a sensitivity of 72.88% and specificity of 76.16%. At 6 h, HACOR score with a cutoff of >3, showed a sensitivity of 66.67% and specificity of 88.74%.

There is a strong positive correlation between the HACOR score (at both 1 and 6 h) and the length of ICU stay ($r = 0.568$ at 1 h and $r = 0.641$ at 6 h, $P < 0.001$). This suggests that higher HACOR scores are associated with longer ICU stays.

Conclusions: Higher HACOR score is strongly associated with NIV failure and worse ICU outcomes.

Table 1 (abstract 001084) ...

Age group	N	%
</=50	28	13.3
51-60	44	21.0
61-70	71	33.8
71-80	55	26.2
>80	12	5.7
Total	210	100.0
Mean+/-SD (Range)	64.0+/-11.6 (29-88)	

Table 2 (abstract 001084) ...

Gender	N	%
Male	114	54.3
Female	96	45.7
Total	210	100.0

Table 3 (abstract 001084) ...

Diagnosis	N	%
AECOPD	48	22.9
Pulmonary Edema	45	21.4
CAP	26	12.4
ARDS	24	11.4
BA	13	6.2
Bronchiectasis exacerbation	10	4.8
ILD	10	4.8
Covid pneumonia	9	4.3
H1N1 pneumonia	7	3.3
Acute pancreatitis	4	1.9
Effusion	3	1.4
Anaphylaxis	2	1.0
Dengue ARDS	2	1.0
Weil's disease	2	1.0
AEILD	1	.5
Angioneurotic Edema	1	.5
Myasthenia Gravis	1	.5
OSA	1	.5
TRALI	1	.5
Total	210	100.0

Demographics and CAE mix.

Table 4 (abstract 001084) ...

Variables	N	Minimum	Maximum	Mean	SD
HR at 1 hour	210	51.0	141.0	100.714	19.3043
HR at 6 hours	175	50.0	134.0	89.777	16.5905
pH at 1 hour	210	7.2	7.5	7.334	.0700
pH at 6 hours	175	7.2	7.6	7.381	.0674
GCS at 1 hour	210	13.0	15.0	14.757	.4723
GCS at 6 hours	173	13.0	15.0	14.931	.2767
P/F at 1 hour	210	115.0	230.0	189.724	28.9084
P/F at 6 hours	175	144.0	230.0	202.743	19.3731
RR at 1 hour	210	12.0	42.0	31.452	5.4051
RR at 6 hours	175	12.0	40.0	25.349	5.1460
HACOR at 1 hour	210	.0	13.0	4.719	3.3692
HACOR at 6 hours	175	.0	10.0	1.686	2.0025
Time of intubation	57	2.0	168.0	17.000	33.4477
Length of MDICU stay	209	1.0	34.0	4.330	3.5682

Table 5 (abstract 001084) ...

Intubated	N	%
Yes	57	27.1
No	153	72.9
Total	210	100.0

Table 6 (abstract 001084) ...

Outcome	N	%
Survived	151	71.9
Intubated	47	22.4
Expired	12	5.7
Total	210	100.0

Table 7 (abstract 001084) ...

NIV failure	N	%
Yes	59	28.1
No	151	71.9
Total	210	100.0

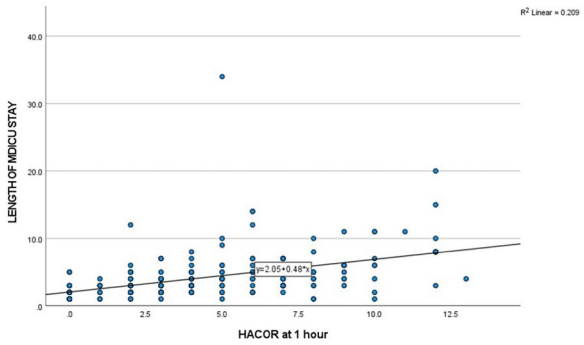
Table 8 (abstract 001084) ...

Variables	NIV failure				Unpaired t test P value
	Yes		No		
	Mean	SD	Mean	SD	
HACOR at 1 hour	7.6	3.2	3.6	2.7	**<0.001**
HACOR at 6 hours	4.0	3.1	1.3	1.5	**<0.001**
Length of MDICU stay	7.4	5.0	3.1	1.7	**<0.001**

Outcome.

Table 9 (abstract 001084) ...

Variable	Spearman Correlation	P value
HACOR at 1 hour * Length of MDICU stay	0.568	**<0.001**
HACOR at 6 hours * Length of MDICU stay	0.641	**<0.001**



Length of stay.

Table 11 (abstract 001084) Normality test

Variables	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Age	.118	173	.000
HR at 1 hour	.048	173	.200*
HR at 6 hours	.068	173	.050
pH at 1 hour	.058	173	.200*
pH at 6 hours	.070	173	.039
GCS at 1 hour	.510	173	.000
GCS at 6 hours	.535	173	.000
P/F at 1 hour	.132	173	.000
P/F at 6 hours	.119	173	.000
RR at 1 hour	.166	173	.000
RR at 6 hours	.085	173	.004
HACOR at 1 hour	.107	173	.000
HACOR at 6 hours	.259	173	.000
Length of MDICU stay	.227	173	.000
Time of intubation	.384	57	.000

Table 12 (abstract 001084) ...

Variables	NIV failure				Unpaired t test P value
	Yes		No		
	Mean	SD	Mean	SD	
HR at 1 hour	112.5	18.5	96.1	17.6	**<0.001**
HR at 6 hours	101.8	15.3	87.9	16.0	**<0.001**
pH at 1 hour	7.3	.1	7.3	.1	**<0.001**
pH at 6 hours	7.3	.1	7.4	.1	**<0.001**
GCS at 1 hour	14.5	.6	14.9	.4	**<0.001**
GCS at 6 hours	14.5	.6	15.0	.1	**<0.001**
P/F at 1 hour	171.3	34.1	196.9	23.0	**<0.001**
P/F at 6 hours	191.6	26.7	204.5	17.4	**0.002**
RR at 1 hour	34.4	2.6	30.3	5.8	**<0.001**
RR at 6 hours	29.7	6.3	24.7	4.6	**<0.001**

Table 12b (abstract 001084) ...

Variables	NIV failure						Mann Whitney U test P value
	Yes			No			
	Median	Q1	Q3	Median	Q1	Q3	
HR at 1 hour	119.0	98.0	126.0	96.0	86.0	108.0	**<0.001**
HR at 6 hours	110.0	89.0	112.0	88.0	78.0	100.0	**<0.001**
pH at 1 hour	7.3	7.3	7.3	7.4	7.3	7.4	**<0.001**
pH at 6 hours	7.3	7.3	7.4	7.4	7.3	7.4	**<0.001**
GCS at 1 hour	15.0	14.0	15.0	15.0	15.0	15.0	**<0.001**
GCS at 6 hours	15.0	14.0	15.0	15.0	15.0	15.0	**<0.001**
P/F at 1 hour	170.0	150.0	202.0	201.0	180.0	214.0	**<0.001**
P/F at 6 hours	188.0	164.5	218.5	207.0	188.0	219.0	**0.034**
RR at 1 hour	34.0	32.0	36.0	32.0	28.0	34.0	**<0.001**
RR at 6 hours	30.0	28.0	33.0	24.0	22.0	28.0	**<0.001**

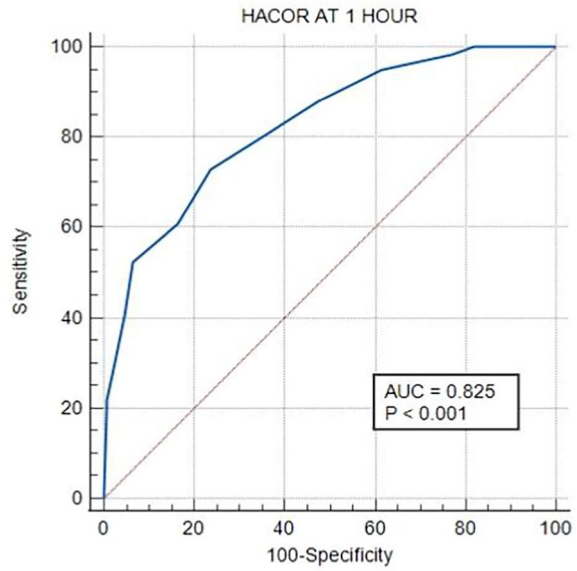
Normality test.

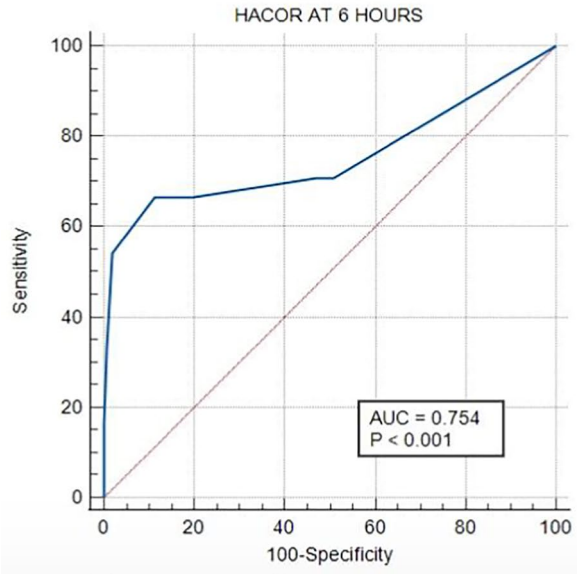
Area under the ROC curve (AUC)

Statistics	At 1 hour	At 6 hours
Cut off value	>5	>3
Area under the ROC curve (AUC)	0.825	0.754
Standard Error	0.0314	0.0701
95% Confidence interval	0.767 to 0.874	0.684 to 0.816
z statistic	10.348	3.629
Significance level P (Area=0.5)	<0.001	0.0003

Statistic – At 1 hour	**Value**	**95% CI**
Sensitivity	72.88%	59.73% to 83.64%
Specificity	76.16%	68.55% to 82.71%
Positive Likelihood Ratio	3.06	2.21 to 4.23
Negative Likelihood Ratio	0.36	0.23 to 0.55
Disease prevalence	28.10%	22.13% to 34.69%
Positive Predictive Value	54.43%	46.33% to 62.30%
Negative Predictive Value	87.79%	82.41% to 91.68%
Accuracy	75.24%	68.83% to 80.92%

Statistic – At 6 hours	**Value**	**95% CI**
Sensitivity	66.67%	44.68% to 84.37%
Specificity	88.74%	82.59% to 93.30%
Positive Likelihood Ratio	5.92	3.49 to 10.06
Negative Likelihood Ratio	0.38	0.21 to 0.66
Disease prevalence	13.71%	8.99% to 19.72%
Positive Predictive Value	48.48%	35.66% to 61.52%
Negative Predictive Value	94.37%	90.46% to 96.73%
Accuracy	85.71%	79.64% to 90.54%

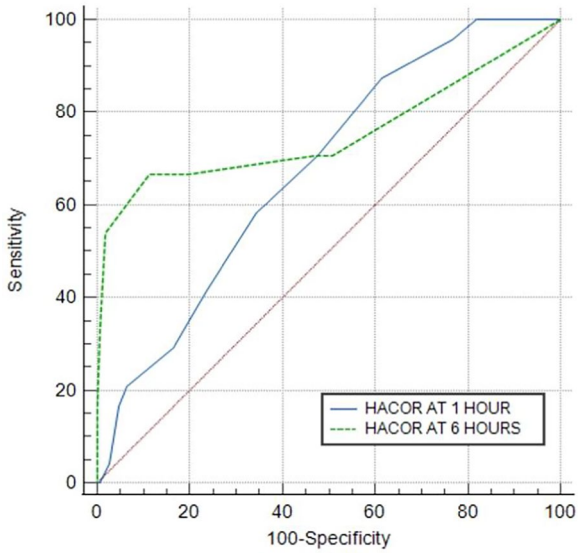




Area under ROC curve.

Table 13b (abstract 001084) ...

HACOR at 1 hour ~ HACOR at 6 hours	
Difference between areas	0.0785
Standard Error	0.0767
95% Confidence Interval	-0.0719 to 0.229
z statistic	1.023
Significance level	P = 0.3062



Comparison of ROC curve.

NIV failure in disease-specific outcome.

Topic: Acute respiratory failure and mechanical ventilation

001085

Incidence of sepsis and antimicrobial resistance in critically ill children with cancer and outcomes: a prospective observational study

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Intensive Care Medicine Experimental 2025,* 13(1):*001085

Introduction: Intensive cancer therapies are associated with greater risk of life-threatening complications, of which sepsis continues to be the commonest cause of admission and death in intensive care. Along with sepsis burden, antimicrobial resistance (AMR) pattern has direct implication on the number of ICU admissions, hospital length of stay, and healthcare costs and mortality. A recent systematic analysis of the global burden of antimicrobial resistance (AMR) identified the six leading bacterial pathogens associated with the highest number of deaths, in descending order: *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Acinetobacter baumannii*, and *Pseudomonas aeruginosa.* This demands focus on tailoring research to improve outcomes in this patient population.

Objectives: Primary objective: Incidence of sepsis and sepsis related mortality in pediatric cancer patients.

Secondary objective: Site and cause of infection, prevalence and pattern of antimicrobial resistance, organ support, predictors of mortality, patient outcomes.

Methods: This is a prospective observational study in critically ill children with cancer (0–18 years). This study aimed to review the mortality in this cohort with focus on sepsis, causative microorganisms, site of

infection, antimicrobial resistance and clinical response. This study was started after ethical approval from Institutional ethics Committee and CTRI registration CTRI/2023/11/059572 and due consent from patients who were eligible.
Electronic Medical records of all consenting participants admitted in our ICU over 15 months were screened. Baseline and outcome information were collected on trial-specific electronic case report forms (eCRFs) and follow up was performed after 90 days of ICU admission.
Results: We have enrolled 176 children under 18 years over last 15 months with 110 children with suspected sepsis. These included 22 children with solid and 88 with hematological malignancies. Seventy-one children were neutropenic out of 110 children. The ICU mortality was 30/110 (27.3%) in suspected sepsis cases. The commonest site of infections were lungs (74), gastrointestinal focus (46), bloodstream infections (32), skin and soft tissue (13), central nervous system (13), endocarditis (4), urinary tract (4). The commonest isolate was *E. coli* in lung, bloodstream and gastrointestinal tract infections. The incidence of gram-positive infections was low. The carbapenem resistance was high in gram negative infections. Low yield of culture, lack of confirmatory methods to detect viral and fungal infections, low sensitivity of biomarkers result in excess coverage or coverage defect in antimicrobial use.
Conclusions: Sepsis is associated with one-third ICU mortality with lower respiratory tract being the most common site of infection. There is high prevalence of carbapenem-resistant gram-negative infections in children with cancer.

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3. No funding applicable

Topic: Sepsis

001086

Clinical characteristics, management strategies and outcomes of ICU patients with *Streptococcus pyogenes* infections

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Intensive Care Medicine Experimental 2025,* 13(1)*:001086

Introduction: *Streptococcus pyogenes* (group A beta-hemolytic streptococcus, GAS) is a major cause of invasive infections that can lead to severe complications, including septic shock, renal failure and coagulopathies. Over the recent years, a growing incidence of GAS infections has been observed. Despite advances in antimicrobial therapy and critical care, mortality remains substantial.
Objectives: To describe the clinical features, sources of infection, complications, antimicrobial resistance patterns, and management strategies in ICU patients with confirmed GAS infections.
Methods: A retrospective cohort study of 29 ICU patients with microbiologically confirmed GAS infections admitted to the ICU of a tertiary hospital in Spain from 2010 to 2024.
Results: The median age was 45.7 years (IQR 37.3–59.5), and 62.1% were male. The most frequent sources of infection were skin and soft tissue (58.6%), respiratory (24.1%), and puerperal (17.2%). Common complications included septic shock (82.8%), acute kidney injury (72.4%), coagulopathy (72.4%), and respiratory failure (62.1%). Empirical antibiotic therapy included clindamycin, linezolid, and carbapenems in 51.7% of cases. Intravenous immunoglobulin was administered in 44.8%. Source control was achieved in 72.4% of patients. GAS isolates were 100% susceptible to penicillin and clindamycin, while resistance was observed in 19.2% to macrolides and 3.4% to quinolones. The mean ICU stay was 12.9 ± 6.5 days, and mean hospital stay was 38.6 days. The overall ICU mortality was 13.8%.
Conclusions: ICU patients with invasive GAS infections present with significant clinical severity, frequently developing septic shock and multiorgan failure. The relatively low mortality observed in this cohort compared to similar populations may reflect the benefits of early source control and the use of adjunctive therapies such as immunoglobulin. Nonetheless, the presence of macrolide resistance underscores the importance of prudent antibiotic use.

Table 1 (abstract 001086) Clinical and treatment characteristics

Demographic characteristics	Total patients Age (median- IQR) Male	29 45.7 (37.3–59.5) 62.1%
Infection sources	Skin/soft tissue Puerperal Respiratory	58.7% 17.2% 24.1%
Length of stay (days)	ICU (IQR) Hospital (IQR)	7 (4-11) 22 (10-45)
Clinic presentation	Respiratory failure Acute renal failure Coagulopathy Shock	62.1% 72.4% 72.4% 82.8%
Antibiotic sensitivity	Penicilin Clindamicin Macrolides Quinolones	100% 100% 80.8% 96.6%
Treatment and management	Clindamycin, linezolid, carbapenem Immunoglobulins Infection sources control	51.7% 44.8% 72.4%
Mortality	13.8	

Topic: Infections and prevention

001087

Infection source and organ failure as key drivers of mortality in ICU patients with GAS infections

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Intensive Care Medicine Experimental 2025,* 13(1)*:001087

Introduction: Group A beta-hemolytic streptococcus (*Streptococcus pyogenes*, GAS) is a highly virulent pathogen associated with

life-threatening invasive infections. Despite modern critical care practices, mortality remains high in ICU patients with GAS infections. Understanding the clinical factors associated with mortality could help improve management strategies and outcomes.
Objectives: To analyze mortality and associated risk factors in ICU patients with invasive GAS infections, with a specific focus on the role of infection source control.
Methods: This was a retrospective cohort study of 29 microbiologically confirmed GAS infections in patients admitted to the ICU of a tertiary care hospital in Spain between 2010 and 2024.
Results: Median age was 45.7 years (IQR 37.3–59.5), and 62.1% were male. The overall ICU mortality rate was 20.7%. Deceased patients were older (median age 58.6 vs. 45.4 years among survivors). Respiratory infections had the highest mortality rate (42.9%), compared to skin/soft tissue infections (17.6%), while no deaths occurred in puerperal infections. Although not statistically significant ($p = 0.13$), respiratory infections were also associated with longer ICU stays (18.9 vs. 10.4 days). Multiorgan failure (MOF) was present in 79.3% of cases; 24.1% developed failure of four or more organs. Infection source control was achieved in 72.4% of patients and was strongly correlated with survival ($r = 0.88$, $p < 0.001$). Median ICU and hospital stays were 7 (IQR 4–10) and 22 days (IQR 10–45), respectively.
Conclusions: Invasive GAS infections in the ICU are associated with a high burden of organ dysfunction and notable mortality. Respiratory infections tend to have worse outcomes and longer ICU stays, although statistical significance was not reached. The strong positive correlation between source control and survival highlights the critical importance of early and effective source management in improving outcomes for this patient population.

Table 1 (abstract 001087) Clinical characteristics and outcomes

	Total (n=29)	Survivors (n=23)	Deceased (n=6)
Age median (IQR)	45.7 (37.3–59.5)	45.4 (36.3–57.2)	58.6 (40–66.9)
Male (%)	62.1% (18)	77.8% (14)	22.2% (4)
Infection sources: - Puerperal (%) - Respiratory (%) - Skin/soft tissues (%)	 17.2% (5) 24.1% (7) 58.6% (17)	 100% (5) 57.1% (4) 82.4% (14)	 0% (0) 42.9% (3) 17.6% (3)
Multiorgan failure (%) - 1 organ - 2 organs - 3 organs - 4 organs	 20.7% (6) 34.5% (10) 20.7% (6) 24.1% (7)	 100% (6) 100% (10) 66.7% (4) 42.9% (3)	 0% (0) 0% (0) 33.3% (2) 57.1% (4)
Infection source control (%)	72.4% (21)	78.3% (18)	50% (3)
ICU length of stay (IQR) Hospital length of stay (IQR)	7 (4–10) 22 (10–45)	7 (4–10) 29 (20–49)	6 (1–8.5) 6 (1–8.5)

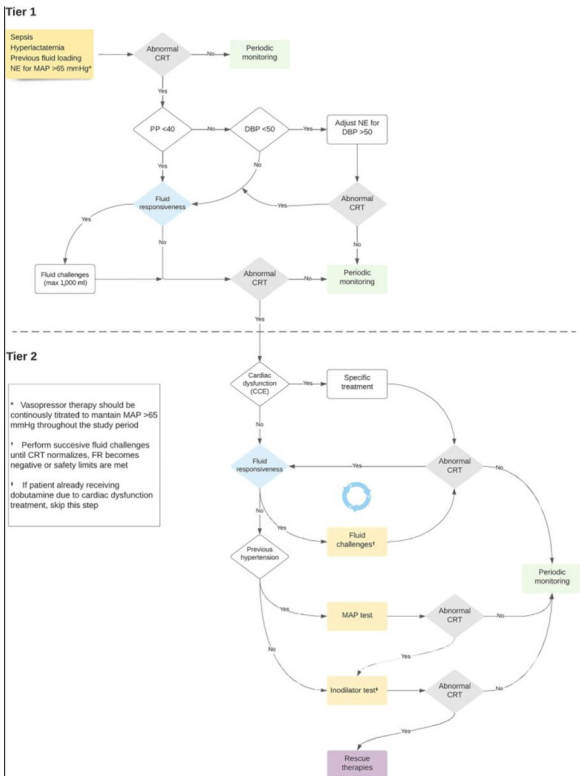
Topic: Infections and prevention

001088

Personalized septic shock resuscitation based on simple physiological principles: the ANDROMEDA–SHOCK-2 trial

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Intensive Care Medicine Experimental 2025,* 13(1)*:001088

Introduction: Septic shock is associated with a very high mortality. Recent expert recommendations have emphazised on the need of a personalized approach for early resuscitation to avoid the risk of overesuscitation and its related-morbidity(1,2). Among strategies to achieve this goal, the recent ANDROMEDA–SHOCK trial demonstrated that targeting capillary refill time (CRT) as compared to lactate was associated with better outcomes and less treatment intensity (3). To further advance in this direction we designed the ANDROMEDA–SHOCK 2 (A2) trial, a major RCT, where we tested if a personalized septic shock resuscitation based on simple physiological principles was associated with better outcomes when compared with usual care (ClinicalTrials.gov NCT05057611).
Methods: A two-tier algorithm was designed as shown in Fig. 1. This strategy included CRT targeting but with an algorithm where initial decision making was based on the bedside hemodynamic phenotyping considering variables such as pulse pressure (PP), diastolic arterial pressure (DAP), fluid responsiveness status, and echocardiography in a key position (4). A fundamental part was to position 4 hemodynamic challenges to test CRT response in 30–60 min according to the signals provided by the algorithm as a way to personalize further interventions (fluid, DAP, MAP and inodilator challenges).
After ethical approval, consent signature, and intensive training early septic shock patients (< 4 h after diagnosis) where centrally randomized to intervention or usual care groups for a 6 h study period. The usual care group was resuscitated according to attendings preferences.
The main outcome was a composite one of 28-day mortality, time to organ support cessation and hospital length of stay as analyzed with the win-ratio method. The sample size was estimated in 1500 pts.
Results: The study started on March 2022 and up-to-date (April 10,2025) has recruited 1470/1500 pts in 80 centers of 17 countries in 3 continents. Importantly, very heterogeneous centers have participated including selected University Hospitals in Western Europe together with big public hospitals in Latin America and other regions, a fact that may allow to analyze results under high versus LMIC countries perspective.
Central Coordination and Data Quality Monitoring were performed at 3 institutions (PUC Chile, Fundación Valle del Lili Colombia, and HCOr Brazil). Data were uploaded to a Castor EDC database and stored at Erasmus MC, NL.
An independent DSMB performed interim analyses at 25% and 75% of the sample size allowing to continue recruiting because of no harm signals.
Compliance with the Intervention so far was considered as satisfactory with only a 4.8% of mayor deviations and 14% of minor ones.
Recruitment will be completed by early May 2025 and the database lock expected by mid-June for starting the statistical analysis at HCOr.
Conclusions: The ANDROMEDA–SHOCK-2 trial, a complex multinational study, is about to be completed. In the meantime, it appears that implementation of this kind of personalization efforts to improve early septic shock resuscitation is feasible among different contexts. If positive, A2 will open new avenues for further optimizing resuscitation strategies but with simple physiologically-based interventions based on the bedside universally available signals.



Intervention algorithm applied in the A2 trial.

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Topic: Cardiovascular issues in ICU

001090

Impact of anaesthetics on the renoprotective effect of remote ischemic preconditioning: the HypnoRenalRIP randomized clinical trial

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Intensive Care Medicine Experimental 2025,* 13(1)*:001090

Introduction: Remote ischemic preconditioning (RIPC) has been shown to reduce acute kidney injury (AKI) in high-risk patients after cardiac surgery. The protective effects are restricted to patients with early and transient increases of the two cell cycle arrest markers, tissue inhibitor of metalloproteinases-2 (TIMP-2) and insulin-like growth factor-binding protein 7 (IGFBP7) in the urine. The studies suggest that propofol may attenuate the preconditioning effect on the myocardium.

Objectives: The purpose of this study was to investigate whether propofol also diminishes the preconditioning effect on the kidneys by measuring [TIMP-2]*[IGFBP7].
Methods: This is a single-center, randomized clinical trial among high-risk patients undergoing cardiac surgery with cardiopulmonary bypass. Patients were randomized to receive either propofol+ sham− RIPC, propofol+ RIPC, sevoflurane+ sham− RIPC or sevoflurane+ RIPC. The primary endpoint was the change in urinary [TIMP2]*[IGFBP7] between post- and preintervention. Secondary outcomes included the incidence of AKI within 72 h after cardiac surgery.
Results: The results are presented in Table 1. 160 patients were included in the trial (propofol + sham-RIPC: $n = 20$, propofol + RIPC: $n = 60$, sevoflurane + sham-RIPC: $n = 20$, sevoflurane + RIPC: $n = 60$). Median change in [TIMP2]*[IGFBP7] before and after RIPC was significantly greater in patients receiving sevoflurane (0.070; IQR −0.120, 0.418) compared with those receiving propofol (−0.015; IQR −0.138, 0.068; $p = 0.029$). Four hours after CPB, [TIMP2]*[IGFBP7] did not increase with sevoflurane + RIPC group whereas it did in the other groups ($p = 0.001$). There were no statistically significant differences in patient-centred outcomes, including AKI, between the groups.
Conclusions: RIPC-induced transient changes of [TIMP2]*[IGFBP7], which are associated with renoprotective effects, were only seen with sevoflurane anesthesia, but not when propofol was used. These results may explain the lack of renoprotection in propofol-anesthetized patients receiving RIPC.

Table 1 (abstract 001090) [TIMP-1]*[IGFBP7] values at different time points. Abbreveations: CBP, cardiopulmonary bypass; RIPC, remote ischemic preconditioning

Group	Pre-RIPC, median (Q1, Q3)	Post-RIPC, median (Q1, Q3)	4h after CPB, median (Q1, Q3)	12h after CPB, median (Q1, Q3)
Propofol + Sham-RIPC (n=20)	0.395 (0.153, 0.808)	0.265 (0.163, 0.555)	0.845 (0.213, 1.400)	0.335 (0.213. 0.620)
Propofol + RIPC (n=60)	0.345 (0.173, 0.783)	0.265 (0.130, 0.673)	0.735 (0.278, 1.450)	0.370 (0.173, 0.835)
Sevoflurane + Sham-RIPC (n=20)	0.370 (0.243, 0.683)	0.280 (0.193, 0.413)	0.895 (0.340, 1.038)	0.400 (0.180, 0.810)
Sevoflurane + RIPC (n=60)	0.360 (0.160, 0.760)	0.580 (0.230, 0.980)	0.240 (0.10, 0.553)	0.285 (0.190, 0.490)
p-value*	0.994	0.025	0.001	0.660

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2. This study was supported by the German Research Foundation (KFO342/1; ZA428/18–1 to AZ)

Topic: Acute kidney injury and hemofiltration

001091

Multimodal assessment of microcirculation in critically ill patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001091

Introduction: Microcirculatory dysfunction is associated with organ failure and poor prognosis in critically ill patients (1). Numerous tools allow bedside microcirculation assessment, making their relevance probably context dependent.
Objectives: To determine the extent to which the most commonly used devices in the intensive care unit (ICU) can detect initial microcirculatory alterations and whether they provide distinct or complementary prognostic information in different subpopulations of critically ill patients.
Methods: This prospective, monocentric cohort study was conducted in a 34-bed ICU in Belgium. Adult patients with an expected ICU stay of at least 3 days were included. Microcirculatory parameters were simultaneously recorded on day 1 (within 24 h of ICU admission), including peripheral perfusion index (PPI), Mottling score (MS), capillary refill time (CRT), core-to-skin temperature gradient (ΔT), skin blood flow at basal temperature (SBF BT) and regional tissue oxygenation (rSO_2). The primary outcome was to assess correlations between various microcirculatory parameters on day 1.
Results: Fifty-five patients were included (median age 64 years, 65.5% male). Circulatory failure (36.4%) was the most common reason for ICU admission, followed by acute brain injury (ABI) (29.1%) and acute respiratory failure (25.4%). PPI and CRT showed strong correlations with SBF BT and ΔT, while rSO_2 had no significant associations with other tools (Fig. 1). Correlations were stronger in circulatory failure group, but weaker in ABI group. CRT had the highest predictive value for ICU mortality (AUC = 0.75, $p = 0.007$), followed by MS (AUC = 0.72, $p = 0.021$), SBF BT and PPI (Fig. 2). ΔT had lower predictive performance and rSO_2 was the weakest predictor. In the circulatory failure group, none of the parameters showed significant discriminatory ability (AUCs 0.52–0.62, all $p > 0.05$). In contrast, in ABI CRT had the highest predictive value (AUC = 0.92, $p = 0.03$), and MS showed good but nonsignificant predictive ability (AUC = 0.81, $p = 0.112$). Other parameters had lower, nonsignificant predictive performance (AUCs 0.55–0.75).
Conclusions: Microcirculatory parameters correlated differently depending on the underlying condition, with stronger associations in circulatory failure. CRT was the best predictor of ICU mortality, particularly in ABI while other parameters showed limited or no prognostic value.

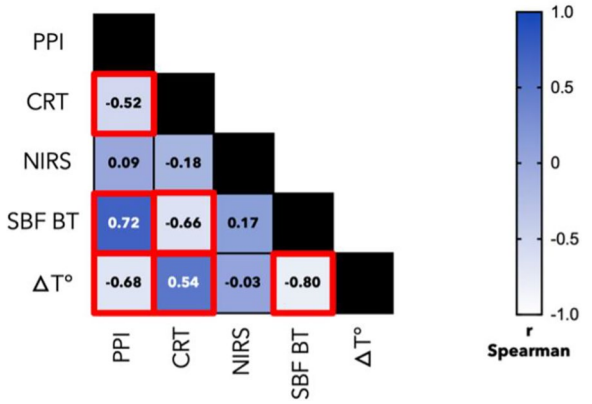


Fig. 1 (abstract 001091) Correlation matrix of the studied parameters in the overall population at day 1. This matrix displays the Spearman's correlation coefficients (ρ) between PPI, CRT, NIRS, SBF BT, and Gradient T ($\triangle T$). Significant correlations ($p < 0.005$) are encircled in red

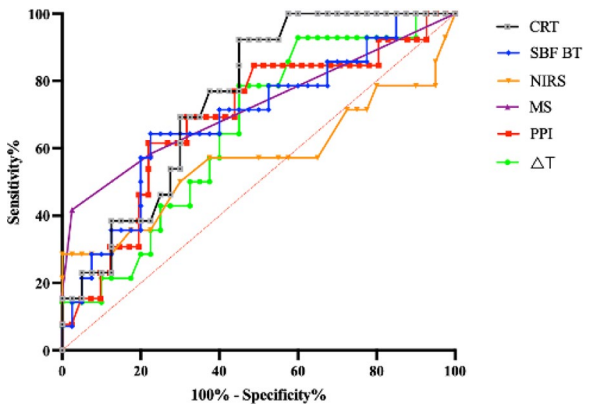


Fig. 2 (abstract 001091) Prediction of ICU mortality by baseline microcirculatory parameters in the overall population. Each ROC curve corresponds to a specific microcirculatory parameter, evaluated in terms of sensitivity and specificity

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Topic: Cardiovascular issues in ICU

001093

Application of transcranial Doppler for vasospasm in aneurysmal subarachnoid hemorrhage

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Introduction: In our unit, transcranial Doppler (TCD) is part of the basic daily neuromonitoring protocol in patients with aneurysmal subarachnoid hemorrhage (aSAH), used for screening vasospasm (VSP), flow alterations, and intracranial hypertension.
Objectives: To describe the characteristics of patients with aSAH and to determine the predictive capacity of TCD as a screening tool of VSP in our sample.
Methods: Retrospective study of patients admitted with aSAH to critical care areas in a tertiary hospital from March 2018 to December 2024. Demographic, clinical, and mortality variables were analyzed. Vasospasm (VSP) was defined as present when confirmed by angiography. TCD was considered positive for VSP if mean velocity in the middle cerebral artery was ≥ 120 cm/s or in the anterior cerebral artery ≥ 130 cm/s and TCD was considered negative if the velocities were under these values. In our sample, delayed cerebral ischemia (DCI) was defined as the appearance of new focal deficits or a decrease of at least two points on the Glasgow Coma Scale for more than 1 h attributed to no other cause than VSP. Sensitivity (Se), specificity (Sp), and predictive values (PV) of TCD for the diagnosis of VSP were calculated. The data are presented as numbers and percentages or median and standard deviation. Mann–Whitney and Chi-square tests were used as appropriate.
Results: Data were collected from 128 patients, with a median age of 61.7 years [IQR 51–70.1]; 71.1% were female. Among these, 91.4% were classified as Fisher IV, 64.8% as Hunt & Hess grades 4–5, and 67.1% as WFNS grades 4–5. Median ICU stay was 11 days [IQR 3–18.8], and median hospital stay was 22.9 days [IQR 11–36]. Of the 128 patients, 57 were diagnosed with VSP by angiography and were classified into two groups based on TCD findings: Group 1 ($n = 31$) included patients with a positive TCD prior to angiography, and Group 2 ($n = 26$) included

patients with a negative TCD. Table 1. No significant differences were found between the groups in terms of DCI, length of stay, functional outcome, or mortality. Group-specific results are shown in Table 2.
In our sample, TCD had a sensitivity of 54.4%, specificity of 86%, positive predictive value of 76%, and negative predictive value of 70%. These results are shown in Table 2.
Conclusions: In our sample, 54.4% of patients with confirmed vasospasm showed suggestive findings on TCD. The sensitivity and specificity of TCD are consistent with the recent literature[1]. However, a larger sample size is needed to better estimate the diagnostic value of TCD for VSP.

Table 1 (abstract 001093) Diiagnostic tets 2 × 2 table

	VASOSPASM POSITIVE (n)	VASOSPASM NEGATIVE (n)	TOTAL (n)
TCD POSITIVE (n)	31	9	40
TCD NEGATIVE (n)	26	62	88
TOTAL (n)	57	71	128

TCD, Transcranial Doppler

Table 2 (abstract 001093) This table shows the results expressed in absolute number and percentage, and mean and interquartile range (IQR)

	Group 1 (n=31)	Group 2 (n= 26)	p
Sex (Women)	24 (77.1%)	20 (76.9%)	0.965
Age, years	54.9 (IQR 49.8-65.3)	58.3 (IQR 51.1-69.6)	0.36
Modified Fisher CT scale, n			0.089
1	2 (6.45%)	2 (7.7%)	
2	2 (6.45%)	0	
3	3 (9.7%)	0	
4	25 (80.6%)	25 (96.1%)	
WNFS scale, n			0.49
1	6 (19.4%)	3 (11.5%)	
2	3 (9.7%)	2 (7.7%)	
3	3 (9.7%)	2 (7.7%)	
4	9 (29%)	10 (38.5%)	
5	10 (32.3%)	9 (34.6%)	
Delayed Cerebral Ischemia,n	17 (54.8%)	13 (50%)	0.716
Radiologic ischemia, n	19 (61.3%)	15 (57.7%)	0.78
Intracranial hypertension, n	24 (77.1%)	15 (57.7%)	0.11
Hydrocephalus, n	22 (71%)	18 (69.2%)	0.88
Modified Rankin scale (at ICU discharge), n			0.462
0	2 (6.5%)	0	
1	3 (9.7%)	1 (3.8%)	
2	4 (12.9%)	3 (11.5%)	
3	2 (6.5%)	5 (19.2%)	
4	9 (29%)	6 (23.1%)	
5	4 (12.9%)	4 (15.4%)	
6	7 (22.6%)	7 (26.9%)	
ICU LOS, days	17 (IQR 12-21.14)	16 (IQR 8.5-25.5)	0.13
Mortality (at hospital discharge), n	8 (25.8%)	7 (26.9%)	0.924

ICU, intensive care unit*; LOS,* length of stay; CT, computed tomography; WFNS, world federation of neurological surgeons scale

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Topic: Neurointensive care

001095

Evaluating the efficacy of tea trolley training to teach bis monitoring in ITU

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Introduction: Over or undersedation of patients in intensive care units (ITU), particularly those receiving neuromuscular blocking drugs (NMBD), has been associated with delayed extubation, increased rates of delirium, prolonged ITU stay and higher rates of PTSD[1, 2]. Bispectral Index (BIS) monitoring has been used in some ITUs to titrate sedation more closely to patients' EEG activity and traditional sedation scoring systems like the Richmond Agitation Sedation Scale (RASS), to reduce the incidence of these adverse effects [3]. We planned to introduce BIS monitoring for proned patients, any receiving NMBD or Level 3 NELA patients in our ITU in a District General Hospital and used the tea trolley training [4] method to train ITU staff on its use.
Objectives: To evaluate whether tea trolley training can be effectively utilised to deliver teaching on the use and interpretation of BIS in an ITU.
Methods: The members of ITU staff, including nurses, Advanced Critical Care Practitioners and doctors, were asked to complete a Likert questionnaire before the teaching assessing their understanding of how to use BIS monitoring. Responses ranged from "very well/confident" to "not at all confident". We delivered tea trolley training on the unit to 31 staff members over a 3-month period demonstrating the use and interpretation of a BIS monitor, in line with our unit guideline which outlines how to utilise BIS monitoring alongside the RASS and clinical assessment. They were asked to complete the questionnaire again immediately after the teaching to assess whether their understanding had improved.
Results: The preteaching survey was completed by 24 people and the post teaching survey by 20 people. The average percentage of all responses indicating low confidence and understanding dropped from 69 to 0.6% after teaching. An average of 75% of answers after teaching were "very confident" or "confident", as opposed to 9% before teaching. The mean proportion of responses indicating "slightly confident" remained the same at 21%.
Conclusions: The results suggest that tea trolley training is effective at delivering BIS training and can continue to be used for this on our unit. The project is ongoing with further teaching planned. We felt the consistency in the average responses of "slightly confident" reflected the difficulty in conveying certain concepts in a short time, such as suppression ratios and the EEG. Burst suppression, what the BIS number means and how to respond to it using the guideline were concepts that were more easily understood. There were some limitations we found that could be addressed to improve the teaching, including more explanation of the suppression ratios and waveform, re-assessing understanding at an interim period to gauge knowledge retention and using a more efficient way to assess understanding than the questionnaire, as this required an email login to access which affected compliance.

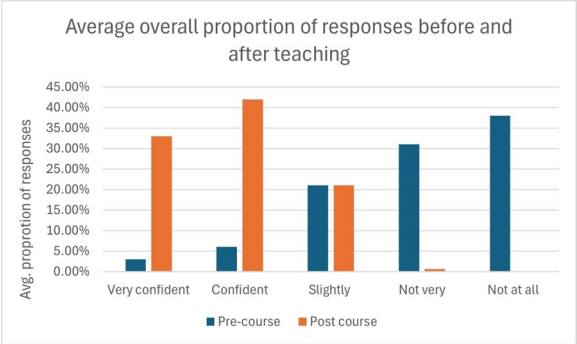


Table showing the average overall proportion of responses before and after teaching.

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Topic: Sedation, analgesia and delirium

001099

MOBILIZE-ICU: impact of early mobilization on functional recovery, delirium, ICU-acquired weakness and mortality in mechanically ventilated ICU patients: a systematic review and meta-analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001099

Introduction: Early mobilization (EM) during critical illness has been focused upon since many years to improve the outcomes of patients in an intensive care unit (ICU), especially ICU acquired weakness (ICU-AW) and it forms an important component of many guidelines. Mechanical ventilation is considered as a barrier to early mobilization. The effects of early mobilization on short term and long term outcomes in mechanically ventilated patients is not clear.
Objectives: We aimed to conduct a systematic review and meta-analysis to assess the effects of early mobilization when compared with standard or usual care in mechanically ventilated patients in an intensive care unit (ICU).
Methods: We conducted a comprehensive search on PubMed, EMBASE and Cochrane databases from inception to 31 January 2025. Randomized controlled trials published in English language, which assessed the effects of early mobilization when compared with usual or standard care in mechanically ventilated patients were included.
Our search strategy was ("mobilization" OR "exercise" OR "physical therapy" OR " rehabilitation") AND ("critical care" OR "intensive care" OR "critically ill" OR "critical illness" OR "mechanical ventilation") AND (RCT OR "Randomized controlled trial" OR "Randomized trial"). Statistical analysis was done using python programming on jupyter notebook and R studio 4.3.2. Custom scripts were developed and executed to perform data pre-processing, effect size calculations and meta-analysis on python. On R studio, relative risk ratio (RR) and Odds ratio (OR) with 95% confidence interval were pooled with fixed effects model. Heterogeneity was assesses using I^2 statistics. Quality assessment and risk of bias were performed according to the Cochrane recommendations.
We included patients with age > 18 years, mechanically ventilated for atleast 24 h, mobilized within 72 h- sitting out of bed, standing or walking compared with usual care (care that was normally provided in each ICU). The primary outcomes were ICU length of stay, ICU-AW, delirium and coginitive function. We also measured adverse events, ICU mortality, duration of mechanical ventilation and mortality at 180 days.
We excluded patients who were dependent, had cognitive impairment, proven or suspected acute brain lesion and/or spinal cord injury other neuromuscular disease, chronic underlying medical condition, death deemed inevitable and had rest-in-bed orders.
Results: We screened a total of 4738 studies. After removing the duplicates, reading the title and abstract and screenig the full text, 14 studies comprising of 2401 patients were included. Of these, 1204 (50.14%) patients received early mobilization. In the pooled data, there is statistical significant reduction in ICU length of stay (RR:0.63; 95% CI 0.55,0.71; $p = 0.00$, $I^2 = 0\%$), ICU-AW (RR:0.74; 95% CI −0.47, −0.13; $p = 0.0004$; $I^2 = 0\%$), incidence of delirium (RR:0.70; 95% CI −0.57, −0.15; $p = 0.0009$; $I^2 = 0\%$) and the duration of mechanical ventilation (RR:0.58; 95% CI 0.49,0.67; $p = 0.00$; $I^2 = 0\%$) in early mobilization group compared with standard or usual care in mechanically ventilated patients.
There was significant increase in the incidence of adverse events associated with early mobilization group compared with standard care. (RR:2.36; 95% CI 0.44,1.29; $p = 0.0001$; $I^2 = 0\%$).
There was no difference in ICU mortality (RR:1.24; 95% CI −0.29,0.73; $p = 0.403$, $I^2 = 0\%$), mortaliity at 180 days (RR:1.05; 95% CI −0.48,0.56; $p = 0.86$; $I^2 = 0\%$) and ventilator free days (SMD = 0.14; 95% CI −0.04,0.31; $p = 0.12$; $I^2 = 0\%$) between the two groups.
There was no statistical difference in the long term cognitive impairment (upto 1 year) (SMD;1.20; 95% CI −1.58,3.98; $p = 0.40$; $I^2 = 94.6\%$) and in the subggroup analysis based on health-related quality of life (QoL) measurement tools (EQ-5D-5L, SF-36, SGRQ) (SMD:0.61; 95% CI−0.23,1.46; $p = 0.15$; $I^2 = 97\%$) between the two groups. Among the three tools, SGRQ showed the larger effect size favouring early mobilization.
Conclusions: Our meta-analysis showed that when early mobilization was compared with usual or standard care in mechanically ventilated patients, there was improvement in ICU-AW, duration of mechanical ventilation, dellirium and ICU length of stay. There was no difference in mortality at 180 days, cognitive impairment and health-related QoL(upto 1 year).

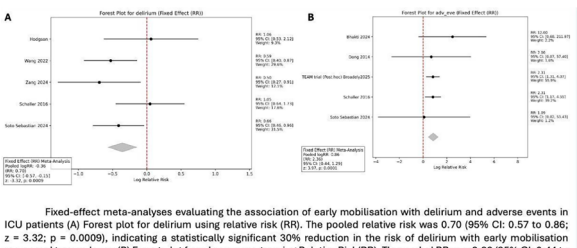
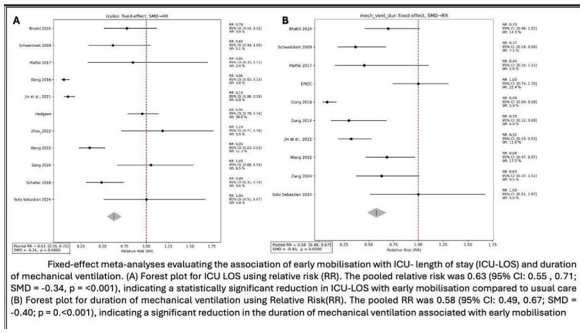
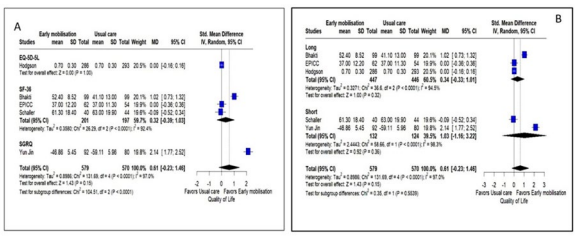


Fig. 1 (abstract 001099) Forest plots of delirium and adverse events when early mobilization is compared with usual care in mechanically ventilated patients



Fixed-effect meta-analyses evaluating the association of early mobilisation with ICU- length of stay (ICU-LOS) and duration of mechanical ventilation. (A) Forest plot for ICU LOS using relative risk (RR). The pooled relative risk was 0.63 (95% CI: 0.55 , 0.71; SMD = -0.34, p = <0.001), indicating a statistically significant reduction in ICU-LOS with early mobilisation compared to usual care (B) Forest plot for duration of mechanical ventilation using Relative Risk(RR). The pooled RR was 0.58 (95% CI: 0.49, 0.67; SMD = -0.40; p = 0.<0.001), indicating a significant reduction in the duration of mechanical ventilation associated with early mobilisation

Fig. 2 (abstract 001099) Forest plot of ICU length of stay and the duration of mechanical ventilation when early mobilization is compared with usual care in mechanically ventilated patients



Subgroup Analyses of Early Mobilisation Versus Usual Care on Quality of Life in ICU Patients

A: Subgroup analysis based on Quality of Life measurement tools (EQ-5D-5L, SF-36, SGRQ). Among the three tools, the SGRQ (Yun Jin study) showed the largest effect size (SMD 2.14), favoring early mobilisation.

B: Subgroup analysis based on follow-up duration. Short-term studies (≤3 months) showed a non-significant trend favoring early mobilisation. No statistically significant subgroup differences were observed.

Fig. 3 (abstract 001099) Forest plot of health-related quality of life (QoL) (upto 1 year) when early mobilization is compared with usual care in mechanically ventilated patients

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Topic: Acute respiratory failure and mechanical ventilation

001104

Long-term neurological outcome after extracorporeal cardiopulmonary resuscitation for OHCA: a cross-sectional analysis from the ECMO-Centre Regensburg

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Intensive Care Medicine Experimental 2025,* 13(1)*:001104

Introduction: Neurologic outcome after eCPR depends on multiple factors mainly due to quality of conventional prolonged resuscitation and an increased risk of neurologic complications associated with ECLS. The range varies from severe impairment to normal neurologic condition. Currently, only limited data are available on long-term neurological and neuropsychiatric outcomes after eCPR in OHCA.

Methods: Retrospective observational cross-sectional study at the University Regensburg ECMO-Center. All patients after eCPR for OHCA between 03/2011 and 11/2023 were included. Behavioral and cognitive dysfunction was obtained by frontal behavioral inventory (FBI) raised by a relative, Montreal cognitive assessment (MoCA) test and instrumental activities of daily living (IADL) test. FBI assesses behavioral changes caused by frontal lobe abnormalities. For 18/30/32 patients a follow-up visit with assessment of FBI/MoCA/IADL was available.

Results: 223 patients had eCPR for OHCA, Age was (median, IQR 25th-75th) 56.2 (49.4–65.3) years. A follow up exceeding 12 months was available for 34 patients. 3 of these had suffered intracranial hemorrhage or ischemia, 2 depended on care. FBI (normal: 0, max. per category 3, max. total 72 points) showed a total of 8.0 (4.0–17.0) points. A noticeable deviation was shown in the categories emotional flatness (1.0, 0–2.0), inflexibility (1.0, 0–2.0) and disorganization (1.0, 0–2.0). Regarding cognitive impairment assessed by the MoCA test (normal > 26, max. 30), the included patients showed a score of 26 (24–28). The IADL (max. 8) showed a median 8 (8 – 8).

Conclusions: To our knowledge, this is the largest cohort of patients after eCPR reporting on long-term neurological outcome. Besides the high risk of neurologic impairment associated with OHCA we showed a good neurological and neuropsychiatric long-term outcome of survivors more than 12 months after eCPR. Regarding the FBI, MoCA and IADL test most of long-term survivors did not develop severe neurological sequelae.

Topic: Cardiac arrest

001105

Predictive validity of the arterial oxygen partial pressure to the inspired oxygen fraction ratio (PaO_2/FiO_2) for mortality in patients with acute respiratory distress syndrome (ARDS): a retrospective observational study

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Introduction: The arterial oxygen partial pressure to inspired oxygen fraction ratio (PaO2/FiO2) is a critical metric for evaluating the prognosis of patients with acute respiratory distress syndrome (ARDS). This ratio offers valuable insights for making informed treatment decisions, particularly in assessing mortality risk. Despite its widespread use, the reliability of the PaO2/FiO2 ratio in accurately gauging ARDS severity and predicting mortality remains a topic of debate.
Objectives: This study aimed to evaluate the accuracy of the PaO2/FiO2 ratio in predicting hospital mortality among ARDS patients in Vietnam.
Methods: We conducted a retrospective observational study that included all adult patients with ARDS admitted to a central hospital in Vietnam from August 2015 to August 2023. The diagnosis of ARDS was based on the Berlin definition. To categorize the severity of ARDS, we applied this definition and converted its categories into a numerical grading system known as the Berlin score. This score ranges from 1 (PaO2/FiO2 > 300 mmHg) to 4 (PaO2/FiO2 $\leq$ 100 mmHg). To evaluate the predictive accuracy of the PaO2/FiO2 ratio, the Berlin score, the Sequential Organ Failure Assessment (SOFA) score, the Acute Physiology and Chronic Health Evaluation II (APACHE II) score, and the CURB-65 score for hospital mortality, we calculated the areas under the receiver operating characteristic curve (AUROC). Lastly, we performed multivariable analysis for each variable of interest (i.e., PaO2/FiO2 ratio, Berlin score, SOFA score, APACHE II score, and CURB-65 score), controlling for the same set of confounders to identify the association of these variables with hospital mortality.
Results: Of the 345 patients, 67.5% were male, and the median age was 55.0 years (IQR: 39.0–66.0). Among these patients, 61.2% (211/345) died in the hospital. On the first day of admission, the PaO2/FiO2 (AUROC: 0.585 [95% CI 0.522–0.649]) had a poor predictive ability for hospital mortality. Incorporating the PaO2/FiO2 into the Berlin score did not improve its predictive accuracy (AUROC: 0.578 [95% CI 0.516–0.641]) for hospital mortality. Both the PaO2/FiO2 ratio and the Berlin score demonstrated lower accuracy in predicting hospital mortality compared to the SOFA (AUROC: 0.650 [95% CI 0.590–0.711]), APACHE II (AUROC: 0.685 [95% CI 0.628–0.742]), and CURB-65 scores (AUROC: 0.689 [95% CI 0.617–0.762]). Higher values of PaO2/FiO2 (adjusted OR [AOR]: 0.988 [95% CI 0.979–0.996]) were independently associated with a lower mortality risk. Higher scores on the Berlin (AOR: 2.477 [95% CI 1.190–5.156]), SOFA (AOR: 1.278 [95% CI 1.102–1.482]), APACHE II (AOR: 1.236 [95% CI 1.108–1.379]), and CURB-65 (AOR: 7.142 [95% CI 2.581–19.763]) were independently associated with an increased mortality risk.
Conclusions: This study investigated a selected cohort of ARDS patients with high mortality rates at a central hospital in Vietnam. The findings revealed that the PaO2/FiO2 ratio poorly predicted hospital mortality. Incorporating the PaO2/FiO2 ratio into the Berlin score did not improve its predictive accuracy. Furthermore, the PaO2/FiO2 ratio and Berlin score demonstrated lower predictive accuracy for hospital mortality than the SOFA, APACHE II, and CURB-65 scores. Nevertheless, lower PaO2/FiO2 ratio and higher scores on the Berlin, SOFA, APACHE II, and CURB-65 scores remained independent predictors of hospital mortality. These findings highlight the need for further studies to develop more accurate scoring systems for predicting outcomes in ARDS patients.

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Topic: Acute respiratory failure and mechanical ventilation

001107

Impact of family involvement on patient safety outcomes in ICUs: a retrospective multicenter analysis from Saudi Arabia

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Introduction: The intensive care unit (ICU) is a high-stress environment where critically ill patients require intensive monitoring and treatment. This setting can be overwhelming for both patients and their families, often leading to emotional distress and challenging interactions with healthcare providers. Traditionally, ICU care has been highly clinician-driven, with limited family involvement. However, recent shifts in healthcare practices emphasize the importance of family-centered care. Research suggests that family participation can improve patient outcomes by enhancing communication, providing emotional support, and helping to monitor and advocate for patient safety.
ICUs are complex environments, and despite best efforts, they remain prone to patient safety incidents such as medication errors, infections, and falls. Incident reporting systems (IRS) are crucial tools for identifying and addressing these errors. This study seeks to explore whether involving family members in patient care in the ICU can influence the frequency and nature of these safety incidents. Specifically, it aims to investigate the association between family presence during ICU care and the number of safety-related events reported in the IRS across multiple hospitals in Saudi Arabia.
Objectives: To evaluate the impact of family involvement on patient safety incidents in ICUs, including medication errors, falls, and communication issues.To compare common patient safety incidents in ICUs with and without family participation.
Methods: This is a multicenter, retrospective cohort study conducted across five private-sector hospitals in Saudi Arabia, all accredited by the Saudi Central Board for Accreditation of Healthcare Institutions

(CBAHI). The study included records of adult patients (aged ≥ 18 years) who were admitted to the intensive care units (ICUs) between 2022 and 2024.
Patients were categorized into two groups based on the level of family involvement in their care during ICU admission. This information was extracted from patient records; in cases where data was missing, family members were contacted by phone to verify their involvement. The primary outcome measured was the number of patient safety incidents, as reported in each hospital's Incident Reporting System (IRS).
A total of 3,274 patients were included in the study (1,637 in each group). Data were analyzed using descriptive statistics and inferential tests. Independent t tests or Mann–Whitney U tests were used for continuous variables, while chi-square tests were used for categorical variables. A $p < 0.05$ was considered statistically significant.
Results: A total of 3,274 ICU patients were included in the analysis, divided equally into two groups: those with family involvement in care ($n = 1,637$) and those without ($n = 1,637$). The overall number of reported patient safety incidents was significantly lower in the group with family involvement compared to the group without (incidents per 1,000 patient-days: 3.2 vs. 5.7; $p < 0.01$).
Further analysis revealed that the most common types of incidents were medication errors, falls, and documentation-related issues. In all categories, the frequency of incidents was consistently lower among patients whose families were actively involved in their care.
There were no significant differences in baseline demographics (age, sex, primary diagnosis) between the two groups, supporting the validity of the comparison. Statistical tests confirmed a significant association between family involvement and a reduction in patient safety incidents, suggesting a protective effect of family presence in the ICU.
Conclusion: This multicenter retrospective cohort study demonstrates a significant association between family involvement in ICU patient care and improved patient safety outcomes. Patients whose families were actively involved experienced fewer reported incidents, particularly in areas such as medication errors and documentation issues. These findings support the integration of family-centered care models in intensive care settings as a strategy to enhance safety, promote transparency, and foster a culture of shared responsibility. Hospitals and policymakers should consider expanding policies that encourage and facilitate meaningful family participation in ICU care.

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Topic: Health services research and outcome

001108

Early serum NGAL elevation predicts ICU mortality in patients with severe acute brain injury

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Introduction: Neutrophil gelatinase-associated lipocalin (NGAL), a well-established biomarker for acute kidney injury1, has also been reported to be increased in patients with acute brain injuries (ABI)2,3 4; however, its prognostic roles in severe ABI patients remain poorly understood.
Objectives: In this study, we investigated the association between serum NGAL levels measured within 24 h and neurologic outcomes, aiming to evaluate its potential role as a biomarker in severe acute brain injury patients requiring ICU care.
Methods: The data were obtained from candidates admitted in Seoul National University Bundang Hospital from 23/01/01 to 24/12/31 enrolled in NCART-KR registry, a retrospective multicenter cohort of neurocritical units from 6 tertiary centers in South Korea. Patients with ABI (including TBI, SAH, ICH and Ischemic stroke) admitted within 72-h from onset without significantly elevated admission serum creatinine levels (> 4.0 mg/dL) or a history of renal replacement therapy (RRT) were included. Serum NGAL levels were measured within 24 h of ICU admission. The association between NGAL levels and ICU mortality was evaluated using the Cox proportional hazards model. Additionally, the relationship between admission Glasgow Coma Scale (GCS), NGAL levels, and ICU mortality was assessed using causal mediation analysis.
Results: Of the 275 ABI patients (mean age 66.3; male 51%; median GCS 12; ICH/IVH 36.0%, SAH 16.7%, TBI 25.5%, Ischemic stroke 21.8%), NGAL quartiles were evaluated as Q1: 62.9, Q2: 85.9, Q3: 122.8, and Q4: 3000. NGAL levels varies significantly by admission GCS: median NGAL was 76.0 for GCS 13–15, 80.7 for GCS 9–12, and 111.8 for GCS 3–8. Over a mean ICU stay of 9.9 days (SD 12.1), mortality occurred in 15% of patients. Risk of ICU death increased according to NGAL quartiles, with highest quartiles of NGAL significantly associated with ICU mortality (HR 5.57 [1.62–19.19], $p \leq 0.01$). On causal mediation analysis, NGAL quartiles were an independent predictor of ICU mortality (indirect effect $\beta = 0.013$, $p = 0.03$), mediating 7.1% of the total effect.
Conclusions: Elevated early serum NGAL levels are related with admission GCS and ICU mortality in severe acute brain injury patients, indicating its potential as a prognostic biomarker. Further research is needed to explore the pathophysiological mechanisms of NGAL in severe ABI.

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Topic: Neurointensive care

001109

Association between intensive care units design and patient safety in Saudi Arabia: a multicenter cross-sectional study

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Introduction: The design of Intensive Care Units (ICUs) is a crucial yet often overlooked factor in enhancing patient safety and clinical outcomes. Environmental variables such as light intensity, noise levels, and room layout can significantly influence both patient recovery and the efficiency of healthcare providers. The research suggests that suboptimal ICU environments—characterized by poor lighting, high noise levels, and overcrowded or open-ward layouts—may contribute to higher rates of medical errors, staff fatigue, and compromised patient safety. For instance, inadequate lighting can hinder critical care tasks, while excessive noise may disrupt patient rest and elevate stress levels. Similarly, the configuration of ICU rooms (e.g., single-patient rooms versus open-ward setups) affects both patient comfort and staff workflow, which in turn can impact the quality of care delivered.
Although several studies have explored the impact of ICU design on staff well-being and patient satisfaction, a gap remains in the literature regarding the direct correlation between ICU design characteristics and patient safety outcomes—particularly in Saudi Arabia. This study aims to address that gap by investigating how specific ICU design features influence the frequency and nature of incidents reported to the Incident Reporting System (IRS). By identifying environmental factors that directly contribute to improved patient safety, this research seeks to provide valuable insights to inform the redesign of ICUs across Saudi hospitals, ultimately enhancing both patient care and operational efficiency.
Objectives: This study aims to evaluate the association between Intensive Care Unit (ICU) design features—specifically light intensity, noise levels, and room layout—and patient safety, measured by the frequency of incidents reported to the Incident Reporting System (IRS) in CBAHI-accredited hospitals across Saudi Arabia.
Methods: A multicenter cross-sectional study was conducted from October 2024 to February 2025 in five CBAHI-accredited private hospitals in Saudi Arabia. ICU design characteristics—including light intensity (measured in Lux using Extech SDL400 light meters), noise levels (measured in decibels using a microphone array), and room layout (open ward vs. single-patient rooms)—were assessed through standardized surveys and environmental measurements. Incident data were extracted from each hospital's Incident Reporting System (IRS), including the number and type of incidents, along with basic patient demographics. A total of 674 patient reports were analyzed. Statistical analysis included descriptive statistics, t tests, ANOVA, chi-square tests, correlation analysis, and multivariable linear regression to evaluate the association between ICU design features and incident frequency.
Results: A total of 674 ICU patient reports were analyzed across five hospitals. ICUs with higher light intensity (> 300 Lux) reported significantly fewer incidents (mean = 4.3/month) compared to those with lower lighting (< 150 Lux; mean = 7.8/month, $p = 0.003$). Similarly, ICUs with lower average noise levels (< 55 dB) experienced fewer incidents (mean = 3.9/month) than those with higher noise levels (> 65 dB; mean = 8.1/month, $p < 0.001$). Single-patient room ICUs showed a 35% lower incident rate (mean = 4.5/month) compared to open-ward ICUs (mean = 6.9/month, $p = 0.01$). Regression analysis confirmed that increased light intensity ($\beta = -0.42$, $p = 0.006$), reduced noise ($\beta = 0.61$, $p < 0.001$), and single-patient room layout ($\beta = -0.33$, $p = 0.02$) were significant independent predictors of lower incident rates.
Conclusions: ICU design characteristics—specifically higher light intensity, lower noise levels, and single-patient room layouts—are significantly associated with reduced incident rates, indicating improved patient safety. These findings underscore the importance of integrating evidence-based environmental design principles into ICU planning and renovation strategies. Optimizing ICU environments have the potential to enhance the safety outcomes for patients, families, and healthcare professionals in critical care settings.

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Topic: Health services research and outcome

001110

Invasive therapies in older patients

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Introduction: Global population aging is a reality that impacts our daily clinical practice. Treatments must be adapted to these specific patient's characteristics, including any invasive therapy they received.
Objectives: To describe invasive treatment applied to elderly population in our intensive care unit (ICU), analyzing vasoactive support (VAS), invasive mechanical ventilation (IMV) and continuous renal replacement therapy (CRRT), as well as mortality rates. We define the elderly population as those patients aged 75 years and older, according to the World Health Organization's definition.
Methods: Retrospective observational study of elderly patients admitted in our ICU between January 1st, 2022 and December 31st, 2023. It is a multipurpose ICU with 12 beds. Demographic characteristics, reasons for ICU admission, severity (APACHE II), application of invasive

therapies (VAS, IMV, CRRT), as well as overall mortality and mortality within each group receiving invasive therapy are analyzed.
Results: During the study period, 979 patients were admitted to our ICU. 166 (16.95%) were over 75 years old (y.o). 94 were males (56.62%). The mean age was 80.31 y.o (95% CI 79.63–80.98), with a median of 79 and a mode of 78. The most common medical histories were hypertension in 126 patients (75.90%), dyslipidemia in 102 (61.44%), diabetes mellitus in 59 (35.54%) and obesity in 33 (19.88%. The most frequent reasons for ICU admission were postoperative control (POP) in 43 patients (25.90%), atrioventricular block (AVB) in 32 (19.27%), septic shock in 25 (15.06%), and acute coronary syndrome (ACS) in 15 (9.03%). The mean APACHE II score was 18.63 (95% CI 17.46–19.81); the average length of stay was 5.59 days (95% CI 4.18–7.02).
The overall survival rate was 59 patients (35,54%). 142 (85.55%) survived in the ICU, 126 (75.90%) one month postdischarge, and 123 (74.10%) one year later. 69 patients (41.57%) received VAS. Survival in this group was 45 patients (65,22%) in the ICU, 38 (55,07%) at one month postdischarge and 32 (46,38%) at one year. 59 patients (35.54%) recieved IMV, with 37 (62,71%) patients surviving in ICU, 28 (47,45%) in one month postdicharge and 27 (45,76%) in one year. 19 patients (11.44%) received CRRT, with 8 (42,10%) patients surviving in ICU, and 5 (26,32%) survivors at first month postdischage and at one year.
Conclusions: Older patients represented 16.95% of admissions to our ICU. The survival rates was 85.55% in the ICU, 75.90% one month postdischarge, and 74.10% one year later. The survival rate for patients who received invasive therapy was 65.22% in the ICU, 55.07% one month postdischarge, and 46.38% one year later.
Therefore, while age should be a characteristic to consider, it should not be a limiting factor when applying invasive measures; however, these measures should be tailored to the individual characteristics of each patient.

Topic: Ethics and end of life care

001111

Empowering infectious disease-led Stewardship in ICU: reducing MDROs through targeted intervention in a tertiary-level eastern European center

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Introduction: ICUs are epicenters for multidrug-resistant organisms (MDROs), where antimicrobial overuse intersects with immunocompromised hosts. While antibiotic stewardship programs (ASPs) are well-established in high-resource ICUs, their implementation in resource-limited, infectious disease-led units remains underreported. Our ICU, led by infectious disease specialists, implemented a focused ASP to address high MDRO burden and optimize antimicrobial use.
Objectives: To assess the clinical and operational impact of a structured ASP and infection control protocol, led by infectious disease physicians, on antibiotic use, MDRO incidence, and patient outcomes in an Eastern European tertiary infectious disease ICU.
Methods: We conducted a prospective, quality improvement initiative from Jan 2023 to Mar 2025. Core interventions included:
1) Daily real-time antibiotic prescription auditing and feedback;
2) Multidisciplinary ICU rounds with infectious disease specialists, pharmacists, and microbiologists;
3) Reinforcement of infection control protocols (hand hygiene, contact isolation, staff re-education).

Primary outcomes: inappropriate antibiotic use, MDRO infection rate, ICU length of stay, mortality.
Results: Among 214 patients admitted during the study period, inappropriate antibiotic use decreased from 47 to21% ($p < 0.001$), and MDRO infections dropped by 30%. ICU length of stay decreased by 1.8 days. Qualitative feedback from staff highlighted increased awareness and adherence to stewardship guidelines. The model proved sustainable with minimal external support.
Conclusions: Infectious disease-led stewardship programs can yield significant reductions in antimicrobial misuse and resistance, even in resource-constrained ICUs. Our experience highlights the power of multidisciplinary collaboration, real-time feedback, and targeted interventions. This model may serve as a blueprint for similar units in Eastern Europe and beyond.

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2. Self-financing

Topic: Infections and prevention

001112

A UK consensus statement on the withdrawal process of veno-venous extra corporeal membrane support (VV-ECMO)

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Introduction: Patients with acute severe respiratory failure receiving veno-venous extracorporeal membrane oxygenation (VV-ECMO) have high mortality risk. Management of the process of VV-ECMO withdrawal is challenging, especially in awake patients. Yet there is no guidance to guide clinicians to manage these morally distressing and ethically ambiguous decisions.
Objectives: To establish consensus recommendations for management of the process of VV-ECMO withdrawal to reduce practice variability and improve care quality.
Methods: Our process for generating recommendation statements for consideration at our consensus meeting included semi-structured interviews and a scoping review. We recruited healthcare professionals with experience in VV-ECMO withdrawal to participate in interviews and a consensus meeting led by an independent facilitator. Using modified nominal group technique, participants discussed and voted on statements, categorising them as essential, desirable, or not required. A subsequent voting round identified key priorities for future research.
Results: During our item generation process we interviewed 12 healthcare professionals with VV-ECMO expertise and identified 41 publications (21 empiric studies and 20 opinion pieces) focused on ECMO withdrawal. We developed 16 recommendation statements from these data, of which 17 participants representing 7 UK ECMO centres considered 8 as essential, 6 desirable, 1 not required; 1 was without consensus. The three priority areas for future research were developing a standardised framework for managing disagreements; creating tools to enhance communication and documentation of information provided; and designing quality improvement strategies to ensure consistency in the clinical and technical aspects of VV-ECMO withdrawal.
Conclusions: Using rigorous methods, we have established consensus on eight essential and six desirable recommendations for management of VV-ECMO withdrawal and three future research priorities.

These recommendations should be considered the foundations of a framework to facilitate a standardised approach to support patients, family members and clinicians through this challenging clinical situation.
Topic: Ethics and end of life care

001113

Predictive validity of the lactate-enhanced quick sequential organ failure assessment (LqSOFA) score for mortality in septic patients in Vietnamese intensive care units

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Introduction: The early identification of sepsis-related mortality risk is critical, particularly in resource-limited settings. The quick Sequential Organ Failure Assessment (qSOFA) score, combining respiratory rate, mental state, and systolic blood pressure, is a simple clinical tool validated in various environments, including emergency departments and intensive care units (ICUs). However, its low sensitivity has raised concerns. Lactate, a byproduct of anaerobic metabolism, is associated with sepsis severity and has shown promise as a diagnostic and prognostic marker. Elevated lactate levels significantly increase mortality risk in septic patients. Combining lactate measurements with qSOFA score into a Lactate-enhanced qSOFA (LqSOFA) score may enhance sepsis recognition and mortality risk assessment, offering a more effective strategy for bedside evaluations than using qSOFA alone.
Objectives: This study aimed to compare the accuracy of the LqSOFA score with the qSOFA score in predicting mortality among ICU patients with sepsis in a lower-middle-income country.
Methods: We conducted a multicentre cross-sectional study of septic patients (≥ 18 years old) presenting to 15 adult ICUs across Vietnam on four specific dates—January 9th, April 3rd, July 3rd, and October 9th—representing different seasons in 2019. We calculated the areas under the receiver operator characteristic (ROC) curve (AUROC) to evaluate the predictive capacity of the LqSOFA and qSOFA scores for hospital mortality at the time of ICU admission. We utilized ROC curve analysis to determine the optimal cutoff values for each score, and Z statistics were employed to assess differences in AUROC for predicting hospital mortality. Finally, logistic regression analyses identified the association of the LqSOFA and qSOFA scores with hospital mortality.
Results: Of the 200 patients, 62.0% were men, the median age was 65 years (Q1–Q3: 53.25–77.75), and 39.0% died in the hospital. The LqSOFA score demonstrated poor discriminatory ability for hospital mortality (AUROC: 0.653 [95% confidence interval, CI 0.576–0.730]; cut-off value: ≥ 2.5; sensitivity: 75.6%; specificity: 47.5%; PAUROC < 0.001). Similarly, the discriminatory ability of the qSOFA score exhibited poor discriminatory ability for hospital mortality (AUROC: 0.613 [95% CI 0.533–0.694]; cut-off value: ≥ 2.5; sensitivity: 33.3%; specificity: 84.4%; PAUROC = 0.007). The AUROC curves of the LqSOFA and qSOFA scores showed a significant difference in predicting hospital mortality (AUROC difference: 0.040; 95% CI 0.007–0.073; Z-statistic: 2.38; $p = 0.017$). The multivariable analyses, with the same set of confounding factors, revealed that a LqSOFA score ≥ 2.5 (adjusted odds ratio [AOR]: 2.697; 95% CI 1.359–5.354; $p = 0.005$) and a qSOFA score ≥ 2.5 (AOR: 3.145; 95% CI 1.442–6.858; $p = 0.004$) were independently associated with an increased risk of hospital mortality.
Conclusions: This study examined a selected cohort of septic patients with a high mortality rate admitted to ICUs across Vietnam. Both the LqSOFA and qSOFA scores were valuable for predicting mortality; however, the LqSOFA score demonstrated significantly better accuracy and higher sensitivity than the qSOFA score. Despite this, both scores showed poor discriminatory ability in predicting mortality outcomes. These findings underscore the need for further research to develop new scoring systems that can enhance the accuracy of predicting outcomes for septic patients.

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9. We thank all ED and ICU staff of participating hospitals for their support with this study. We also thank the staff of the Faculty of Public Health at Thai Binh University of Medicine and Pharmacy for their support and statistical advice.
10. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Topic: Sepsis

001114

Increasing the reflection efficiency of the Sedaconda ACD-S by thermocycling using sevoflurane in a bench study

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Introduction: Inhaled sedation of intensive care patients using Sedaconda ACD-S is widely used. Volatile anaesthetics like sevoflurane are potent greenhouse gases, making it more environmentally sustainable to minimize their consumption and contribute to green anaesthesia [1].
Objectives: This study aims to identify the optimal temperature difference between clinical conditions and thermocycling (periodic cooling and heating of the reflector) to enhance reflection efficiency [2] in 5 °C steps.
Methods: Sevoflurane was administered to the ACD-S via a syringe pump at infusion rates of 0.5, 1, 2, 5 and 10 ml/h.
A test lung, maintained under BTPS and normocapnic conditions, was ventilated (IPPV, tidal volume = 500 ml, respiratory rate = 12/min, FiO2 = 0.21). BTPS conditions were achieved by filling the test lung with 100 ml of distilled water and heating it in a water bath. The ventilation circuit between the test lung and the ACD-S was split into an inspiratory limb, heated to 37 °C using a humidifier, and an expiratory limb, where the gas was channelled through a copper tube in a freezer. The expiratory gas temperature was adjusted across six levels (26 °C to 1 °C in 5 °C steps) by controlling the freezer's cooling level, varying the copper tube's exposure, and insulating the tube (Fig. 1). Temperature at the expiratory limb before the ACD-S, as well as temperature, humidity, sevoflurane, and CO_2 concentrations inside the test lung were continuously monitored. Sevoflurane concentration was measured three times on different days for each temperature and infusion rate combination over a 5-min steady-state period. Reflection efficiency was calculated. In addition, a clinical baseline was measured with a shorter tube system.
Results: Intensified thermocycling led to increased sevoflurane concentration in the test lung at a constant infusion rate. An interpolation of the data shows, that in order to achieve a sevoflurane concentration of 1 Vol%, the infusion rate could be reduced from 5.75 ml/h under clinical conditions to 1.6 ml/h at the most intensified thermocycling, ID EST by 72% (Fig. 2). Reflection efficiency improved in a nonlinear fashion across all concentrations tested (Fig. 3).
Conclusions: Reflection efficiency increases with cooling intensity. The increase in efficiency follows a first order with the highest increase within the first few degrees and levels off at approximately 16 °C. Notably, even moderate thermocycling (5 °C steps) significantly impacts reflection efficiency, potentially simplifying cooling techniques and offering a more climate-friendly approach.

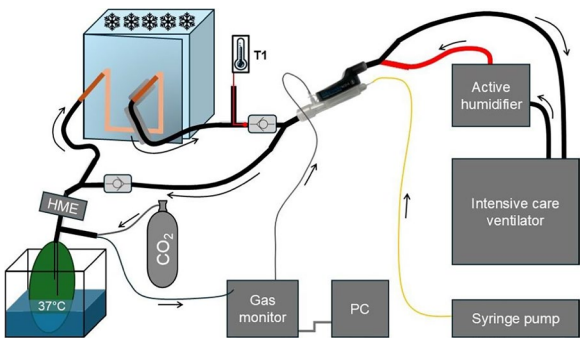


Fig. 1 (abstract 001114) Experimental setup for thermocycling trials

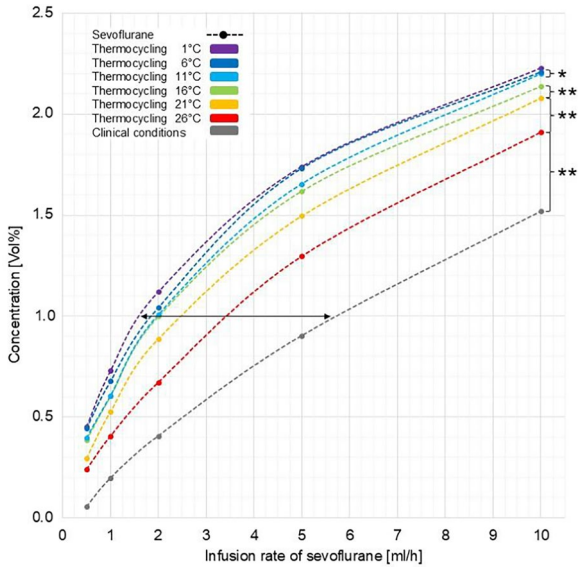


Fig. 2 (abstract 001114) Concentration of sevoflurane depending on the infusion rate across all temperature levels; *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

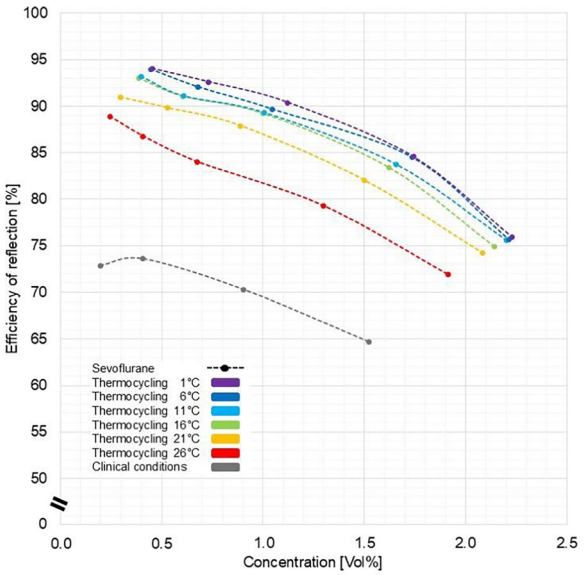


Fig. 3 (abstract 001114) Efficiency of reflection depending on the concentration of sevoflurane across all temperature levels

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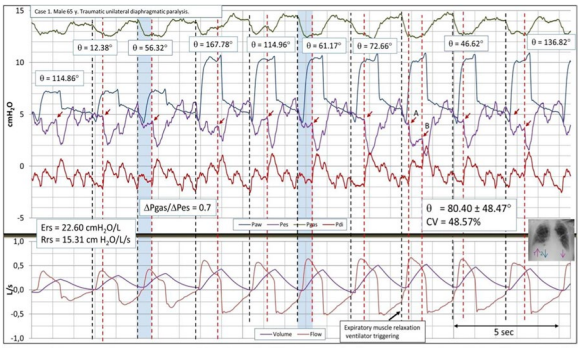
Topic: Sedation, analgesia and delirium

001115

Patient-ventilator dyssynchrony induced by diaphragmatic paralysis: similarity to reverse triggering

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Introduction: Reverse triggering (RT) is respiratory entrainment triggered by the ventilator usually in heavily sedated and attributed to reflexes phenomenon. RT is a cause of 'double breaths'; it is likely to be injurious for lung. We have observed a similar dyssynchrony during spontaneous ventilation modes in patients with diaphragmatic paralysis (DP). We hypothesized this could be generated due to a misbalance of transdiaphragmatic pressure.
Objectives: Our objective was to review tracings during PSV, obtained in patients with diaphragmatic paralysis, with consecutive efforts after initiating a ventilator breath, patient triggered, to describe this asynchrony and its characteristics.
Methods: Design. A prospective observational study at HU. R. Sofia, Córdoba; period September 2023–December 2024. Protocol was approved by the local ethics committee (Musc-Txp-23). We studied a group of patients mechanically ventilated (MV) during PSV, in whom we observed clinical signs thus as paradoxical (negative) swing abdominal wall, elevated hemidiaphragm on chest X-rays, and they did not wean after 7 days of controlled mechanical ventilation.
Data acquisition. Transdiaphragmatic pressure (Pdi) and its components, gastric pressure (Pga) and esophageal pressure (Pes) were registered, as well as airway and tracheal pressures (Paw, Ptra) and flow. Sampling 1126 Hz. Ten respiratory cycles were averaged for calculations.
Measurements: Respiratory mechanics (Elastance and resistances of respiratory system, Ers and Rrs), DPgas/Pes. Assesment of the dyssynchronie: Angle phase (Ø)of coupling between ventilator breath – patient triggered- and consecutive effort, coefficient of variation (CV), and frequency of appearance of asynchrony.
Data were analyzed by descriptive statistical methods and are expressed as mean ± SD, medians, and the IQR, frequency and percentages.
Results: Patients: N 12. Unilateral paralysis 10, 83.3%. Male: 9 (75%). Age 62 (55.75–65) years. Diagnosis: Trauma 2 (16.6%), lung transplant 10 (83.3%). MV at inclusion 15.5 (7–27.5) days. Respiratory components: Ers 20.9 (18.3–25.7) cmH2O/L; Rrs 12 (9.8–14.1) cmH2O/L/s. DPdi 7.3 (4–9) cmH2O. D Pgas/Pes 0.6 (−0.2 to −0.7) cmH2O. Inspiratory pressure 13.5 (10–15), PEEP 6 (5–7.3) cmH2O. Coupling dyssynchrony: Ø = 67.5 ± 28.4°. CV = 33.7 ± 16.8%. Ratio 1/1 (51.7%) in high support; coexisting 2/1, 3/1 (74.5%) and variable in medium and low support. Double cycling 33%. A representative case is shown in the figure.
Conclusions: Dyssynchronies can occur during spontaneous ventilation modes in patients with DP, particularly unilaterally. This asynchrony resembles RT; however, occurs after patient-initiated effort with wide coupling variability, which could be attributed to paradoxical diaphragmatic movement. We could adopt the term pseudo reverse-triggering to describe this phenomenon.



Representative case of apparent reverse triggering ratio 1/1 at two levels of pressure support ventilation. Traumatic right diaphragm paralysis in a male 65-year. Tracing of airway pressure (Paw), esophageal (Pes), gastric (Pgas), and transdiaphragmatic (Pdi) pressure; flow and volume. Note the depression of Pgas during inspiration, active expiration, and low amplitude transdiaphragmatic pressure. Two ventilatory impulses are appreciated during inspiration; the first can be induced by active expiratory release, the second by changes in transdiaphragmatic pressure (imbalance between the paretic and patent diaphragm). The angular phase of the asynchrony and its coefficient of variation are shown.

Representative case.

Topic: Acute respiratory failure and mechanical ventilation

001118

The role of the intensivist in the emergency room: a single-center experience from a peripheral hospital

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Intensive Care Medicine Experimental 2025,* 13(1)*:001118

Introduction: Intensivists are trained to manage the full spectrum of critical illness, both within and beyond the boundaries of the Intensive Care Unit (ICU). The concept of an "ICU without walls" reflects this comprehensive approach, emphasizing a care model that prioritizes the clinical needs of the patient over their physical location within the hospital. Nevertheless, the role of intensivists in the Emergency Department (ED) is often limited, with early decision making frequently led by other specialties. Some authors advocate for the early involvement of intensivists in the care of acutely ill patients in the Emergency Room (ER), suggesting that this may help prevent clinical deterioration and reduce the need for ICU admission. At our hospital, the Intensive Care Department has been responsible for the management of the ER since 2021. Owing to constraints in human resources within the ICU medical team, full-time intensivist coverage in the ER has so far only been feasible during daytime hours (8am to 8 pm). During the night shift, emergency care is provided by teams from Internal Medicine and General Surgery, with intensivists available for consultation and patient assessment upon request. The stroke fast track protocol, available 24 h a day in our ER, is managed by neurologists and Internal Medicine physicians.
Objectives: The aim of this study is to characterize the activity of the ICU medical team as first-line responders in the initial assessment and management of patients admitted to the ER and subsequently to the ICU.
Methods: A retrospective study was conducted using the data from electronic medical records of adult patients admitted to the ER of the ED and subsequently to the ICU in a peripheral hospital, between January and June 2024.
Results: During the first semester of 2024, a total of 1086 patients were admitted to the ER, 783 during daytime hours and 300 during the nighttime. A total of 818 patients (75%) were referred directly from the triage area, where the Manchester Triage System is applied, while the remaining 268 were referred from other areas of the ED or the hospital. Among the triage group, 129 patients (15.7%) were classified as red priority, 400 (48.9%) as orange, and 289 (35.3%) were admitted via

the stroke fast track pathway. Of the 1086 patients, 625 (57.6%) were assessed by intensivists at the time of admission. During this period, a total of 223 ICU admissions were registered, with 198 patients (89%) being directly referred from the ER following initial assessment by the intensivist. Among these ER-to-ICU admissions, 140 patients (71%) were medical, 45 (23%) surgical, and 13 (6%) trauma-related. Most of these ICU admissions occurred within 2–4 h of ER arrival, with patients already receiving targeted and/or invasive therapies upon transfer. The most common primary diagnoses were septic shock (32%), altered mental status or coma due to acute neurological injury (15%), trauma-related sequelae (7%), postcardiac arrest neuroprotection (6%), intoxications (3%), diabetic ketoacidosis (2%), and hemorrhagic shock (2%). The average ICU length of stay was 6.3 days for patients admitted from the ER, compared with 11.3 days for those admitted from other departments. A total of 49 deaths occurred in the ICU during this period, 41 of which (84%) involved patients admitted directly from the ER, corresponding to a mortality rate of 20% in this subgroup (41/198). Among patients admitted to the ICU from other departments, 8 deaths were reported, representing a higher mortality rate of 32% (8/25).

Conclusions: This study highlights the importance of the physical presence of intensivists in the ER, aiming to ensure the early initiation of therapeutic interventions—particularly invasive procedures—in critically ill patients, especially in resource-limited hospitals. This approach facilitates continuity of care for those requiring subsequent admission to the ICU. Overall, our team's experience suggests that this strategy contributes to resource optimization, reduced waiting times, prompt evaluation of ICU admission criteria, and the multidisciplinary establishment of treatment ceilings. Looking ahead, we aim to secure the necessary human resources to provide full coverage of the ER during night shifts.

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Topic: Health services research and outcome

001121

Neurological prognostic factors in comatose patients after cardiac arrest

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Introduction: Neurological sequelae following cardiac arrest (CA) have a significant impact on patients' quality of life, especially in those who survive but remain comatose. Early identification of patients with poor neurological prognosis is crucial to guide therapeutic decisions, enabling a more personalized and effective approach to their management.

Objectives: This study focuses on evaluating neurological prognostic factors in comatose patients after resuscitated CA, using diagnostic tools such as electroencephalogram (EEG), somatosensory-evoked potentials (SSEPs), cranial computed tomography (CT), transcranial Doppler ultrasound, and biomarkers like neuron-specific enolase (NSE).

Methods: This retrospective study included adult comatose patients following resuscitated CA, admitted to a 16-bed ICU between 2014 and 2024. Patients who died within the first 24 h or regained consciousness within the first 72 h were excluded. Collected data included clinical, biochemical, and neurodiagnostic variables. Neurological outcomes were assessed at 6 months using the Cerebral Performance Category (CPC) scale.

Descriptive statistics were used for quantitative variables (mean ± SD or median [IQR]) and qualitative variables (frequencies and percentages). Associations between prognostic variables and neurological outcomes were evaluated using the Chi-square test for qualitative variables and Student's t test for quantitative ones. A p value < 0.05 was considered statistically significant.

Results: During the study period, 50 patients were included, median age of 64 years (48–76); 62% were male. CA was respiratory in 40%, cardiac in 34%, and 64% were out-of-hospital arrests, with the most frequent initial rhythm being asystole/PEA (78%). The CA was witnessed in 94% of cases, and the mean time to return of spontaneous circulation (ROSC) was 20 ± 15 min.

The key clinical and biochemical parameters included: admission troponin level of 0.29 ng/ml (0.06–0.66), peaking at 1.12 ng/ml (0.59–14.38); admission pH of 7.14 ± 0.13; and lactate 7.79 ± 6.16 mmol/L. NSE at 24 h was 43 ng/ml (21–73), increasing to 91 ng/ml (63–212) at 72 h.

Common complications included early pneumonia (36%), cardiogenic shock (26%), and need for high-dose vasopressors (> 0.5 mcg/kg/min of norepinephrine) in 32%.

Neurodiagnostic findings indicating poor prognosis included: severe diffuse cerebral edema on CT at 48 h in 35% of cases; brain herniation in 2%. EEG at 72 h revealed nonconvulsive status epilepticus in 19%, nonspecific diffuse slowing in 51%, and severe generalized encephalopathy in 24%. Bilateral absence of N20 response in SSEPs was observed in 50%. Transcranial Doppler showed reverberating flow in 30% and systolic spikes in 60%. In addition, 20% exhibited myoclonus after 48 h; 56% had absent or extensor motor response at 72 h; 34% lacked pupillary reflexes at 72 h.

In-hospital mortality was 78%, with an ICU mortality rate of 58%. Post-anoxic encephalopathy was present in 84%, and 20% progressed to brain death. At 6 months, functional outcomes were: CPC 1–2 (good recovery/moderate disability) in 8%, CPC 3 (severe disability) in 8%, and CPC 4–5 (persistent coma/death) in 84%.

Significant correlations between CPC and prognostic variables included: ROSC duration (r = 0.36, p = 0.01), Lactate > 4 mmol/L (r = 0.36, p = 0.01), absent/extensor motor response (r = 0.37, p = 0.01), EEG findings (r = 0.8, p = 0.01), combination of multimodal tests (EEG, SSEPs, CT, Doppler) (r = 0.63, p = 0.01).

Conclusions: The results of this study highlight the importance of early neurological assessment in postcardiac arrest patients to guide therapeutic decisions. Despite the high in-hospital mortality observed, the survivors who achieved favorable functional recovery were exceptional. Multimodal diagnostic tools, such as EEG, SSEPs, and CT, proved to be the key in differentiating patients with a favorable neurological prognosis from those with irreversible damage. These findings suggest that integrating these tests within the first 72 h could not only improve the accuracy of prognosis prediction but also allow for greater personalization in patient management, optimizing resources and supporting more informed decision-making.

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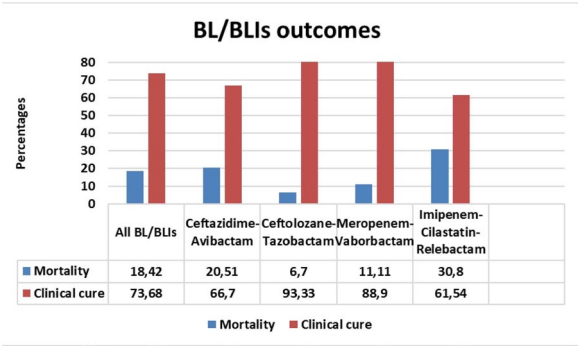
Topic: Cardiac arrest

001122

New beta-lactam/beta-lactamase inhibitor combinations for the treatment of severe infections in critically ill patients

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Introduction: Critically ill patients are highly susceptible to difficult-to-treat (DTR) infections caused by Gram-negative bacteria (GNB). In recent years, four novel β-lactam/β-lactamase inhibitor (BLBLI) combinations—ceftolozane–tazobactam (C/T), ceftazidime–avibactam (CAZ-AVI), imipenem–relebactam (IMI/REL), and meropenem–vaborbactam (MER/VAB)—have been developed and approved for the treatment of selected DTR-GNB infections.
Objectives: To evaluate the clinical cure rates and 28-day mortality following treatment with the newly approved BLBLIs in critically ill patients with GNB infections, as well as to assess associated adverse events.
Methods: A retrospective analysis was conducted on 118 cases of GNB infections in patients admitted to the intensive care unit (ICU) between January 2024 and January 2025 who received at least one of the novel BLBLIs. Patient demographics, comorbidities, type of infection and causative pathogens, presence of sepsis or septic shock, and disease severity scores (APACHE II, SOFA, and Charlson Comorbidity Index [CCI]) were recorded.
Results: Of the 118 infections reviewed, 76 cases were included in the final analysis; 42 were excluded due to pathogen susceptibility falling outside the BLBLI activity spectrum. Among the 76 patients analyzed, 50 (65.8%) were male, with a mean age of 59.3 ± 16.7 years. The mean APACHE II, SOFA, and CCI scores were 20.3 ± 8.1, 6.9 ± 3.36, and 3.63 ± 2.38, respectively. Sepsis was present in 81.6% of patients, and 54% met criteria for septic shock. The most common infections were ventilator-associated pneumonia (VAP) and hospital-acquired pneumonia (HAP) (57.9%), followed by primary bacteremia (11.84%), complicated intra-abdominal infections (10.53%), secondary bacteremia (7.9%), and complicated urinary tract infections (3.95%). *Pseudomonas aeruginosa* (56.6%) and *Klebsiella pneumoniae* (35.2%) were the predominant pathogens. CAZ-AVI was the most frequently prescribed BLBLI (51.3%), followed by C/T (19.7%), IMI/REL (17.1%), and MER/VAB (11.8%).
The overall clinical cure rate was 73.68%, and the 28-day mortality rate was 18.42% (Fig. 1). Subgroup analysis revealed clinical cure rates of 73.68%, 93.35%, 61.54%, and 88.9% for CAZ-AVI, C/T, IMI/REL MER/VAB group, respectively. Corresponding 28-day mortality rates were 20.51%, 6.7%, 30.8%, and 11.11%, for each group, respectively (Fig. 1). The most commonly reported adverse events were acute kidney injury (7.63%), acute liver failure (0.85%), and *Clostridium difficile* enterocolitis (3.39%).
Conclusions: Novel BLBLIs demonstrate high clinical efficacy in the treatment of severe infections in critically ill patients. Mortality rates observed in this cohort are consistent with the existing literature. Further prospective studies are warranted to confirm these findings and to optimize the use of these agents in critically ill populations.



28-day mortality and clinical success rates in whole study group and BLBLIs groups separately.

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Topic: Infections and prevention

001125

Machine learning-derived temperature trajectories identify coagulation phenotypes in sepsis: a multicenter analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001125

Introduction: Sepsis-induced coagulopathy ranges from mild coagulation activation to disseminated intravascular coagulation (DIC), significantly impacting outcomes. The current diagnostic approaches lack precision in predicting individual patient trajectories. This study explores temperature trajectories as digital biomarkers to identify distinct coagulation phenotypes in sepsis patients across multiple cohorts (MIMIC-IV, eICU, and local validation). We investigate phenotype-specific coagulation profiles, predictors of phenotype membership, and differential responses to anticoagulation therapy, aiming to enable more personalized management approaches. The research represents the first large-scale validation of temperature trajectory-based coagulation phenotypes in sepsis.
Objectives: Sepsis-induced coagulopathy exhibits significant heterogeneity, challenging precise risk stratification and targeted treatment. We hypothesized that machine learning-derived temperature trajectories could identify distinct coagulation phenotypes with prognostic and therapeutic implications.
Methods: In this multicenter retrospective study, we analyzed 1,542 sepsis patients from three cohorts: MIMIC-IV (n = 533), eICU (n = 238), and a local validation cohort (n = 771). Using dynamic time warping and unsupervised clustering of temperature measurements during the first 48 h of ICU admission, we identified temperature trajectory phenotypes and evaluated their association with coagulation parameters, clinical outcomes, and response to anticoagulation therapy.
Results: Four distinct temperature trajectory phenotypes were identified: normothermic (42.3%), hypothermic (16.8%), hyperthermic (23.7%), and fluctuating (17.2%). The hypothermic phenotype demonstrated the most severe coagulation abnormalities with rapid platelet

decline (−5.63 × 10^9/L/h), elevated INR (median 1.8, IQR 1.4–2.3), and highest 28-day mortality (38.9%). Age was the dominant predictor of phenotype development (SHAP feature importance 0.718). External validation confirmed the reproducibility of these phenotypes with consistent coagulation profiles across all cohorts (calibration slope 0.94, 95% CI 0.88–1.01). Treatment-response analysis revealed that therapeutic anticoagulation was associated with reduced mortality in the hypothermic phenotype (adjusted OR 0.68, 95% CI 0.52–0.89) but not in the normothermic phenotype (adjusted OR 0.94, 95% CI 0.76–1.18; interaction $p = 0.03$).

Conclusions: Temperature trajectories identify distinct coagulation phenotypes in sepsis with differential response to anticoagulation therapy. These digital biomarkers may enable precision approaches to coagulation management in sepsis.



Fig. 1 (abstract 001125) Temperature trajectories and distribution of temperature phenotypes in sepsis patients

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Topic: Sepsis

001126

Mechanical power as a predictive tool for clinical outcome in ventilated patients: a prospective observational study in an onco-critical care unit (MePoVent study)

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Intensive Care Medicine Experimental 2025,* 13(1)*:001126

Introduction: Prevention of ventilator induced lung injury is the key goal in intensive care unit (ICU). Low tidal volume ventilation is the standard intervention in lung protective strategy. However, mechanical power as a predictor of lung injury and clinical outcome has evolved recently with heterogenous results.

Objectives: The aim of the study is to evaluate the impact of mechanical power on the clinical outcome in mechanically ventilated patients who has undergone Open lung ventilatory (OLV) strategy. Primary objective is difference in mechanical power between 28 days survivors and non-survivors. The secondary objectives are difference in 28-day ventilator-free days, 28-day ICU-free days, need for rescue (prone) ventilation and incidence of other organ failure.

Methods: This is a prospective observational study done in the medical ICU of Tata Medical Center Kolkata. After obtaining IRB clearance, patients requiring mechanical ventilation more than 24 h have been included in the study. Mechanical ventilation has been continued as per standard OLV strategy. All the necessary data were collected from the patients' files and electronic medical records (EMR). Patients' clinical outcome was evaluated from the medical records in terms of mortality, ventilator days and ICU stay. Mean value of mechanical power was compared between survivor and nonsurvivors as primary objective. Similarly, patients' baseline clinical data, organ failure and other clinical outcomes were compared between the two groups.

Results: Over a period of 3 months, 54 patients have been recruited in the study period (male = 33, female = 21) (Table 1). Eleven patients in this cohort have lung cancer and rest 43 patients have other malignancy as their primary disease. 14 patients (2.6%) have chronic lung pathology on admission. Mean age of the population is 59.5 years. On ICU admission, mean APACHE 4 score was 86.2 and mean respiratory SOFA score was 2. Six patients are lost to follow up and we have outcome data for 48 patients. Twenty-seven patient (56%) have died during their ICU stay. The on-admission APACHE 4 score, chronic lung pathology, respiratory SOFA score and mean PaO2 / FiO2 ratio are comparable between the survivor and the non-survivor groups (Table 2). The mean value of mechanical power among the non-survivor group (32.29 J /min) was significantly higher compared to the survivor group (23.86 J/ min) ($p = 0.034$). This difference remains statistically significant even after weighted for APACHE 4 score on admission. There is no statistically significant difference in need for rescue ventilation, ventilator and ICU free days between survivor and non survivors (Table 3).

Conclusions: Mechanical power can be an important predictor of clinical outcome for mechanically ventilated patients, including mortality. We need randomized control trial on large patient population to validate our observation.

Table 1 (abstract 001126) Demographic profile of the patients

	Value	Percentage (%)
Total no of patients	54	
Mean age (Years)	59.5	
Male	33	61%
Female	21	39%
Lung cancer	11	20%
Non- lung cancer	43	80%
Chronic lung disease	14	26%
No lung pathology	40	74%
Mean APACHE 4 score	86.2	
Mean respiratory SOFA score	2	

Table 2 (abstract 001126) Severity of clinical condition on admission ($n = 48$)

	Survivors (n =21)	Non-survivors (n= 27)
APACHE 4 score*	86.17	86.3
Respiratory SOFA*	2	2
PaO2/ FiO2 ratio*	254.25	253.85

*Statistically non-significant

Table 3 (abstract 001126) Clinical outcome between survivors and nonsurvivors ($n = 48$)

	Survivors (n =21)	Non-survivors (n= 27)
Mechanical power (J / min)#	23.86	32.29
Ventilator free days*	11.01	10.43
ICU free days*	8.0	7.52

*Statistically non-significant

Statistically significant (p = 0.034)

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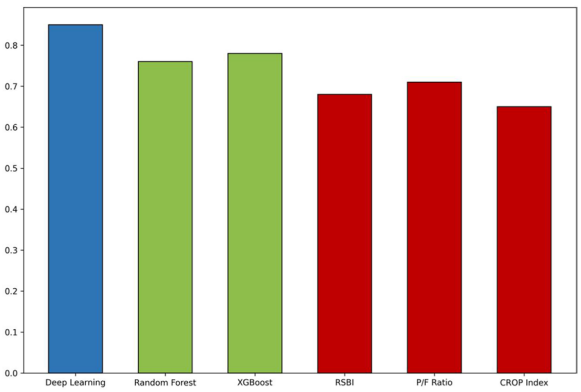
Topic: Acute respiratory failure and mechanical ventilation

001127

Deep learning-enhanced electrical impedance tomography for mechanical ventilation weaning prediction: a phenotype–trajectory integrated approach

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Intensive Care Medicine Experimental 2025,* 13(1):*001127

Introduction: Predicting successful liberation from mechanical ventilation remains challenging despite advances in respiratory care. This study introduces a novel approach integrating dynamic phenotyping with temporal trajectory analysis using electrical impedance tomography (EIT) during 2-h spontaneous breathing trials (SBTs).
Methods: In this multicenter study (NCT06756204), we enrolled 278 mechanically ventilated patients from three tertiary hospitals. Our framework combines: (1) Pendelluft-driven phenotyping defining three clinical phenotypes (stable compensatory/occult decompensation/rapid failure); (2) Spatiotemporal trajectory modeling using attention-enhanced LSTM networks; and (3) Real-time risk stratification based on phenotype–trajectory coupling. EIT measurements (32 × 32 pixels, 50 Hz sampling) were continuously recorded during SBTs with synchronized respiratory mechanics monitoring.
Results: The machine learning model demonstrated superior predictive performance with an AUC of 0.85, significantly outperforming traditional clinical metrics which ranged from 0.65 to 0.71. Our analysis identified three distinct clinical phenotypes with markedly different outcomes. Although the stable compensation group represented 42.3% of cases with a relatively low failure rate of 12.8%, the rapid deterioration phenotype, although the smallest at 20.2%, showed the highest failure rate of 58.5%. The latent decompensation group accounted for 37.5% of cases with intermediate outcomes (34.6% failure rate). Feature importance analysis revealed ventilation heterogeneity as the most significant predictor (28.3%), followed by pendelluft phenomenon (21.7%) and regional compliance (18.4%). Notably, dorsal region activation scores showed dramatic differences between success and failure cases (0.31 vs 0.78, $p < 0.001$), providing physiological validation of the model's predictions. The model provided median early warning of 5.2 h (IQR: 4.1–6.3) before clinical deterioration. Implementation reduced ICU length of stay by 1.8 days ($p = 0.007$) and reintubation rates by 47% in the high-risk group.
Conclusions: Our dynamic phenotyping and trajectory analysis framework transforms mechanical ventilation weaning from a static decision point to a continuous risk-monitored process. By revealing the heterogeneous mechanisms of weaning failure and compensatory dynamics, this approach enables precision critical care medicine.



(abstract 001127) Performance comparison of different models description:this bar chart compares the AUC values of six different predictive models, including three machine learning methods (Deep Learning, Random Forest, XGBoost) and three traditional clinical metrics (RSBI, *P/F* ratio, CROP Index). The deep learning model achieved the highest AUC of 0.85, followed by XGBoost (0.78) and Random Forest (0.76). Traditional metrics showed lower performance, with RSBI scoring 0.68, *P/F* ratio 0.71, and CROP Index 0.65.

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Topic: Acute respiratory failure and mechanical ventilation

001128

Comparative analysis of 2 community-based CPR/AED training programmes

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Intensive Care Medicine Experimental 2025,* 13(1):*001128

Introduction: Cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) can help save an out-of-hospital cardiac arrest (OHCA) victim if carried out and applied promptly and properly. The public must be taught to perform CPR effectively and to apply AED properly.

Poor learning and skill decay can lead to decline in CPR performance and improper or delayed application of an AED, that in turn, can affect the probability of victim survival.

Objectives: This study aims to explore whether the enhanced version of a dispatcher-assisted first responder (DARE) programme leads to improved learning and retention as compared to the current DARE programme (enhanced DARE programme utilises digital application called the "DARE Instructor App" to conduct the training, with enhanced components such as gamified testing of the cognitive learning via game-based learning platform such as Kahoot! and incorporation of a game at the end of the training session via QCPR race competition to allow learner to experience performing CPR in high-tension situations in an informal and fun way vs. current DARE programme which utilises the conventional way of teaching via classroom style lecture, using PowerPoint slides and training videos, followed by hands-on practice and a practical assessment at the end).

Methods: 21 participants with no CPR/AED training before or no training within the last 3 years were randomly assigned to the current DARE programme or the enhanced DARE programme.

Their CPR/AED knowledge was assessed via a post-training survey and an online knowledge retention assessment 42 days after the training.

Results: Mean score (total score out of 5) for the pre-training survey was 2.9 for the current DARE group and 3.7 for the enhanced DARE group. After training, mean score for the post-training survey was 4.3 for the current DARE group and full score of 5.0 for the enhanced DARE group. During knowledge retention assessment, mean score for the knowledge retention survey was 4.4 for the current DARE group and 4.6 for the enhanced DARE group.

Overall compression performance from QCPR Training Application was 89% for the current DARE group and 97% for the enhanced DARE group.

Participants in both programmes showed increased confidence and likelihood of performing CPR and using AED in real emergencies.

Participants in the enhanced DARE group achieved a higher mean score during the post-training and online knowledge retention assessment.

CPR compression performance data indicated that the participants in the enhanced DARE group achieved an overall higher compression performance.

Conclusions: The study showed that participants exposed to the enhanced DARE programme resulted in better knowledge, greater improvement in confidence and attitudes towards possible CPR/AED use in real emergencies, and better quality of CPR chest compression after training. However, both programmes did not result in better knowledge retention 42 days after.

Topic: Cardiac arrest

001131

Intrahospital cardiorespiratory arrests in adults of North Kivu in the Democratic Republic of Congo: clinical aspects, outcomes of cardiopulmonary resuscitation and associated factors

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Introduction: Intrahospital cardiopulmonary arrest (IHCA) is a critical event with high morbidity and mortality in resource-limited settings.

Objectives: This study determines causes, outcome of cardiopulmonary resuscitation (CPR) of IHCA and their associated factors in Democratic Republic of Congo (DRC).

Methods: This is an 18 months prospective cohort study conducted in North-Kivu Province at HEAL Africa and Kyondo hospitals. 84 adult patients who sustained IHCA were included in the study. We analyzed data by SPSS version 26 using the Pearson Chi-square test or Fisher's exact test and multinomial regression. The $p < 0.05$ was considered statistically significant.

Results: IHCA was common in men (58.3%), the mean age of patients was 57.7 years (± 17.1). IHCA was triggered by a combination of several reversible causes (39.3%) and isolated hypoxia (33.3%). Most patients had various diagnosis (45.2%) and cardiovascular diseases (28.6%). Emergency Point of Care was performed in 42.9%. Metabolic acidosis was observed in 50%. Hyponatremia and hyperkalemia were the most common electrolyte disturbances encountered in IHCA. The National Emergency Warning Score 2 (NEWS2) was assessed in 52.4%. 51.2% had a NEWS2 score ≥ 5. In 41.6% the alert was launched after CA. 47.6% of CPR was initiated between 1 and 4 min. Half of life-threatening distressed patients were monitored by a multiparameter monitor. Asystoly was noted in 83.3%. Advanced CPR with intubation was performed in 45.2%. The rate of return of spontaneous cardiac activity (ROSC) after IHCA was 42.9%. The determinants of ROSC were marital status and weekend resuscitation. The survival rate on the thirtieth day was 6%. Three over 5 patients had a complete recovery on the thirtieth day.

Conclusions: IHCA in North-Kivu is triggered by reversible causes and often occurs in patients with multiple combined and cardiovascular diseases. Early detection and prevention measures of IHCA are still limited. The high ROSC rate has paradoxically a very low survival rate at day 30 after IHCA. Advanced Cardiac Life Support training and

implementation of a Rapid Response Team are essential to improve prevention and management of IHCA in the DRC.

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Topic: Cardiovascular issues in ICU

001132

Comparative performance of pediatric risk of mortality IV and pediatric index of mortality 3 in critically ill children with cancer: a prospective observational study

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Introduction: In pediatric critical care, Pediatric Risk of Mortality (PRISM) and Pediatric Index of Mortality (PIM) scoring systems are the most widely used severity of illness scoring systems. The current versions of these scoring systems (PRISM IV and PIM 3) have not been validated in critically ill oncology population.
Objectives: The aim of this study was to evaluate the comparative performance of Pediatric Risk of Mortality IV and Paediatric Index of Mortality 3 in Critically Ill Children with cancer.
Methods: 415 critically ill pediatric patients were recruited at a single-center, mixed medical-surgical ICU in a prospective observational study. Patients with an expected ICU stay of greater than 24 h were included. Demographic, physiological and laboratory parameters required to calculate the PRISM IV and PIM 3 scores were collected; laboratory data from 2 h prior till 4 h after admission, and physiological data within 4 h of admission. The worst value was considered for calculating the scores. Both scores and their predicted mortality risk were calculated using online calculators.
Results: The mortality at ICU discharge and at hospital discharge was 32.7% and 36.1% respectively. For the prediction of hospital mortality, the AUROC for PRISM IV score was 0.71and PIM 3 estimated mortality (%) was 0.78 respectively. There was a statistically significant positive correlation between PRISM IV scoreand PIM 3 estimated mortality (%) with the hospital mortality. The logistic model for PRISM IV score also passed the goodness-of-fit test indicating a good model fit. The goodness-of-fit test for the PIM 3 model suggests that the model may not fit the data well and may require further investigation or improvement.
Conclusions: Both PRISM-IV and PIM-3 scores showed acceptable discriminative ability between survivors and nonsurvivors in critically ill pediatric oncology population. However, only the PRISM-IV score showed good calibration in the prediction of survival.

Topic: Hematologic–oncologic issues in the ICU

001133

Ketone therapy to reduce energetic dysfunction in acute brain injury

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Intensive Care Medicine Experimental 2025,* 13(1)*:001133

Introduction: Acute brain injury is a major cause of mortality and neurological disability. A state of cerebral glucose hypo-metabolism, impaired glycolytic pathways and reduced glucose availability are typically presents in the postinjury period. Supplemental ketone bodies (KB) exert various neuroprotective properties in experimental settings of traumatic brain injury (TBI); however, only few clinical data are available in TBI and subarachnoid hemorrhage (SAH) patients.
Objectives: The aim of this study was to assess whether the administration of KB might reduce the energetic dysfunction following TBI and SAH, which is associated with poor long-term outcomes.

Methods: This is a prospective ongoing single-arm interventional pilot study including adult (> 18 years of age) and severe (Glasgow Coma Scale, GCS on admission < 9) consecutive TBI and SAH patients admitted to the intensive care unit (ICU), undergoing multimodal neuromonitoring, including cerebral microdialysis (CMD) as part of standard care. Energetic dysfunction was defined as a lactate to pyruvate ratio (LPR) > 25 for at least 3 consecutive hours within the first 5 days after injury. Ketone ester (KE) therapy was administered via nasogastric tube for 6 h (e.g. bolus of 500 mg/kg followed by 125 mg/kg/h for 6 h), aiming to maintain blood beta-hydroxybutyrate (BHB) around 3 mmol/L. Primary outcome was changes in LPR, glucose and glutamate measured by CMD from baseline to the end of KE administration.
Results: Among 46 screened patients, 14 (8 TBI and 6 SAH) were enrolled. Eleven patients were male (78.6%). The median age was 46 (IQR 31–61) years-old and the admission GCS was 5 (3–9). Three patients died in the ICU (21.4%) and 11 (78.6%) had an unfavorable outcome at 3 months, defined as a Glasgow Outcome Scale of 1 to 3. A significant increase in arterial blood BHB levels over time [from 0 (0–0.2) at baseline to 3.5 (3.5–3.2) mmol/L at the end of KE administration ($p = 0.001$)] was detected. There was a slight, yet not statistically significant, decrease in cerebral LPR over time during KE administration [from 37.5 (29.0–39.9) at baseline to 33.2 (29.9–38.4) after 6 h, $p = 0.17$]. Cerebral glucose did not change over time [from 1.35 (1.02–1.86) at baseline to 1.16 (1.04–1.87) after 6 h, $p = 0.89$]. Glutamate decreased over time during KE administration [from 4.04 (1.33–10.45) at baseline to 3.5 (0.94–12.88) after 6 h; $p = 0.06$].
Conclusions: These preliminary findings shown that administration of KE successfully increased serum levels of BHB and was associated with nonsignificant changes in interstitial metabolites.

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Topic: Neurointensive care

001134

Mechanical power vs driving pressure as a prognostic marker in severe ARDS due to Influenza A

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Intensive Care Medicine Experimental 2025,* 13(1)*:001134

Introduction: In patients with severe ARDS requiring invasive mechanical ventilation, the intensity of ventilation as reflected by driving pressure (DP) or mechanical power (MP) analysis has been shown to have a significant relationship with patient prognosis. PD values > 15 cmsH2O or MP > 17 J/min are associated with increased 28-day mortality as well as increased hospital stay.
Objectives: The aim of the study is to evaluate the relationship between DP and MP with prognosis in patients with severe Influenza A ARDS.
Methods: Retrospective study of patients admitted to the ICU between 2022 and 2025 for severe ARDS secondary to Influenza A with need for invasive mechanical ventilation. The Gattinoni formula was used to calculate MP in patients on volume controlled ventilation with constant flow and the Becher formula for patients on pressure-controlled ventilation. Variables collected: age, sex, comorbidity, APACHE II, SOFA on admission, duration of MV, ICU and hospital stay and mortality. Respiratory mechanics: DP (by pause method), MP, elastance of the respiratory system, PaO_2, PaO_2/FiO_2.
Results: A total of 18 patients was admitted for acute respiratory failure due to Influenza A, only 10 patients required invasive mechanical ventilation. 60% women, median age 52 years; 50% smokers; 30% immunocompromised and 30% with morbid obesity. Median MV duration 16 days; median ICU stay 26 days; mortality 10%. Respiratory mechanics during the first 7 days of invasive MV: mean MP 24.67 J/min; mean DP 12.17 $cmsH_2O$; mean elastance SR 27.75 cmsH2O/L. A multivariate analysis was performed, evaluating PM and PD separately, and no statistically significant relationship was observed between mortality, duration of MV or ICU/hospital stay. A linear relationship between PM and PD was observed in both models (p 0.005) con R20.7026 (p 0.034) and R2 0.7833 (p 0.016), respectively.
Conclusions: The analysis of respiratory mechanics is key in patients with severe ARDS.
We observed a significant correlation between DP and MP, however, we did not observe a significant relationship with mortality, MV duration or length of stay.

Topic: Acute respiratory failure and mechanical ventilation

001136

Short- and long-term outcomes in intensive care unit patients with acute kidney injury treated with renal replacement therapy: a retrospective cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001136

Introduction: Acute kidney injury treated with renal replacement therapy (AKI-RRT) in intensive care units (ICU) is known to be associated with poor outcomes. Although data on ICU outcomes are readily available, in the Irish context published data on longer term outcomes of these patients is limited. This study aims to determine both the short- and long-term outcomes of AKI-RRT patients in a tertiary university hospital critical care units and to examine the factors associated with same.
Objectives: The objectives of this study were to determine the incidence of AKI-RRT in ICU patients, describe their demographics and characteristics, determine their outcomes in terms of mortality, dialysis dependence, renal recovery and Major Adverse Kidney Events (MAKE) at ICU discharge, hospital discharge, 90 days and 1 year, and to examine the factors that influence these outcomes in these patients.
Methods: A single center retrospective review was conducted in a 20 bed ICU in Cork University Hospital (CUH). Data were collected through the critical care electronic patient record in CUH. All ICU admissions between January 2019 and December 2023 were screened for inclusion. Ultimately, 458 patients were included in the analysis.
Results: The study cohort consisted of 388 patients with AKI-RRT, which was 16% of all patients admitted to ICU during the study period. Survival was 56% at ICU discharge, decreasing to 45% by hospital discharge and 37% at 1 year. At hospital discharge, 7.6% were on dialysis increasing to 13% by 1 year. At hospital discharge, 47% of patients had incomplete renal recovery decreasing to 40% at 1 year. MAKE was present in 54% at hospital discharge and 63% at 1 year. Of the hospital survivors 36.4% had follow-up with nephrology after discharge.

Nonsurvivors were older, had higher illness severity, and more hemodynamic instability. Logistic regression found that medical admission, male sex, late RRT initiation and increased illness severity were associated with decreased survival. Incomplete renal recovery was associated with medical admission, late RRT initiation and higher creatinine at RRT initiation.
Conclusions: The patient cohort had high rates of mortality and incomplete renal recovery, primarily linked to illness severity. This study's findings provide insights into AKI-RRT outcomes in an Irish ICU and emphasize areas for further research, specifically focusing on long-term recovery and quality of life.

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Topic: Acute kidney injury and hemofiltration

001137

Predictive value of procalcitonin, NT-proBNP, and troponin for septic cardiomyopathy: biomarker performance in sepsis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001137

Introduction: Sepsis-induced myocardial dysfunction is a major cause of morbidity and mortality in critically ill patients and earlyidentification of patients at risk can significantly impact prognosis. Various biomarkers have been investigated as potential predictors of this condition but none is well defined.
Objectives: To assess the ability of procalcitonin, NT-proBNP, troponin, and their peak values to predict the occurrence of septic cardiomyopathy in septic patients.
Methods: Retrospective, observational study of consecutive patients with sepsis diagnosis, admitted in a Polivalent Intensive Care Unit. The area under the curve (AUC), sensitivity, specificity, and diagnostic accuracy were calculated to assess the predictive value of the 3 biomarkers.
Results: A total of 306 patients were included, of which 19% had septic cardiomyopathy (SC) and 81% did not. The prevalence of cardiovascular comorbidities and prior structural heart disease was comparable between the two groups (SC: 20.4% vs. no SC: 22.2%). Procalcitonin, NT-proBNP and troponin T levels were investigated as potential predictors of SC. At admission, procalcitonin exhibited an area under the curve (AUC) of 0.608, with an optimal cutoff value of 38.55, yielding a sensitivity of 48.3%, specificity of 74.2%, and diagnostic accuracy of 1.225. These results suggest that procalcitonin has limited diagnostic utility for septic cardiomyopathy, with relatively low sensitivity. NT-proBNP at admission demonstrated a slightly higher AUC of 0.653, with a cutoff of 11072, resulting in a sensitivity of 58.5%, specificity of 75.2%, and diagnostic accuracy of 1.337. While NT-proBNP showed better performance than procalcitonin, its diagnostic accuracy remains moderate. Troponin T at peak levels showed the highest AUC (0.684), with a cutoff value of 238, sensitivity of 46.6%, specificity of 85.3%, and diagnostic accuracy of 1.319. Despite its lower sensitivity, peak troponin T exhibited excellent specificity, indicating its potential role in ruling out septic cardiomyopathy. Peak procalcitonin demonstrated an AUC of 0.630, with a sensitivity of 63.8% and specificity of 63.3%, yielding a diagnostic accuracy of 1.271. This suggests a moderate performance but does not outperform the other markers. Finally, peak NT-proBNP showed an AUC of 0.663, with a cutoff value of 11180.5, sensitivity of 60%, specificity of 72.8%, and diagnostic accuracy of 1.328, making it the most promising marker in this study for predicting septic cardiomyopathy.
Conclusions: Although none of the biomarkers demonstrated high diagnostic accuracy, peak NT-proBNP and peak troponin T showed the best diagnostic performance. These findings suggest that a strategy of biomarkers combination, especially of their peak values, may enhance the diagnosis of septic cardiomyopathy in septic patients.

Topic: Cardiovascular issues in ICU

001138

Impact of beta-blockers on mortality and hemodynamics in septic shock: a systematic review and meta-analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001138

Introduction: Septic shock is a critical condition marked by severe circulatory and inflammatory disturbances, with high associated mortality. The recent interest has emerged around the use of beta-blockers to control heart rate and improve hemodynamic stability in this setting, with evidence indicating potential benefit.
Objectives: To evaluate the impact of beta-blocker therapy on mortality, ICU length of stay, lactate levels, and vasopressor requirements in patients with septic shock.
Methods: A systematic review and meta-analysis were conducted. A total of 247 studies were initially identified through database searches and screened by two independent reviewers. Six studies met the inclusion criteria and were included in the final analysis.
Results: Beta-blocker use was associated with lower mortality (odds ratio 0.71; 95% CI 0.51–0.98) and improved lactate clearance (mean difference −0.19 mmol/L; 95% CI −0.41 to −0.03). No significant differences were found in ICU length of stay or vasopressor requirements between groups.
Conclusions: The use of beta-blockers in patients with septic shock may offer mortality and metabolic benefits; however, clinical significance remains to be fully established. Although initial findings are promising, further large-scale randomized controlled trials are needed to establish definitive clinical recommendations.

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7. Persistent tachycardia
8. Beta-blocker
9. Septic shock
10. Sepsis

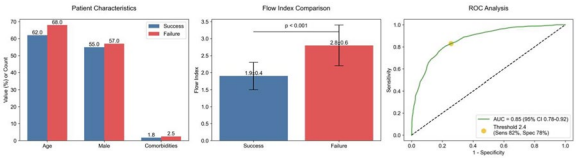
Topic: Sepsis

001139

Flow index derived from electrical impedance tomography predicts high-flow nasal cannula failure in acute respiratory failure: a prospective observational study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001139

Introduction: High-flow nasal cannula (HFNC) oxygen therapy has emerged as a widelyadopted noninvasive respiratory support strategy for patients with acuterespiratory failure. HFNCprovides high-flow, heated, and humidified oxygen, which can improveoxygenation, reduce work of breathing, and enhance patient comfort. However, a significant proportion of patients may experience HFNC failure, requiring escalation to invasive mechanical ventilation, which is associated with increased morbidity and mortality. Early identification of patients at high risk of HFNC failure is crucial for optimizing clinical management and improving patient outcomes. Traditional assessment methods, such as the Rapid Shallow Breathing Index (RSBI) and esophageal pressure-derived metrics, have been used to evaluate respiratorydrive and predict HFNC failure. However, these techniques have limitations, such as invasiveness and the requirement forspecialized equipment. Electrical impedance tomography (EIT) is a noninvasive imaging technique that can provide real-time, quantitative assessments of regional lung function. EIT-derived parameters, such as the Flow Index, have shown promise in evaluating respiratory mechanics and couldpotentially serve as novel predictors of HFNC failure.The aim of this study was to investigate the utility of the EIT-derived FlowIndex in assessing respiratory drive and predicting HFNC failure in patientswith acute respiratory failure.
Objectives: High-flow nasal cannula (HFNC) therapy has become increasingly important inmanaging acute respiratory failure. However, predicting HFNC failure remainschallenging. This study investigates the predictive value of Flow Index, derived from Electrical Impedance Tomography (EIT), for HFNC failure.
Methods: In this prospective observational study, we enrolled adult patients with acuterespiratory failure requiring HFNC therapy. EIT measurements were performedat baseline and at predetermined intervals. Flow Index was calculated using anovel algorithm based on EIT data. The primary outcome was HFNC failure, defined as the need for intubation or noninvasive ventilation within 48 h.
Results: We enrolled 120 patients (mean age 64 $\pm$ 15 years, 55% male). HFNC failureoccurred in 35 patients (29.2%). Flow Index was significantly higher in thefailure group compared to the success group (2.8 $\pm$ 0.6 vs. 1.9 $\pm$ 0.4, $p < 0.001$).ROC analysis showed Flow Index had excellent predictive value (AUC 0.85,95% CI 0.78–0.92). A Flow Index threshold of 2.4 showed sensitivity of 82%and specificity of 78% for predicting HFNC failure.
Conclusions: Flow Index derived from EIT is a promising tool for predicting HFNC failure inacute respiratory failure patients. This noninvasive method could help optimize timing of respiratory support escalation.



Comparative outcomes analysis: baseline characteristics, significant flow index differences and ROC curve of Flow Index.

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Topic: Acute respiratory failure and mechanical ventilation

001142

Effect of artificial intelligence in extracorporeal membrane oxygenation: a systematic review and meta-analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001142

Introduction: Extracorporeal Membrane Oxygenation (ECMO) is a life-saving support for patients with severe cardiopulmonary failure, but its high complexity and resource demands necessitate innovative solutions. Artificial Intelligence (AI) offers potential in optimizing ECMO management by enhancing clinical decision making, predicting outcomes, and guiding initiation timing. However, challenges such as data heterogeneity and model generalizability limit its widespread adoption. Our research aimed to evaluate the effectiveness of AI in ECMO, addressing the need for innovative strategies to improve patient outcomes and resource allocation.
Methods: A systematic review and meta-analysis were conducted following PRISMA guidelines. The literature searches were performed in PubMed, Embase, and Cochrane Library for studies published between January 1980 and June 2024. Studies were screened based on inclusion criteria focusing on AI applications in ECMO, clinical outcomes, and research designs. Data extraction included AI methodologies, performance metrics, and key findings. Meta-analysis was performed using a random-effects model, with pooled AUCs calculated for ECMO initiation and prognosis prediction.
Results: Of 212 inital records, 36 studies met criteria for inclusion. Studies with AI models demonstrating high accuracy for both ECMO initiation and prognosis prediction were included. For initiation decision-making, the pooled AUC was 0.838 (95% CI 0.8042–0.8727), and for prognosis prediction, the pooled AUC was 0.7760 (95% CI 0.7546–0.7974). Ensemble learning models outperformed non-ensemble methods in both tasks. Subgroup analysis revealed that single-center studies exhibited higher AUCs for both tasks compared to multi-center studies. Key applications included patient identification, mortality prediction, and real-time monitoring, with notable improvements in resource allocation and clinical decision making. However, heterogeneity across studies, data variability, and limited external validation were significant limitations.
Conclusions: AI has shown promise in improving ECMO management by providing predictions for initiation timing and patient outcomes. Future research should focus on multi-center validation, data standardization, and real-time clinical integration.

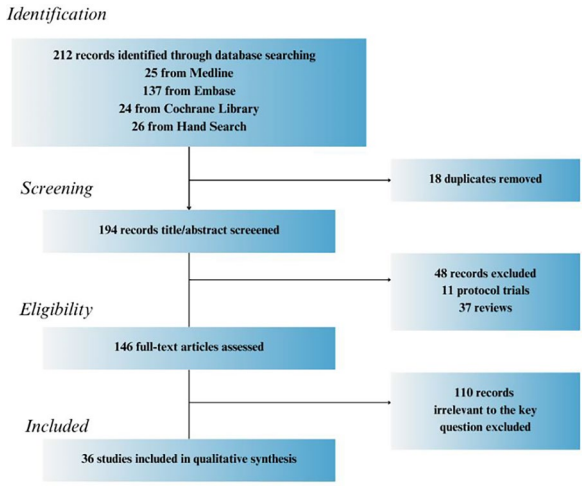


Fig. 1 (abstract 001142) Flow diagram of included studies

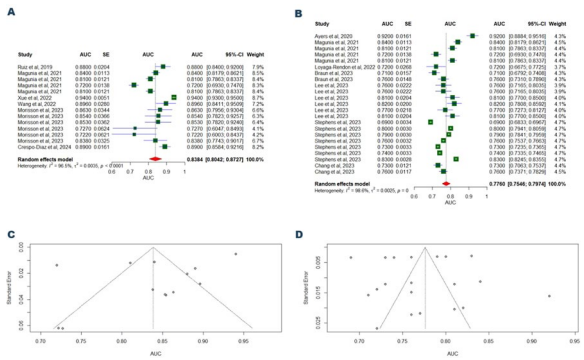


Fig. 2 (abstract 001142) Forest plots and funnel plots of meta analysis

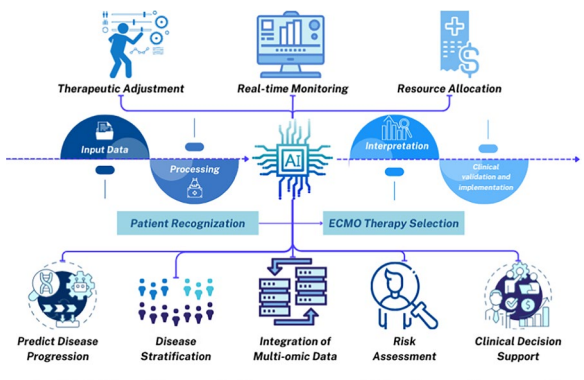


Fig. 3 (abstract 001142) Artificial intelligence in extracorporeal membrane oxygenation clinical application

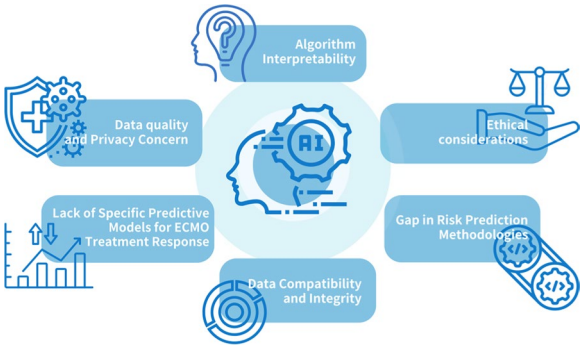


Fig. 4 (abstract 001142) Challenges of artificial intelligence in extracorporeal membrane oxygenation therapy

Topic: Cardiovascular issues in ICU

001143

Bridging disciplines: development of an interprofessional neurocritical care simulation course

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Intensive Care Medicine Experimental 2025,* 13(1)*:001143

Introduction: King's College Hospital is a major regional neurosurgical and neurovascular centre serving a population of 4.5 million across Southeast England. As a major trauma centre with a 90-bed Critical Care Unit (CCU), it manages a high volume of complex neurocritical care patients. To promote patient safety through enhancement of clinical knowledge, optimised communication and interdisciplinary teamworking, we developed a high-fidelity simulation course tailored to the neurocritical care environment, involving neurosurgeons, intensivists, CCU nurses, and advanced critical care practitioners (ACCPs).
Objectives: To design, implement, and evaluate an interprofessional neurocritical care simulation course, aimed at optimising collaborative decision-making, interdisciplinary communication, and improving clinical knowledge, ensuring alignment of curriculum competencies across specialties.
Methods: The NeuroICU Simulation NeuroSIM course was co-designed by a multidisciplinary team, including neurosurgeons, intensivists, simulation experts, and a practice development nurse. Each scenario was collaboratively developed and curriculum-mapped to interdisciplinary frameworks for: the National Standards for Adult Critical Care Nurse Education (CC3N), the Intercollegiate Surgical Curriculum Programme for Neurosurgery, the Faculty of Intensive Care Medicine, and CoBaTrICE Neurocritical Care Competencies. Iterative scenario refinement was informed by focus groups and participant feedback. Critical care leads, neurosurgical consultants, and nurse practitioner leads were invited to observe and contribute to formative evaluation. Feedback was gathered from both participants and observers for ongoing development.
Results: Twenty-five participants (6 neurosurgeons, 11 CCU nurses, 7 CCU doctors and an ACCP) attended two simulation courses, with experience ranging from under 3 years to over 8 years. Core scenarios included traumatic brain injury, subarachnoid haemorrhage, and refractory status epilepticus. Based on the feedback, the course evolved to include brainstem death testing, and faculty was expanded by an ACCP. Notably, 68.2% had not previously had simulation training for neurosurgical patients. Participants rated the training highly for

clinical relevance, structure, and facilitation. Feedback from 2024 highlighted team integration; 2025 emphasized communication, reflection, and the need for expanded content, duration, and variety. Participants were overall comfortable will intradisciplinary communication. (Charts 1–2). Discrepancies in baseline knowledge—particularly around ventilation and delayed cerebral ischemia—highlighted the need for harmonized Objectives:

Conclusions: The NeuroSIM course sought to improve interdisciplinary communication and collaboration in high-acuity neurocritical care. Aligned curricula and shared clinical scenarios fostered mutual understanding. Ongoing development will focus on differentiated content and structured prelearning to support individual needs and optimise outcomes.

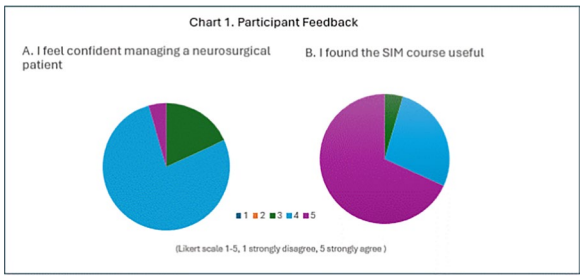


Chart 1 (abstract 001143) Participant Feedback, Chart 2. Comfort Levels in Interdisciplinary Communication

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Topic: Nursing care and physiotherapy

001144

The high-drive ARDS phenotype: characterization of ventilatory heterogeneity, metabolic dysregulation and clinical consequences

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Intensive Care Medicine Experimental 2025,* 13(1)*:001144

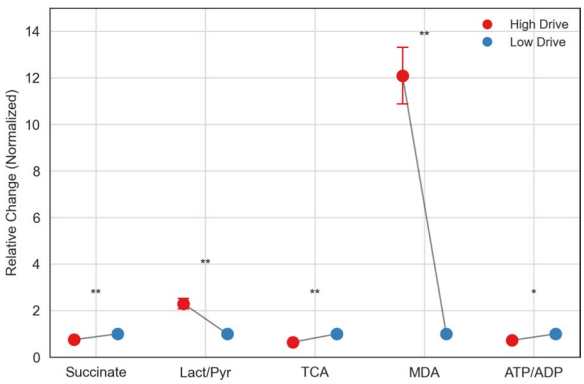
Introduction: Acute respiratory distress syndrome (ARDS) remains a significant cause of mortality in intensive care units, with respiratory drive emerging as a critical but understudied determinant of clinical outcomes. Although excessive respiratory effort is increasingly recognized as a contributor to patient self-inflicted lung injury (P-SILI), the pathophysiological mechanisms linking high respiratory drive to adverse outcomes remain poorly understood. The current ventilator strategies focus primarily on mitigating ventilator-induced lung injury, yet growing evidence suggests that patient-ventilator asynchrony and excessive respiratory effort may be equally detrimental. The recent studies have identified respiratory drive, as measured by P0.1, as an independent predictor of weaning failure and mortality. However, these investigations have largely focused on clinical outcomes without exploring the underlying biological mechanisms. Furthermore, the potential metabolic consequences of sustained high respiratory effort—particularly regarding energy metabolism and oxidative stress—have not been systematically evaluated in ARDS patients.

This study sought to comprehensively characterize the high respiratory drive phenotype in ARDS through three complementary approaches: (1) detailed analysis of clinical outcomes, (2) electrical impedance tomography (EIT)-based assessment of ventilation heterogeneity, and (3) targeted metabolomic profiling. We hypothesized that high respiratory drive would be associated with distinct metabolic derangements and that these changes would correlate with both physiological measures of lung injury and clinical outcomes. Our findings provide new INSIGHTS into the biological consequences of excessive respiratory effort and support the development of personalized ventilation strategies based on the respiratory drive assessment.

Methods: This retrospective cohort study analyzed 242 adult ARDS patients admitted to ICUs across three tertiary care hospitals between January 2020 and December 2022. Patients were stratified into high-drive (P0.1 $\geq$ 3.5 cmH_2O) and low-drive groups based on initial respiratory drive measurements obtained within 24 h of mechanical ventilation initiation. Blood samples collected at enrollment underwent targeted metabolomic analysis via LC–MS to quantify TCA cycle intermediates (succinate, citrate), oxidative stress markers (malondialdehyde, MDA), and energy metabolites (ATP/ADP ratio). Clinical outcomes included 28-day ventilator liberation success (primary outcome), ICU mortality, and ventilator-induced lung injury (VILI) incidence, diagnosed by predefined radiological and physiological criteria. Multivariable logistic regression adjusted for age, ARDS severity, and comorbidities. The predictive performance of a novel multimodal model (incorporating drive parameters, metabolic markers, and EIT data) was compared against SOFA and APACHE II scores using ROC analysis.

Results: High respiratory drive (P0.1 $\geq$ 3.5 cmH_2O) in ARDS patients (n = 153 vs. low-drive n = 89) was associated with significantly worse outcomes, including lower 28-day weaning success (41.2% vs. 68.5%, $p = 0.002$), higher mortality (34.6% vs. 18.3%, $p = 0.012$), and increased VILI incidence (29.8% vs. 11.4%, $p = 0.004$). These patients exhibited greater ventilation heterogeneity (right/left lung ratio 1.8 $\pm$ 0.6 vs. 1.2 $\pm$ 0.3, $p < 0.001$) and metabolic derangements, including 35.7% reduced TCA intermediates ($p = 0.003$) and 12.1-fold elevated oxidative stress ($p < 0.001$). A multimodal model integrating these features achieved superior weaning prediction (AUC = 0.89) versus conventional scores (SOFA = 0.71, APACHE II = 0.65).

Conclusions: This study identifies high respiratory drive as a key predictor of poor outcomes in ARDS, associated with nearly doubled mortality (34.6% vs 18.3%) and significant metabolic dysfunction. These findings support routine respiratory drive assessment in ARDS management and highlight potential therapeutic targets in metabolic pathways.



Differential metabolic profiles in ARDS patients stratified by respiratory drive.

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Topic: Acute respiratory failure and mechanical ventilation

001145

Use of isoflurane as a first-line hypnotic in the ICU

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Introduction: Isoflurane is gaining attention in the ICU as an inhaled sedative due to its advantages overother widely used sedatives. We conducted a descriptive study of its use in the two ICU withinour province during 2024.
Objectives: To describe the use of isoflurane in the Territorial Intensive Care Medicine Department in Lleida (Spain) during 2024.
Methods: It is a retrospective bicenter study of a sequential cohort of patients withisoflurane-inhaled sedation in two hospitals in Lleida (Spain) during 2024 (Hospital UniversitariArnau de Vilanova -HUAV- and Hospital Universitari Santa Maria -HUSM-).Indication, duration, side effects, withdrawal, and awakening quality were analised. Data-analysis was performed using SPSS (Mann–Whitney and Chi-square).
Results: A total of 133 patients were analysed (98 men, 73.7%; 35 women, 26.3%), 113 patients were admitted in HUAV (85%) and 20 patients were admitted in HUSM (15%). 88 patientssuffered from medical pathologies (66.2%), 32 had surgical pathologies (24.1%) and 13 werepolytraumatic (9.8%). Indications for isoflurane sedation to be initiated was moderate to deep sedation (RASS-3/-5) of any cause except neurocritical patients. Severe respiratory failure was the main cause (72%).The isoflurane vaporizer was mostly located in proximal (Y-piece) arrangement (121; 91%). During the first semester, there were 52 patients with isoflurane (39.1%) and 81 wereunder isoflurane sedation during the second semester (60.9%).
Causes of completion: fast (<6 h) weaning (47; 35.3%), slow (>6 h) weaning (38;28.6%), death/LLST (21; 15.8%), suspected adverse effects (11; 8.3%), interhospital transfer(8; 6%), EEG (2; 1.5%) or others (6; 4.5%). Quality of awakening: good (extubation according to expectation; 40; 30.1%),regular (hyperactive delirium and use of dexmedetomidine: 33; 24.8%), or bad(reintroduction of isoflurane/other hypnotic; 14; 10.6%), not registered/death (46;34.5%). Mean duration of use was 5.15 days (1–30 days).
Conclusions: Isoflurane is used as a first-line sedative mainly used in respiratory failure and in the second semester in our units.

Topic: Sedation, analgesia and delirium

001146

Sleep tight: improving sleep in the ICU—proof of concept study

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Introduction: Sleep is essential for physiological and emotional well-being. Sleep deprivation in the critically ill has been shown to impact patient cognition, increase intensive care unit (ICU) and hospital length of stay. To date, there is limited data on this harmful yet frequently overlooked condition among our local ICU population.
Objectives: The main objectives of our study are to.
1. Detect the frequency of poor sleep among the surgical ICU population
2. Evaluate the impact of a pilot bundle of interventions, aimed at improving sleep hygiene, on the subjective and objective sleep quality in critically ill surgical patients

Methods: We conducted a quasi experimental before-after study in our surgical ICU at a tertiary hospital in Singapore. Adult patients aged 21 years or older who stayed in the ICU for one night or more, and no pre-existing sleep disorder, cognitive impairment or delirium were eligible for enrolment. The study was conducted in two phases, before (Phase 1) and after (Phase 2) implementation of the 'Good Sleep Bundle'. The bundle includes light and noise management, and rationalization of ICU nocturnal patient care activities. Phase 1 and Phase 2 consisted of separate groups of patients. Subjective sleep quality was assessed using the Richards–Campbell Sleep Questionnaire (RCSQ); while objective sleep quality was monitored with WatchPAT-300, a wearable arterial tonography home sleep apnea testing device. Enrolled patients were monitored for two nights, unless discharged from ICU prior to completion of two nights upon enrolment.
Data were analysed for the prevalence of poor sleep, defined as RCSQ $\leq$ 50, sleep efficiency less than 80%, sleep duration less than 7 h, sleep latency more than 20 min, rapid eye movement (REM) sleep less than 10%, or wake episodes more than 20. The effect of the 'Good Sleep Bundle' on measured and subjective sleep quality were evaluated.
Results: Each phase consisted of 22 patients, with generally similar demographic and clinical characteristics across the phases. A total of 69 sleep studies were completed. 61.9% reported poor sleep in Phase 1, compared to 57.1% in Phase 2 ($p = 0.753$). 23.8% reported very poor sleep (RCSQ $\leq$ 25) in Phase 1, which decreased to 4.8% in Phase 2; while the proportion of patients reporting very good sleep increased from 4.8% in Phase 1 to 23.8% in Phase 2. However, Fisher's exact test ($p = 0.092$) indicated that these differences were not statistically significant (Fig. 1).
RCSQ scores reflected slightly higher sleep quality across all dimensions in Phase 2, albeit none of these differences reached statistical significance. The mean RCSQ total score was 42.3 ($\pm$ 23.4) in Phase 1 and 53.4 ($\pm$ 27.8) in Phase 2 ($p = 0.169$). Sleep depth, sleep latency, awakenings, ability to return to sleep, and overall sleep quality followed a similar trend, with Phase 2 showing numerically higher scores ($p = 0.113$–0.794).
There were no statistically significant differences in objective sleep measures between the two phases (Fig. 2), and similar finding from the multiple linear regression analysis adjusted for age, gender, BMI and maximum noise level.
Our findings of a paradox where participants who subjectively reported poor sleep demonstrated better objective sleep parameters may suggest that measurements from WatchPAT do not consistently align with RCSQ scores. This is consistent with results reported by Lochova et al. and Zhang et al. reflecting a lack of robust correlational evidence supporting the relationship between RCSQ and actigraphy.
While general noise exposure remained stable across both phases, Phase 2 observed significantly lower maximum noise level. Nocturnal care activities and light reduction remained consistent across phases.
Conclusions: Our study demonstrates a high prevalence of poor sleep in our critically ill surgical patients. While our findings did not provide evidence for an effect of the Good Sleep Bundle on objective sleep parameters, the wide confidence intervals indicate uncertainty about the true effect, and larger studies would be needed to draw definitive conclusions about the intervention's impact.

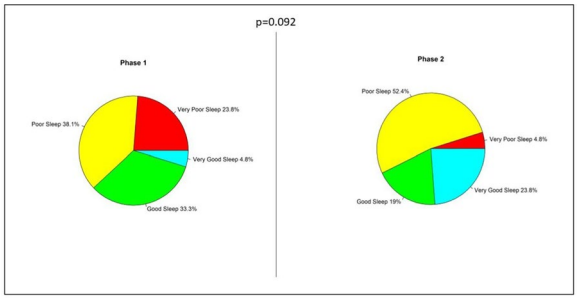


Fig. 1 (abstract 001146) Categorization of RCSQ total score and comparison of their distributions between phases 1 and 2. Very poor sleep (0–25), Poor sleep (26–50), Good sleep (51–75), Very good sleep (76–100)

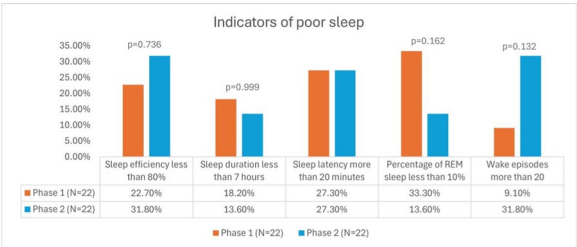


Fig. 2 (abstract 001146) Distribution of poor sleep indicators between phases 1 and 2

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Topic: Health services research and outcome

001147

Prevalence of gastrointestinal failure in patients under invasive mechanical ventilation at the intensive unit care on Mexico

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Introduction: The gastrointestinal failure (GIF) is a common entity at critical ill patients, associated with worst outcomes and a higher short- and long-term mortality. It is defined as the interruption of enteral nutrition secondary to high reisdual gastric volume, abdominal disconfort, distension, emesis and diarrhea, which happens on 30.5% of the patients with invasive mechanical ventilation for at least 72 h on the intensive care unit (ICU).
Objectives: Verify the prevalence of the gastrointestinal failure at patients under invasive mechanical ventilation (IMV), evaluate the degree of failure and aim the association with vasopressors, opioids, hypoperfusion markers, obesity, PEEP and the driving pressure.
Methods: A prospective, obervational, descriptive study performed at the intensive unit care for a 6-month period including all inpatients with invasive mechanical ventilation with integrity of the gastrointestinal tract.
Results: A total of 77 inpatients to the ICU were included. Gastrointestinal Failure was presented on 22 patients with a prevalence of the 28.5% which 59.1% of them were males, with an average age of 47 ± 15.4 years. The main reason for admition was acute respiratory distress syndrome (ARDS) on 27.2% ($n = 6$) and septic shock was present at 50% ($n = 11$). (Table 1). The frecuency of the degree of GIF was: degree 2 with 63.6% ($n = 14$), degree 3 with 22.7% ($n = 5$) and degree 4 with 13.6% ($n = 3$), respectively. Starting at 6.5 ± 6.3 days of admission to the ICU. The most prolonged GIF was observed in degree 4 patients with a total of 8.67 ± 4.5 days ($p = 0.021$). BMI was associated with the degree of gastrointestinal failure ($p = 0.022$), being the most at degree 3 (41.46 ± 12.7). Vasopressors were present on 95.5% ($n = 21$) with a prevalent use of norepinephrine and vasopressin ($n = 11$), but not significally association was found; neither with the use of opioids or the lactate level. A significant association was found with the levels of PEEP (8.68 ± 3.45 cmH_2O; $p = 0.028$). The length of stay in intensive care unit were 15 ± 8.8 days (range 4–39) without statistically significant difference with the degree of disease, however the patients with GIF degree 4 had the long stay (23.3 ± 9 days). (Table 2).
Conclusions: Prevalence of gastrointestinal failure was similar to the reported on the literature. A significant relationship of GIF with BMI and PEEP leves was found; without signfically association with use of vasopressors or opioids and hypoperfusion markers. The length of disease was longer in GIF degree 4.

Table 1 (abstract 001147) Demographic characteristics and comorbidities

General	Value
Sex – no (%)	
• Female	9 (40.9)
• Male	13 (59.1)
Age – yrs, mean (SD)	47.4 (15.45)
Weight – Kg, mean (SD)	80.42 (22.85)
Height – mts, mean (SD)	1.63 (.10)
Body mass index [BMI], mean (SD)	30.50 (9.64)
Reason for Admission , n (%):	
• Medical	17 (77.3)
• Surgical	5 (22.7)
Etiology, n (%)	
• Acute hepatic failure	1 (4.5)
• Neurocritic	
-Status epilepticus	2 (9)
-Guillain Barre Syndrome	1 (4.5)
- Subarachnoid hemorrhage	1 (4.5)
• Airway Pathology	
-ARDS (hipoxemic)	6 (27.2)
-Asthma / COPD	
• Infection	2 (9)
- Emphysematous Pyelonephritis	
• Surgical	1 (4.5)
• Others	5 (22.7)
	3 (13.6)
Septic shock at admition, n (%)	11 (50)
Shock at stay on ICU, n (%)	11 (50)
Type of Shock, n (%)	
• Hipovolemic	1 (4.5)
• Septic	10 (45.5)

Table 2 (abstract 001147) Degree of GIF

Gastrointestinal failure	Total= 22	2° degree	3° degree	4° degree	Value (p)
Degree of gastrointestinal failure, n (%)					
• 2° degree	14 (63.6)	14 (63.6)			
• 3° degree	5 (22.7)		5 (22.7)		
• 4° degree	3 (13.6)			3 (13.6)	
Start of disease on days, mean (SD)	6.50 (6.33)	12.86 (6.34)	17.40 (12.8)	23.33 (9.23)	0.071
Length of GIF, mean (SD)	5.23 (3.30)	4 (2.4)	6.60 (3.43)	8.67 (4.50)	0.021
BMI, mean (SD)	30.50 (9.64)	26.66 (6.1)	41.49 (12.66)	30.13 (1.44)	0.022
Length of stay in ICU, mean (SD)	15.32 (8.86)	12. 86 (6.34)	17.40 (12.81)	23.33 (9.23)	0.071
Ventilatory parameters, mean (SD)					
• PEEP	8.68 (3.45)	7.1 (1.83)	12.4(3.91)	9.67(4.5)	0.028
• Driving Pressure	12.55 (3.66)	12.8 (3.43)	12.8 (5.35)	10.67(0.57)	0.239
Vasopresor, n (%)	21 (95.5)	13 (59.1)	5 (22.7)	3 (13.6)	0.741
Type of vasopressor, n (%)					
• Norepinephrine	10 (45.5)	4 (18.2)	4 (18.2)	2 (9.1)	0.320
• Norepinephrine/ vasopressin	11 (50)	9 (40.9)	1 (4.5)	1 (4.5)	-
Hypoperfusion markers					
• Lactate	3.21 (3.12)	4.05(3.65)	1.96 (0.80)	1.36 (0.20)	0.073
• Δ CO2	5.66 (2.92)	5.09 (3.65)	7.56 (2.32)	5.1(2.97)	0.265
Use of opioids, Fentanil, n (%)	22 (100)				
• Dose, mean (SD)	1.97 (.42)	2 (.39)	2 (0.61)	1.8 (.28)	0.522
Discharge from ICU, n (%)					
• Clinical improvement	16 (72.7)	9 (40.9)	4 (18.2)	3 (13.6)	0.599
• Maximum benefit	3 (13.6)	3 (13.6)	0 (0)	0 (0)	
• Death	3 (13.6)	2 (9.1)	1 (4.5)	0 (0)	

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Topic: Metabolism, endocrinology, liver failure and nutrition

001148

Enabling scalable and automated classification of acute kidney injury in big data contexts: an open source approach

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Introduction: Acute Kidney Injury (AKI) is a common and potentially serious complication in critically ill patients, occurring in up to 50% of ICU admissions. While standardized classification using the Kidney Disease: Improving Global Outcomes (KDIGO) criteria is essential for consistent research and clinical evaluation, applying these definitions to large datasets remains challenging due to the absence of accessible and reliable tools. To address this gap, we present pyAKI, an open-source solution that automates AKI classification by implementing the KDIGO 2012 criteria in time series data. By enabling reproducible and standardized AKI classification at scale, pyAKI supports improved data quality and research in critical care nephrology.
Objectives: The objective of this study was to develop and validate pyAKI, an open-source tool that automates the classification of acute kidney injury (AKI) in large clinical datasets using the KDIGO 2012 criteria. The study aimed to address the lack of accessible and standardized solutions for AKI detection by creating a reliable, scalable pipeline that improves accuracy, efficiency, and reproducibility in AKI research.
Methods: pyAKI was developed and validated using the Medical Information Mart for Intensive Care (MIMIC-IV) database. The pipeline implements the KDIGO 2012 guidelines for AKI classification, utilizing both serum creatinine (SCr) and urine output (UO) data. To enable consistent processing, a standardized data model was created, and interpolation techniques were applied to address data sparsity. Validation of the tool was performed by comparing pyAKI's output with expert annotations generated by a panel of junior and senior physicians.
Results: Validation results showed that pyAKI achieved an accuracy of 1.0 across all KDIGO stages, outperforming human annotations, which had a sensitivity of 0.96 and a specificity of 0.99. The pipeline also demonstrated high efficiency, completing dataset labeling in just 0.27 s, compared to 970 min required by physicians. With its consistent accuracy and speed, pyAKI provides a valuable solution for AKI classification in large-scale datasets, reducing variability from human annotation and supporting more reproducible research.
Conclusions: pyAKI provides a reliable, open-source solution for AKI classification based on the KDIGO 2012 criteria. It surpasses human-level accuracy and improves the consistency and scalability of AKI research. By automating a time-consuming task, pyAKI supports clinical research and decision making in critical care, offering a powerful tool that saves time and enhances reproducibility in large-scale research projects.

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Topic: Acute Kidney Injury and haemofiltration

001150

An insight into the role of primary care physicians for survivors of critical illness

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Introduction: Critical care survivors are often left with physical and non-physical morbidity, commonly termed post intensive care syndrome. As a result, significant rehabilitation needs persist after leaving hospital with recovery taking many months and less than half of survivors returning to work at 12 months following hospital discharge [1]. A lack of specialist follow-up services means that patients only source of support may be their primary care physicians, although previous work has suggested they may lack the experience and expertise to effectively support ICU survivors [2].
Objectives: To evaluate primary care clinicians' awareness and involvement in the care of survivors of critical illness.
Methods: As part of a National Confidential Enquiry into Patient Outcomes and Death (NCEPOD), case reviews were completed to evaluate the care provided to survivors of critical illness. Inclusion criteria were adults, admitted to ICU for > 4 days between 1st October 2022 and

31st December 2022, and surviving to hospital discharge. As part of this review, primary care physician records were accessed to evaluate contact and support provided.

Results: A total of 248 primary care case records were reviewed during the study period. Of these, around a third (31%) of clinicians reported they were not aware the patients had been in the ICU and only 34% reported to having a standardised approach to identify if patients had been in hospital. Where an ICU stay was identified, 31% of practices reported this would trigger them to contact the patient automatically for review and 6% would place a flag on the patient's medical record.

The majority of patients (86%) had attended for at least one appointment with the primary care physician over the first year following hospital discharge, with around half of these (49%) being directly related to the ICU admission. Just under half (47%) required an assessment of rehabilitation need and 29% required onward referrals for rehabilitation.

Primary care physicians highlighted a need for more education around likely post ICU rehabilitation needs and how they could support recovery. They also highlighted a lack of awareness of what rehabilitation pathways were available, with one stating:

"There is no information available in primary care as to what help is available for rehabilitation. The wait list for any community services in our area is so long that any input is irrelevant by the time it is received."

Conclusions: Critical care survivors regularly access their primary care clinician for support following hospital discharge. This study highlights the need to improve discharge planning and communication between hospitals and primary care. Increasing awareness of the challenges faced by survivors of critical illness and education of primary care physicians around the availability of rehabilitation services is urgently required.

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Topic: Nursing care and physiotherapy

001151

Comparison of predictive ability of variability index of LVOT-VTI, IVC collapsibility index & Carotid doppler parameters for fluid responsiveness in spontaneously breathing ICU patients

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Introduction: Fluid responsiveness is important in optimizing fluid therapy and improving outcomes in critically ill patients. Hence, accurate assessment of fluid responsiveness is essential to avoid both inadequate and excessive fluid administration, as these can have detrimental effects on organ function and patient morbidity.

Objectives: Precisely determining fluid responsiveness in spontaneously breathing critically ill patient population remains challenging, and consensus regarding most reliable and accurate method is yet to be established. Consequently, our study aimed to evaluate and compare diagnostic accuracy and feasibility of three distinct methods; left ventricle outflow tract-velocity time integral (LVOT-VTI) variability, inferior vena cava (IVC) collapsibility index, and change in carotid artery parameters—for predicting fluid responsiveness in spontaneously breathing intensive care unit(ICU) patients.

Methods: This prospective observational study was carried out at a tertiary care center over 15 months (Sept 2021–Jan 2023) after ethical approval. Participants included patients aged above 18 years who were spontaneously breathing and admitted to ICU. Patients with pregnancy, pulmonary hypertension, severe tricuspid regurgitation, atrial fibrillation, intraabdominal hypertension, liver disease, carotid disease, COPD, known severe cardiovascular or renal impairment, poor echo image quality, abdominal surgery, patients without spontaneous breathing effort, patients with neck surgery, trauma, radiotherapy, or those with obesity (BMI > 35 kg/m2) were excluded from study.

Measurements were taken before and after administering 250 ml of crystalloids over 10 min.

Transthoracic echocardiography was performed to measure stroke volume, LVOT-VTImax, and LVOT-VTImin during four breathing cycles. IVCmax and IVCmin diameters were also measured during breathing cycles. The variability of LVOT VTI was calculated using the formula: {(VTImax—VTImin) / [(VTImax—VTImin) / 2] × 100%}.

For IVC measurements, inferior vena cava was visualized using B-mode from a longitudinal paramedian subxyphoid view. IVC measurements were taken in M-mode 2 cm below confluence of the hepatic veins. Maximal expiratory diameter of vein was recorded (dIVC expiration), and the collapsibility index (IVCCI) was calculated using the formula: IVCCI = (dIVC expiration—dIVC inspiration)/dIVC expiration × 100.

Stroke volume (SV) was calculated using LVOT VTI and LVOT diameter, defined as SV = cross-sectional area × VTI. Carotid Doppler parameters, including systolic VTI, systolic time (Ts), diastolic time (Td), and cycle time (Tc), were measured. Doppler was performed in common carotid artery (CCA) 1–1.5 cm proximal to bifurcation of left carotid artery.

Positive fluid responsiveness was defined as an increase in SV of at least 15% after fluid challenge. The study group was divided into fluid responders and nonresponders, and changes in above parameters before and after fluid administration were collected for analysis.

Results: Of the 100 patients included in study, 49 were fluid responders and 51 nonresponders. Significant differences were observed between responders and nonresponders in IVC collapsibility index, LVOT VTI variability, and carotid artery parameters (FTc, ΔVpeak).

The receiver-operating characteristic (ROC) curve analysis was performed to determine diagnostic accuracy of methods. IVC collapsibility index exhibited the highest diagnostic accuracy among studied methods, with an area under curve (AUC) of 0.741 ($p < 0.001$). LVOT VTI variability had AUC of 0.665, while change in corrected carotid flow time and change in carotid VTI had AUCs of 0.241 and 0.314, respectively. These findings suggest that IVC collapsibility index has moderate diagnostic accuracy for predicting fluid responsiveness in spontaneously breathing ICU patients.

Conclusions: IVC collapsibility index has the highest diagnostic accuracy and hence, can aid clinicians in optimizing fluid therapy decisions in spontaneously breathing ICU patients.

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Topic: Cardiovascular issues in ICU

001152

Phenotypic dynamics of myeloid cells and inflammatory microenvironment remodeling in acute respiratory distress syndrome (ARDS)-associated pulmonary fibrosis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001152

Introduction: Pulmonary fibrosis following acute respiratory distress syndrome (ARDS-PF) is a critical complication affecting long-term patient prognosis. Its development is closely associated with dynamic changes in myeloid immune cells. However, the phenotypic characteristics and mechanisms of key subpopulations remain unclear.
Methods: In this study, three patients with severe ARDS were included. The early (non-fibrotic stage, NPF stage) and late (fibrotic stage, PF stage) phases were defined based on the evidence of pulmonary fibrosis on lung CT. Single-cell RNA sequencing was performed on bronchoalveolar lavage fluid (BALF) samples from these patients, and a multi-stage comparative analysis was conducted in conjunction with three healthy control samples from a public database, involving a total of 68,027 cells.
Results: Our study found that a significant increase in CCL3hi neutrophils during early fibrosis. As disease progressed, pro-inflammatory S100A8/A9hi neutrophils and IL1Bhi monocytes accumulated progressively, while immunosuppressive HLA-DRlowS100Ahi monocytes markedly decreased after fibrosis formation. Alveolar macrophage populations also showed significant depletion. Compared with healthy controls, neutrophils and monocytes in PF stage exhibited enriched chemokine signaling and multiple inflammatory pathways. Cell communication analysis further confirmed that intensified neutrophil–monocyte interactions through CCL3-CCR1 and CCL3L1-CCR1 chemokine axes during PF stage, driving escalating inflammatory responses.
Conclusions: These findings collectively suggest that the temporal activation of pro-inflammatory neutrophils and monocytes through inflammatory microenvironment remodeling may constitute a key driver of ARDS-PF progression. This study identifies an intervention window for targeting myeloid cell hyperinflammation and provides theoretical foundation for developing stage-specific anti-fibrotic strategies.

Topic: Acute respiratory failure and mechanical ventilation

001154

Integrating clinical, physiological, and technological expertise in liver disease: a multidisciplinary remote monitoring project

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Intensive Care Medicine Experimental 2025,* 13(1)*:001154

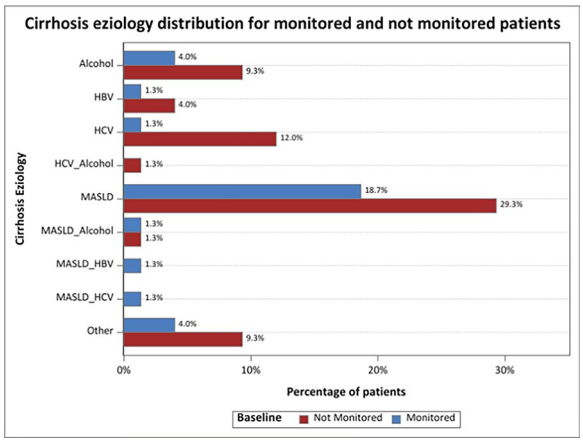
Introduction: Chronic liver diseases (CLD) require continuous, proactive monitoring to prevent decompensation and to reduce hospital admissions. Traditional outpatient follow-up is often inadequate for timely intervention. This study introduces a new multidisciplinary care model integrating hepatologists, physiotherapists, a project coordination team, IT engineers, and data scientists to improve early detection of clinical deterioration in patients awaiting liver transplantation. The system combines wearable devices, functional and cognitive assessments, and AI-powered predictive analytics to enhance remote patient management and enable earlier, personalized interventions.
Objectives: Assess the feasibility of an AI-assisted telemonitoring system in CLD patients on the liver transplant waiting list, and describe the baseline characteristics of the enrolled population. The project aims to redefine the standard of care shifting from reactive to proactive management, improving functional surveillance, reducing preventable complications, and optimizing clinical resource allocation.
Methods: A single-center, assessor-blind, randomized controlled trial (1:2 allocation) was launched at IRCCS ISMETT UPMC involving 75 CLD patients. Patients were randomized in a telemonitoring group ($n = 25$) and a control group ($n = 50$). The intervention included daily home monitoring of vital and functional parameters via wearable sensors and tablets, supported by a scalable AI platform for real-time data analysis and clinical alerts. Baseline, 4-, 8-, and 12-month assessments included Liver Frailty Index (LFI), PROMs, MOCA, and activity trackers. Hepatologists guided clinical care, physiotherapists conducted remote assessments, and data scientists developed predictive models based on acquired data.
Results: Enrollment was completed in January 2025, with baseline evaluation performed on all patients. Median age was 62 years, 77% were male, and the most frequent etiology was MASLD (48%), HCC 45%, Child Pugh B 61.3%, history of ascites 57.3%, EPS 24% (Table 1). At baseline, median Liver Frailty Index was 3.4 [IQR 3.0–3.8], with 61.6% of patients classified as pre-frail. SARC-F score median was 3.0, MOCA score median was 23 (Table 2). Initial descriptive analysis highlights differences in baseline functional profiles between groups. The AI model development was initiated using these early data, with the goal of identifying risk trends to guide timely intervention.
Conclusions: This project was a structured, multidisciplinary effort to innovate care pathways in advanced CLD. The integration of clinical expertise, physiotherapy, technological infrastructure, and data science enables to create a scalable model of care capable of anticipating clinical deterioration and enhancing patient outcomes Future developments will focus on refining predictive algorithms, increasing patient engagement, and evaluating long-term impact on quality of life, healthcare sustainability and tele-rehab.

Table 1 (abstract 001154) Baseline demographic and clinical characteristics of the study population by intervention and control groups

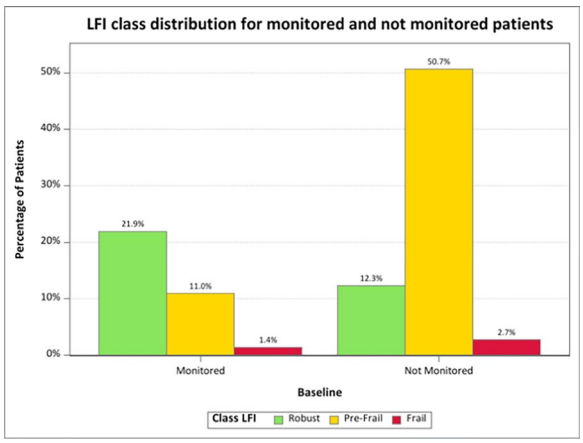
		tot	case (%)	control (%)
Gender (male)		58 (77%)	21 (84.0%)	37 (74.0%)
Cirrhosis etiology				
	10 (13.3%)	3 (12.0%)	7 (14.0%)	7 (14.0%)
	4 (5.3%)	1 (4.0%)	3 (6.0%)	3 (6.0%)
	10 (13.3%)	1 (4.0%)	9 (18.0%)	9 (18.0%)
	1 (1.3%)	0 (0.0%)	1 (2.0%)	1 (2.0%)
	36 (48.0%)	14 (56.0%)	22 (44.0%)	22 (44.0%)
	2 (2.7%)	1 (4.0%)	1 (2.0%)	1 (2.0%)
	1 (1.3%)	1 (4.0%)	0 (0.0%)	0 (0.0%)
	1 (1.3%)	1 (4.0%)	0 (0.0%)	0 (0.0%)
	10 (13.3%)	3 (12.0%)	7 (14.0%)	7 (14.0%)
HCC (yes)	34 (45%)	10 (40.0%)	24 (48.0%)	24 (48.0%)
Child Pugh Class				
	24 (32.0%)	6 (24.0%)	18 (36.0%)	18 (75.0%)
	46 (61.3%)	16 (64.0%)	30 (60.0%)	30 (60.0%)
	5 (6.7%)	3 (12.0%)	2 (4.0%)	2 (40.0%)
History of Ascites (yes)		43 (57.3%)	15 (60.0%)	28 (56.0%)
History of EPS		18 (24.0%)	7 (28.0%)	11 (22.0%)
Presence of TIPS		11 (14.7%)	6 (24.0%)	5 (10.0%)
Class LFI				
	3 (4.1%)	1 (4.0%)	2 (4.2%)	2 (4.2%)
	45 (61.6%)	8 (32.0%)	37 (77.1%)	37 (77.1%)
	25 (34.2%)	16 (64.0%)	9 (18.8%)	9 (18.8%)

Table 2 (abstract 001154) Baseline functional and clinical assessment parameters of the study population by intervention and control groups

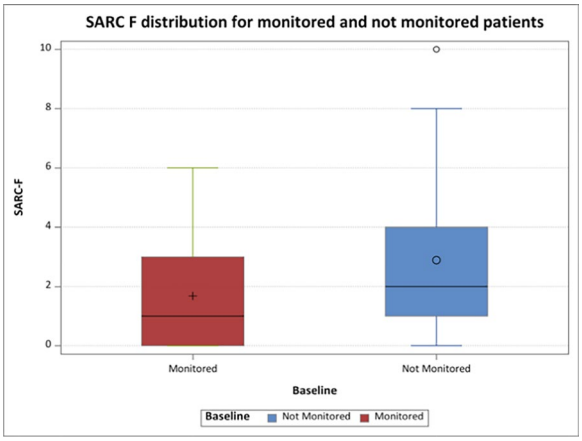
	Tot			Case			control		
	N	Median (25th - 75th)	Std Dev	N	Median (25th - 75th)	Std Dev	N	Median (25th - 75th)	Std Dev
Age	75	62.0 (56.0-67.0)	7.99	25	59.0 (55.0-63.0)	7.6	50	63.0 (57.0-68.0)	8.07
Weight	75	77.4 (68.0-94.0)	16.86	25	84.0 (76.0-100.0)	15.49	50	75.5 (64.0-88.0)	16.72
Height	75	1.7 (1.7-1.8)	0.1	25	1.7 (1.7-1.8)	0.07	50	1.7 (1.6-1.8)	0.11
MOCA	61	23.0 (20.0-25.0)	3.76	22	24.0 (22.0-25.0)	3.52	39	23.0 (20.0-25.0)	3.88
BMI Baseline	75	27.8 (24.8-31.8)	6.25	25	28.9 (26.6-31.7)	4.43	50	26.8 (23.9-31.8)	6.96
Muscular Mass	62	48.2 (41.9-53.7)	7.54	22	50.8 (47.7-57.3)	6.53	40	46.5 (40.9-52.8)	7.71
Oxygen	75	99.0 (97.0-100.0)	1.79	25	99.0 (97.0-100.0)	1.39	50	99.0 (98.0-100.0)	1.98
Stroop	67	220.1 (187.7-266.3)	69.26	24	198.2 (181.2-228.5)	60.27	43	245.9 (204.6-309.8)	71.15
Liver Frailty Index	73	3.4 (3.0-3.8)	0.67	25	3.1 (2.6-3.5)	0.75	48	3.5 (3.2-3.9)	0.59
SARC-F	51	3.0 (1.0-5.0)	2.35	15	1.0 (1.0-4.0)	2.13	36	3.0 (1.0-5.0)	2.43



Cirrhosis etiology distribution for monitored and not monitored patients.



LFI class distribution for monitored and not monitored patients.



SARC *F* distribution for monitored and not monitored patients.

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Topic: Nursing care and physiotherapy

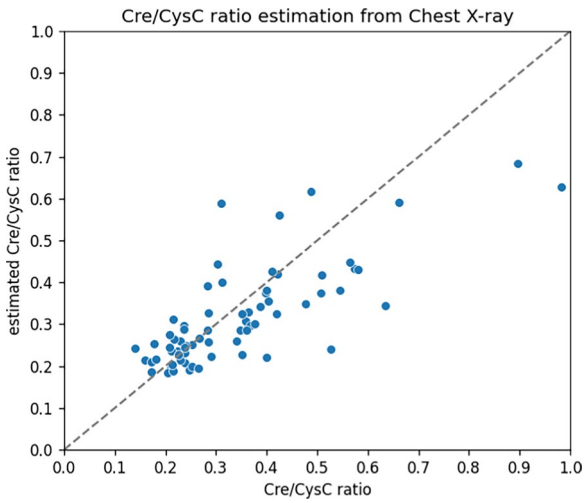
001156

AI-based serum creatinine to cystatin C ratio estimation from chest X-ray in children

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Intensive Care Medicine Experimental 2025,* 13(1):*001156

Introduction: Although sarcopenia is a significant problem in children, there is a paucity of modalities for skeletal muscle quantification in this age group, particularly in the critically ill children. Serum creatinine to cystatin C ratio (SCCR) is a potent surrogate marker for skeletal muscle mass in adults and in children, however, it is not widely accepted because serum cystatin C is not routinely measured. Modalities with wider availability are required.
Objectives: To build an estimation model for SCCR from a chest X-ray image (CXR).

Methods: A single-centre retrospective study was conducted. The derivation cohort consisted of patients aged under 15 years who visited or were admitted to The University of Tokyo Hospital between April 2012 and May 2022 with serum creatinine, serum cystatin C, and CXR within a month. Subjects with impaired renal function (eGFR < 50 ml/minute/1.73m2) or who intubated in the pediatric intensive care unit (PICU) were excluded. The validation cohort included patients aged under 15 years who were admitted to the PICU at the same hospital in 2023 and 2024 with the same measurements as in the derivation cohort within three days of admission. Subjects with impaired renal function (eGFR < 50 ml/minute/1.73m2) or who were already included in the derivation cohort, were excluded from the validation cohort. The SCCR was estimated using a transfer learning approach on an image-recognition model (ConvNeXt V2), which was pretrained to estimate the age from CXR using an open dataset (VinDR-PCXR). The performance of the trained model was evaluated using Pearson's correlation coefficient, and the attention of the model was evaluated by GradCAM.
Results: A total of 160 and 71 patients were included in the derivation and the validation cohort, respectively. The participants' age, serum creatinine, and serum cystatin C for the derivation and the validation cohort were 6.2 (2.5–10.3) and 1.85 (0.3–4.3), 0.32 (0.23–0.45) and 0.23 (0.19–0.27), and 0.80 (0.67–0.96) and 0.74 (0.60–0.97), respectively (median (IQR)). Pearson's correlation coefficient between SCCR and estimated SCCR was 0.77 (95% CI 0.66–0.85, $p < 0.001$). The GradCAM suggested the commitment of the sucapulohumeral region to the estimation.
Conclusions: A Chest X-ray image may provide a significant information about the skeletal muscle mass in children.



Estimated serum creatinine to cystatin C ratio (SCCR) versus true SCCR. Pearson's $r = 0.77$ (95% CI 0.66–0.85, $p < 0.001$).

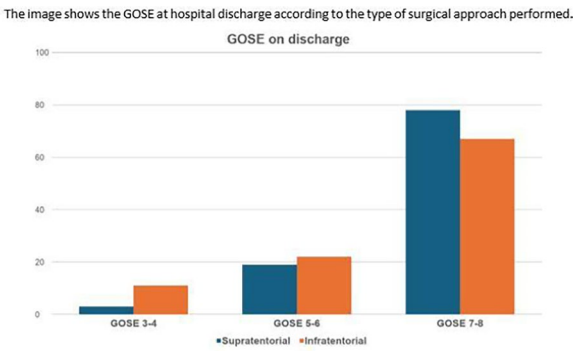
Topic: Information systems and Data Science

001157

Pilot study: prognostic differences in patients undergoing surgery for a brain neoplasm based on the surgical approach

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Intensive Care Medicine Experimental 2025,* 13(1)*:001157

Introduction: The aim of this study is to assess the postoperative outcomes of patients undergoing resection of an intracranial tumor via craniotomy and to compare supratentorial cases with infratentorial cases.
Methods: This descriptive study was carried out in the Intensive Care Department of a University Hospital. It included all patients admitted in 2024 who underwent surgical intervention for brain neoplasia. A general analysis was performed, and the patients were divided into two groups based on the surgical approach: supratentorial versus infratentorial. Statistics: Qualitative variables are expressed as percentages and compared using the χ^2 test. Quantitative variables are expressed as means and standard deviations ($\pm$ S.D.). The significance level was set at $p < 0.05$. Statistical analysis was conducted using specific software (IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM Corp).
Results: A total of 79 patients were included, 47% of whom were women, with a mean age of 60.4 years (SD 13.5). Elective interventions accounted for 75% (60) of the cases, and 88% (70) involved a supratentorial approach. Table 1 presents the main differences based on the type of surgical approach, but no statistically significant differences were found. The image shows the Glasgow Outcome Scale Extended (GOSE) at hospital discharge according to the type of surgical approach performed.
Conclusions: In our sample, no statistically significant differences were found between the two types of surgical approaches (supratentorial versus infratentorial). However, as reported in the literature, patient prognosis tends to be worse for those undergoing the infratentorial approach, even though pre-surgical clinical symptoms are more frequent in supratentorial cases. The supratentorial approach is also associated with a higher frequency of non-elective surgeries, longer procedure durations, and more postoperative complications. Given the sample size, the higher proportion of female patients in the infratentorial group, and the lack of long-term prognostic follow-up, we consider it necessary to expand the sample size and extend the follow-up period, as well as to incorporate a gender perspective.



The image shows the GOSE at hospital discharge according to the type of surgical approach performed.

Table 1	Supratentorial	Infratentorial
Female sex	44,3%	66,7%
Glioblastoma multiforme	34%	0
Meningioma	24%	43%
Metastasis	17%	11%
Pre-surgical motor focality	33%	22%
Pre-surgical language alteration	29%	11%
Pre-surgical cranial nerve involvement	16%	22%
Pre-surgical seizures	23%	0
Non-elective surgery	23%	0
Surgery duration > 4 hours	47%	22%
Post-surgical cranial nerve involvement	9%	55%
Post-surgical surgical complications	24%	1,2%
Post-surgical medical complications	14 %	13%
Reoperation during admission	3 %	0

Outcome results.

Topic: Neurointensive care

001158

Review of practice and recommendation for exclusion of routine chest X-ray confirmation following CVC insertion post-HPB surgery in a tertiary ICU

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Intensive Care Medicine Experimental 2025,* 13(1)*:001158

Introduction: Background: Pneumothorax remains a well-documented complication of central venous catheter (CVC) insertion, prompting routine use of chest X-rays (CXR) for confirmation as per national guidelines, including the ICS LocSSIP checklist. However, the actual utility of this practice in ICU settings with real-time waveform transduction remains under scrutiny.
Objectives: To evaluate the diagnostic and therapeutic value of routine post-insertion CXR in patients undergoing hepatopancreatobiliary (HPB) surgery and subsequently admitted to ICU with CVCs placed under standardised conditions.
Methods: We conducted a retrospective audit of all post-HPB surgery ICU admissions at Glenfield Hospital from May 2022 to March 2025. Data were collected on CVC insertion site, confirmation methods, complications (especially pneumothorax and malposition), and whether CXR findings led to any change in clinical management.
Results: Out of 864 patients, 621 (72%) had CVCs inserted in the internal jugular vein, predominantly in the right IJV. All CVCs were transduced with appropriate venous waveforms. Routine CXR was performed in all cases.
Only 4 cases (0.6%) of pneumothorax were detected, none requiring intervention beyond observation, with one attributable to intraoperative events. Malposition was identified in 9 cases (4 in subclavian vein, 5 at cavo-atrial junction/right atrium), none of which necessitated repositioning. All lines were safely used under continuous waveform monitoring. No CXR led to a change in clinical management.
Conclusions: Routine CXR following CVC insertion in post-HPB surgery patients admitted to ICU did not influence patient outcomes or guide intervention. With real-time waveform confirmation and standardised insertion techniques, CXR can be omitted unless clinically indicated (e.g., difficult insertion, respiratory deterioration). This approach aligns with safe, cost-effective, and patient-centered care.
Recommendations: Revise local protocols to exclude routine CXR post-CVC insertion in ICU when venous waveform is confirmed and no clinical concern exists. Reserve imaging for targeted indications.

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Topic: Perioperative care

001160

The COPPTRIAHL randomized controlled trial: a preliminary analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001160

Introduction: Critically ill patients with cirrhosis and ascites are at high risk of developing intraabdominal hypertension (IAH), which is associated with increased mortality. Clinical guidelines recommend maintaining intra-abdominal pressure (IAP) below 16 mmHg. However, over 75% of these patients develop IAH within the first week of ICU admission. Large-volume paracentesis (LVP) is the standard treatment to relieve abdominal wall tension in these patients, resulting in intermittent reduction of IAP associated with transient improvements in renal and pulmonary function. Continuous passive paracentesis (CPP) offers a strategy to treat and prevent IAH, potentially improving clinical outcomes. However, no studies have compared paracentesis strategies for IAH management.
Objectives: This study aims to compare clinical outcomes of patients with cirrhosis and ascites treated with CPP versus LVP in intensive care.
Methods: A randomized clinical trial in a tertiary hospital center, open to collaboration with other centers, with an estimated duration of 36 months. A total of 72 patients with liver cirrhosis and grade 2 ascites will be enrolled and randomly allocated (1:1) to either the LVP (control) or CPP (intervention) groups. Randomization within the initial 24 h of admission will be stratified based on the maximum values of serum creatinine concentration (sCr) and IAP. LVP will be performed intermittently according to clinical guidelines, while CPP will drain ascitic fluid for up to 7 days. The primary outcome is sCr measured up to day 7, with secondary outcomes including 28-day mortality.
Results: Between September 2022 and November 2024, 89 patients were screened, and 26 (29%) were included in the study and in this preliminary analysis (LVP n = 10 vs. CPP $n = 16$, henceforth). The most frequent exclusion criterium was minimal ascites ($n = 21$). The median patient age was 58 (50–62) years-old and male gender represented 73%. Clinical severity at admission showed SAPS II 44 (30–76), MELD-Na 31 (25–38), ACLF 3 (1–3) and CLIF-SOFA 13 (9–17) and CLIF-C 56 (37–63) median score values. The baseline sCr was similar between groups (2.0 vs 1.9 mg/dL, $p = 0.9$). The results for sCr from days 1 to 4 post-randomization are presented. No significant differences between groups were observed (general linear model repeated measures, $p = 0.06$). The overall 28-day mortality rate was 42%, with no significant group difference (50% vs. 38%, $p = 0.7$), as depicted by Kaplan–Meier analysis.
Conclusions: This preliminary analysis of the COPPTRIAHL clinical trial revealed a slow patient recruitment rate. There was no significant difference in sCr or 28-day mortality between critically ill patients with cirrhosis and ascites submitted to LVP or CPP. The study remains open for collaboration with other centers.
ClinicalTrials.gov registration NCT04322201. Protocol published in Trials, 24, 534 (2023).

Topic: Metabolism, endocrinology, liver failure and nutrition

001161

TGF-β3 inhibits SKP1-mediated ubiquitination degradation of AMPKα and enhances its phosphorylation to promote mitochondrial biogenesis and autophagy in cardiomyocytes to attenuate septic cardiomyopathy

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Intensive Care Medicine Experimental 2025,* 13(1)*:001161

Introduction: The development of septic cardiomyopathy (SCM), a prevalent condition that increases patient mortality, is closely associated with mitochondrial dysfunction in cardiomyocytes.
Objectives: To elucidate the mechanism by which TGF-β3 attenuates SCM by promoting mitochondrial biogenesis and autophagy in

cardiomyocytes, demonstrating that it can be an effective target for intervention in SCM.
Methods: Peripheral blood and clinical information of patients were collected. SCM rat model was established by cecum puncture ligation method, and TGF-β3 was interfered or overexpressed by adenoviral vector myocardial in situ injection; LPS-induced SCM cell model was constructed and overexpressed by plasmid transfection of TGF-β3. Group comparisons were meticulously designed according to the experimental purpose, followed by the qualitative or quantitative detection and analysis of myocardial tissues, cardiomyocytes and mitochondria using molecular biology techniques such as transmission electron microscopy, fluorescence staining, RT-PCR, ELISA, WB, IP-MS, flow cytometry, and so on.
Results: There is a partial correlation between TGF-β3 levels and the condition of SCM patients. The down-regulation of TGF-β3 expression in cardiomyocytes in SCM and the concomitant mitochondrial damage in cardiomyocytes were verified in cellular models. Overexpression of TGF-β3 in constructed SCM cells and animal models confirmed that it promotes mitochondrial biogenesis and autophagy and reduces myocardial pathological damage and inflammatory factors. TGF-β3 was also found to act on SKP1, an assembly factor of the E3 ubiquitination ligase SCF complex, in cardiomyocytes, and TGF-β3 inhibited SKP1-mediated degradation of AMPKα ubiquitination and enhanced the level of AMPKα phosphorylation, which promoted mitochondrial biogenesis and autophagy in cardiomyocytes. Finally, molecular docking was utilized to screen the TGF-β3 high-affinity drug thiamine pyrophosphate (TPP) and confirm its SCM therapeutic effects.
Conclusions: TGF-β3, a protective factor in the myocardium, exerted a role in attenuating SCM by inhibiting SKP1-mediated degradation of AMPKα ubiquitination and enhancing AMPKα phosphorylation promoting mitochondrial biogenesis and autophagy in cardiomyocytes.

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Topic: Sepsis

001163
Bidirectional causality between muscle function and sepsis: from prospective cohort and Mendelian randomization studies
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Introduction: To explore the causal association between sepsis and sarcopenia-related traits through a prospective observational study combined with Mendelian randomization analysis.
Methods: A prospective observational study was conducted in our intensive care unit (ICU) from June to September, 2024. Adult patients expected to stay in ICU over three days were included, and received skeletal muscle ultrasound examination on days 1, 3 and 7 after admission. Ultrasound characteristics including thickness of rectus femoris, vastus intermedius and quadriceps femoris, cross-sectional area of rectus femoris (RF-CSA) and pennation angle of tibialis anterior (TA-PA) were recorded, clinical diagnosis and laboratory examinations were also collected. Patients were classified to three groups: sepsis at admission, sepsis after admission and non-sepsis according to the time of sepsis diagnosis to compare the differences of skeletal muscle ultrasound characteristics. Binary logistic regression was used to investigate the relationship between ultrasound characteristics and occurrence of sepsis after admission. Besides, bidirectional two-sample Mendelian randomization analysis was adopted to assess the causal relationship between sepsis and sarcopenia-related traits using the Genome-wide Association Study (GWAS) database of European populations and the UK Biobank (UKB) database, alternating usual walking pace and sepsis as exposure and outcome variables. Sensitivity analysis was conducted using MR–Egger approach and Mendelian Randomization Pleiotropy Residual Sum and Outlier (MR–PRESSO) test.
Results: 94 patients in the cohort were analyzed in which 30 were sepsis at admission, 18 were sepsis after admission and 46 were nonsepsis. Skeletal muscle ultrasound characteristics of ICU patients on day 3 and day 7 were all lower than baseline ($P < 0.01$). Sepsis at admission group had significantly lower muscle thickness, cross-sectional area and pennation angle ($P < 0.05$) and higher rate of RF-CSA loss (21.65% vs. 9.40%, $P = 0.023$) on day 7 after admission compare to non-sepsis group. Sepsis after admission group had significantly lower baseline TA–PA than nonsepsis group (7.20 ± 1.20° vs. 8.31 ± 1.69°, $P = 0.014$), while other muscle ultrasound characteristics did not show statistical difference. Logistic regression indicated that TA–PA on day 1 was an independent predictive factor of sepsis after admission (adjusted OR = 0.604, 95% CI 0.392–0.930, $P = 0.022$). Mendelian randomization analysis showed that sepsis could decrease usual walking pace (inverse variance weighted: $\beta = -0.019$, SE = 0.009, $P = 0.030$).
Conclusions: The skeletal muscle mass of patients with sepsis was more significantly reduced during ICU stay than those without sepsis, and traits related to muscle function had bidirectional causality with sepsis. Pennation angle of tibialis anterior measured by bedside ultrasound might be a potential indicator for occurrence of sepsis.

Topic: Metabolism, endocrinology, liver failure and nutrition

001168
Incidence and outcomes of acute myocardial injury and acute myocardial infarction in patients with septic shock
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Intensive Care Medicine Experimental 2025,* 13(1)*:001168

Introduction: Elevated cardiac troponin (cTn) levels are common among patients with sepsis. However, whether cTn increases are due to myocardial injury or infarction remains unclear. The primary objective of this study is to evaluate the incidence of acute myocardial injury (AMInj) and acute myocardial infarction (AMI) in patients with septic shock in the ICU. Secondary objectives are to assess the independent association of AMInj and AMI with organ support-free days at 30 days and mortality up to 365 days after ICU admission.
Methods: This multicenter study included 276 ICU patients with septic shock, identified according to the Sepsis-III criteria. The data were collected during ICU admission, at 30 days, and at 365 days following ICU admission. Blood samples were collected daily during ICU stay (max 7 days), and ECGs were performed on days 1, 3, and 7. AMInj and AMI were defined according to the 4th Universal Definition of Myocardial Infarction (UDMI). Organ support-free days (OSFD) were defined as days without invasive mechanical ventilation, vasopressors, inotropes, or renal replacement therapy within 30 days of ICU admission. Multivariable logistic regression analysis was performed to assess the relationship between AMInj/AMI and the outcomes, adjusted for age, BMI, SOFA score, presence of cardiovascular risk factors, and history of coronary artery disease.
Results: A majority of patients (85.9%) fulfilled the UDMI definition of AMInj and 22.3% had AMI. Mortality rates were 14.1% in the ICU, 18.6% at 30 days, and 31.8% at 365 days after ICU admission. Neither AMInj nor AMI was independently associated with mortality at in ICU (AMInj: aOR 1.06, CI 0.21–5.49; AMI: aOR 1.42, CI 0.52–3.92), at 30 days (AMInj: aOR 1.76, CI 0.35–8.89; AMI: aOR 1.07, CI 0.43–2.69), or at 365 days (AMInj: aOR 0.69, 95% CI 0.19–2.50; AMI: 1.50, 95% CI 0.64–3.51) after ICU admission.
There was a significant difference in OSFD in patients with and without AMInj (24 vs 27, $p = 0.018$), but not between those with and without

AMI (23 vs 25, $p = 0.416$). AMInj was not independently associated with OSFD (beta −4.64, 95% CI −9.79 to 5.11) or AMI (beta −0.84, 95% CI −4.52 to 2.83).
Conclusions: Cardiac troponin increases fulfilling consensus definitions for acute myocardial injury and myocardial infarction are common in septic shock patients in the ICU. However, neither AMInj nor AMI were independently associated with mortality in the ICU, at 30 days, or at 1 year in this cohort. AMInj was not associated with organ support-free days, suggesting that while myocardial injury is prevalent in septic shock, it does not affect short-term organ outcomes.

Topic: Sepsis

001169

Neutrophil–lymphocyte ratio in traumatic brain injury, what value can it bring in the first 48 h?

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Intensive Care Medicine Experimental 2025,* 13(1)*:001169

Introduction: The neurophil-to-lymphocyte ratio (NLR) has been associated with global critical illness(1), greater levels indicating hemodynamic shock or major neurological injury, among others. Its use in traumatic brain injury (TBI) patients is currently being studied(2).
Objectives: To determine if a greater NLR during the first 48 h after TBI is related to patient prognosis and to need of invasive procedures.
Methods: Retrospective study in a trauma intensive care unit. Patients with trauma admitted from 2022 to 2024 were included, those with an Abbreviated Injury Scale of 0 in the head were excluded. They were grouped by Glasgow coma scale (GCS) and AIS head. The maximal NLR obtained during the first 48 h of admission was registered. A multivariate analysis was performed, entering as predictor variables GCS, NLR, age and hemodynamic status, studying the association with the need of urgent neurosurgery (< 24 h), tracheostomy, intracranial pressure (ICP) invasive monitoring, as well as with ICU mortality. Statistical analysis was performed with R studio.
Results: Final inclusion gathered 312 patients, 79% male with a median age of 47 years (standard deviation of 19). Severe TBI patients (GCS 3–8) represented 26% of patients, 100% of them had an Abbreviated Injury Scale (AIS) of the head area ≥ 3. Moderate TBI (GCS 9–13) were 29%, with 71% of them having AIS head ≥ 3, and finally mild TBI patients (GCS 14–15) were 45%, with 46% of them having AIS head ≥ 3. Median Injury Severity Score was 22 (interquartile range 13 to 29). Thirty one patients (10%) presented with hemodynamic instability on admission, two thirds of them in the 3–8 GCS group.
In multivariate analysis, a greater NLR was related with a greater need of urgent neurosurgery, invasive ICP monitoring also tracheostomy, but was not related to ICU mortality. After cutoff study with Youden index calculation, we found that having a NLR > 14 during the first 48 h multiplied by 4 the need of invasive ICP monitoring and the need of tracheostomy, and by 5 the probability of urgent neurosurgery.
Conclusions: The NLR may carry important prognostic value since the first hours of TBI. Greater NLR levels during the first 48 h of TBI were associated with need for invasive ICP, urgent neurosurgery and ulterior tracheostomy.

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Topic: Trauma

001170

$ECCO_2R$ in severe ARDS: efficacy in acidosis control and protective ventilation, associated complications and mortality

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Introduction: Extracorporeal carbon dioxide removal ($ECCO_2R$) is a useful tool in the ICU for patients with severe ARDS who have refractory hypercapnia and acidosis despite optimized mechanical ventilation. By facilitating CO_2 clearance at lower ventilatory pressures, $ECCO_2R$ allows for ultraprotective ventilation, potentially reducing ventilator-induced lung injury and improving outcomes in cases where conventional therapies are insufficient.
Objectives: To assess the efficacy, clinical course, and complications associated with $ECCO_2R$ therapy in patients with severe ARDS.
Methods: Prospective observational study analyzing patients admitted to the ICU for severe ARDS between 2019 and 2023. Inclusion criteria: pH ≤ 7.25 with pCO_2 > 60 mmHg and/or driving pressure (Dp) > 15 cmH_2O despite optimized mechanical ventilation (MV) and adjunctive therapies. Patients meeting ECMO criteria were excluded.
Collected data included clinical and demographic variables, Dp, PaO_2/FiO_2 ratio, pH, pCO_2, adjunctive therapies, and $ECCO_2R$-related complications.
Hospital mortality and its association with target achievement were analyzed. The results are expressed as percentages and mean ± standard deviation.
Results: 43 patients were included, 83.7% male, mean age 62 ± 8 years. Etiology of ARDS: 28% bacterial pneumonia, 9% septic shock, 5% alveolar hemorrhage, 56% COVID-19, 2% autoimmune hepatitis.
$ECCO_2R$ was initiated due to respiratory acidosis in 32.5%, Dp > 15 in 18.6%, and both in 48.9% of cases.
Acidosis was corrected ($p < 0.05$) starting at 2 h after $ECCO_2R$ initiation. Protective MV was achieved by 24 h and maintained at 48 and 72 h ($p < 0.05$).
$ECCO_2R$ was considered successful if acidosis was corrected and Dp < 15 cmH_2O was achieved. This was attained in 62.7% at 24 h, 65.3% at 48 h, and 50% at 72 h.

Complications occurred in 79% of patients, all mild to moderate: 65% thrombosis related to the $ECCO_2R$ circuit, 35% non-severe bleeding. No catheter-associated infections were observed.
Overall hospital mortality was 46.5%. Among patients who did not achieve Dp < 15 at 48 h, mortality was 88.8% ($p < 0.05$).
Conclusions: $ECCO_2R$ in patients with severe ARDS proved effective in correcting respiratory acidosis and facilitating protective mechanical ventilation. The therapy was associated with a high rate of mild to moderate complications, without severe clinical impact. Overall the mortality was high and significantly greater in patients who did not achieve Dp < 15 within 48 h.

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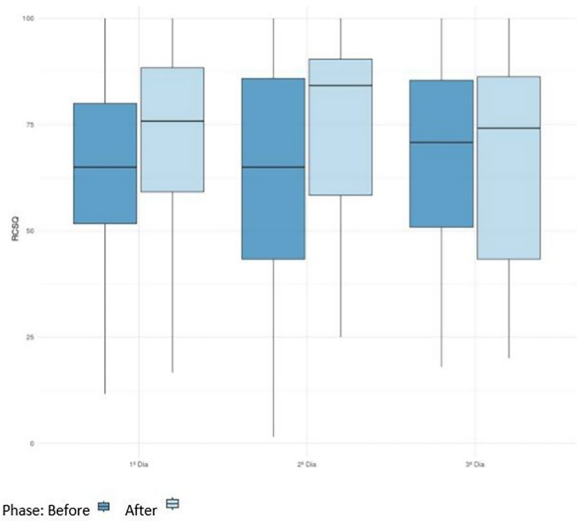
Topic: Acute respiratory failure and mechanical ventilation

001172

Impact of the implementation of a multidisciplinary protocol for best practices for sleep in critical patients: multicenter clinical trial

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Introduction: Sleep disorders in the intensive care unit (ICU) are associated with an increased incidence of delirium, alterations in the immune system, and neuroendocrine function, with their abnormalities linked to cardiovascular changes, neuropsychiatric diseases, and mortality. Poor sleep quality in critically ill patients may be related to factors associated with critical illness or healthcare-related factors. Unicentric studies have demonstrated that it is possible to improve care-related factors, impacting the subjective assessment of sleep.
Objectives: The aim is to demonstrate an improvement in sleep quality in critically ill patients through a reduction in the Richards–Campbell Sleep Questionnaire (RCSQ) score after implementing a structured package of evidence-based measures to enhance sleep in critically ill patients.
Methods: This is a multicenter clinical trial with a quasi-experimental design. The first stage involved assessing the quality of sleep in patients admitted to the ICU by applying the RCSQ over three consecutive days and the ICU Sleep Questionnaire (SICUQ) on the day of ICU discharge. The second stage involved training for the implementation of a Multidisciplinary Sleep Improvement Protocol for Critically Ill Patients. Subsequently, data collection was repeated, and the questionnaires were applied to a new group of patients. Approval from the local ethics committee was obtained under opinion number 5.882.443. Comparisons between quantitative variables were performed using the *t* test or Wilcoxon test. For categorical variables, the Chi-square test was used. The statistical significance level was set at 5% for all analyses; thus, *p* values less than 5% ($p < 0.05$) were considered statistically significant.
Results: The data were collected between March 2023 and March 2024. During the baseline and intervention phases, respectively, 61 and 51 patients were included in the final analysis. There were no significant differences in patient characteristics. According to the RCSQ, there was a significant difference in the reduction of noise in the assessed units before and after the first night. There was also an improvement in the sleep quality item and time to resume sleep on the second night, as well as a perceived reduction in noise. Regarding the SICUQ, the analysis demonstrated an improvement in sleep quality during the final period of hospitalization in the ICU, a reduction in daytime sleepiness in the middle and end of the ICU stay, and a decrease in sleep interruptions due to pain, noise, light, examinations, laboratory tests, and nighttime medication administration.
Conclusions: The implementation of a multidisciplinary care protocol to improve the sleep quality of patients hospitalized in the intensive care environment reduces environmental and cultural barriers in patient care, contributing to an enhancement in patients' sleep quality.



Overall RCSQ score, by phase of the study and on the three days of assessment.

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Topic: Sedation, analgesia and delirium

001173

Necrotising fasciitis: reviewing the cases of the past to prepare for the cases of the future

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Introduction: Necrotizing fasciitis (NF) is a severe and rapidly progressing soft tissue infection characterized by the destruction of muscle fascia and subcutaneous tissues. It can lead to rapid systemic deterioration, making prompt identification and treatment crucial.
In approximately 80% of cases, it results from bacterial invasion through a breach in the skin, which allows the pathogen access to deeper tissues. The infection is usually polymicrobial in nature, with the involved organisms often producing gas. Gram-positive cocci, particularly strains of *Staphylococcus aureus* and *Streptococcus* species, are the most common causative agents in these infections.
Overall, the aggressive nature of necrotizing fasciitis demands immediate medical attention, as delays in diagnosis or intervention can lead to significant morbidity and mortality. The best chance for survival lies in prompt and radical debridement, intravenous hydration, and the administration of broad-spectrum antibiotics. The outcome predictor scores have been proposed, such as LRINEC and the lactate/albumin ratio to attempt at an earlier recognition or prognostication of the condition, but the fact remains that clinical suspicion upon patient's assessment is key. Hence, the relevance of clinical audit remains significant and provides a learning opportunity for the multidisciplinary team to optimize strategies of care.
Methods: A single centre retrospective analysis where all the patients admitted to the ICU in context of soft tissue infections in the past five years (2019–2024) was performed, and the cases with clinical suspicion and imagiological confirmation of necrotising fasciitis were selected.
A complete analysis included demographics, risk factors and comorbid conditions, surgical protocol, support treatment, infection control measures, severity scores and literature suggested biomarkers, made with the intention of audit of practice, including diagnosis and treatment optimisation within the institution.
Results: There was an incidence of 15 cases in the span of 5 years: 6 were Fournier's gangrene, one abdominal fasciitis, one fasciitis of the upper limb and seven cases of lower limb fasciitis. All the patients were admitted to the ICU via the emergency department, after inicial resuscitation and surgical care. Most of the patients presented with septic shock upon admission to the unit (80%). Overall outcomes included 6,7% mortality and 6,7% of patients with amputation of limb. One patient underwent hyperbaric oxygen treatment with a positive outcome.
Blood and surgical samples were sent for microbiological cultures and its results directed antibiotherapy in 73% of cases.
Conclusions: With multidisciplinary management, the challenge of necrotising fasciitis can be overcome with a much lower risk of mortality and morbidity. Early recognition of the condition and assertive surgical approach along with adequate supportive care can result in significant outcome improvements even in severe infections caused by multirresistant bacteria.

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Topic: Infections and prevention

001174

Non-invasive measurement of myocardial work by transthoracic cardiac ultrasound in intensive care patients: the MYOLOAD study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001174

Introduction: Myocardial work (MW) is an emerging parameter in echocardiography, used as a surrogate for cardiac energetics. Its measurement is based on myocardial deformation (global longitudinal strain) and left ventricular afterload (systolic blood pressure) assessment. To date, no study has assessed the feasability of myocardial work by echocardiography in ICU patients.
Objectives: The objectives of this study were to assess the feasibility of non-invasive measurement of myocardial work by transthoracic echocardiography (TTE) in ICU and to evaluate the effects of fluid administration on the different components of myocardial work (MW).
Methods: This was a prospective, longitudinal, multicenter study conducted in three ICUs of French teaching hospitals (Archet and Pasteur in Nice and Timone in Marseille) from June to August 2024. A TTE examination was performed before and after fluid administration in patients already equipped with an arterial catheter. The MW components were calculated using the EchoPAC software (Global work index (GWI), Global constructive work (GCW), Global wasted work (GWW) and Global work efficiency (GWE)). Patients with an increase in VTI > 15% after fluid administration were considered responders. An operator with a university degree in TTE and practical experience of > 2 years was considered an expert.
Results: The measurement of MW was obtained in 59% of patients and was more frequently obtained when TTE was performed by an expert (75% vs. 36%, $p = 0.03$). GWE significantly increased after fluid administration in responders only. The fluid-induced increase in GWI (56% vs. 10%, $p = 0.01$) and GCW (30% vs. 8%, $p = 0.01$) was higher in responders than in non-responders.
Fluid-induced changes (%) in VTI were correlated with fluid-induced changes in GWI ($r = 0{,}60$; $p < 0.001$) and GCW ($r = 0.62$; $p < 0.001$), but not with fluid-induced changes in GWW and GWE.
Conclusions: The MW is a new and promising parameter that requires a high level of TTE expertise to be obtained. These preliminary results suggest that response to fluid administration should also be assessed in terms of cardiac energetics rather than just cardiac output. Indeed, some patients could benefit from fluid administration in terms of cardiac energetics (by improving their GWE), without necessarily showing an increase in cardiac output (VTI > 15%) by established norms.

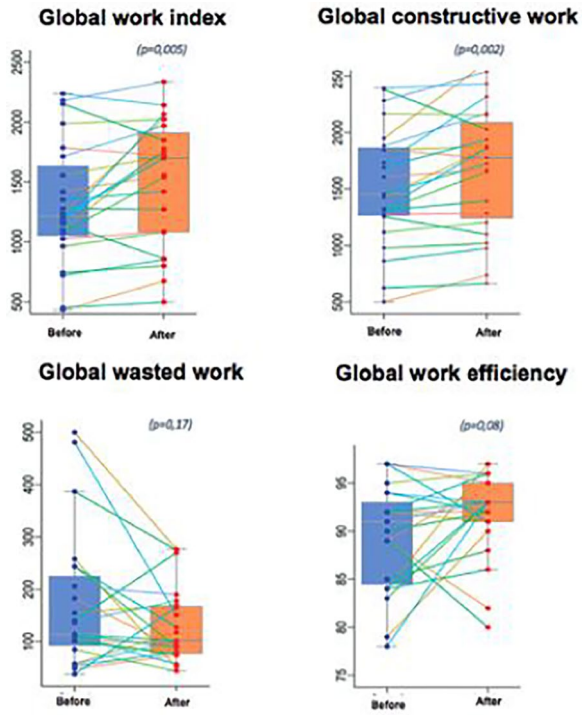


Fig. (abstract 001174) Changes in MW components in non responders

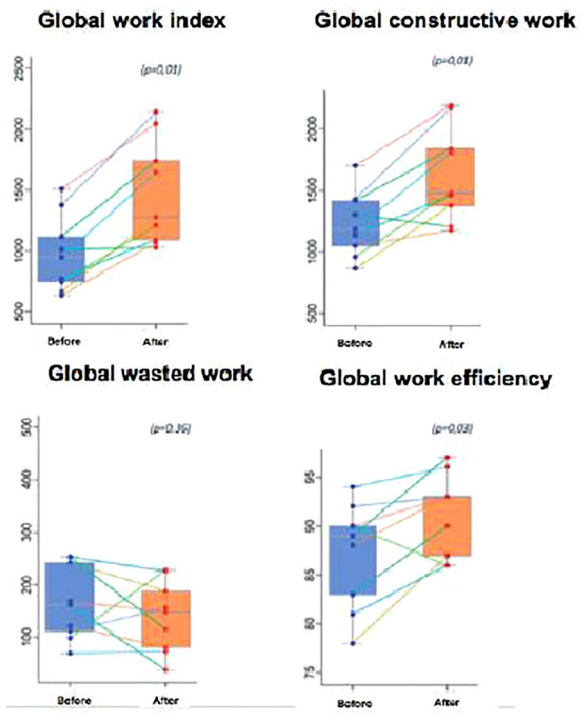
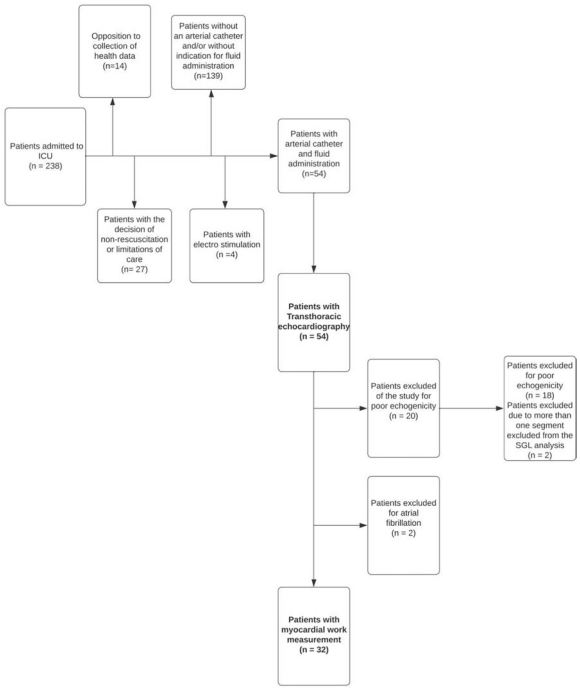


Fig. (abstract 001174) Changes in MW components in responders



(abstract 001174) Flow chart

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Topic: Cardiovascular issues in ICU

001175

Difficult sedation in the critically ill: patterns of RASS mismatch and associated outcomes

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Introduction: Sedation is fundamental for critically ill patients undergoing mechanical ventilation. Light sedation is recommended in international guidelines [1], but may be difficult to achieve, leading to a "mismatch" between the desired sedation level and the level observed. Implications of this mismatch are poorly understood [2].
Objectives: To test the hypothesis that a higher proportion of sedation mismatch is associated with fewer ventilator-free days at day 28 in adults receiving invasive mechanical ventilation (MV).
Methods: Retrospective study including adult patients who received ≥ 48 h of invasive MV between 2011 and 2024 at a single center. The exposure was the proportion of ventilated days with at least two consecutive mismatches between target and observed Richmond Agitation–Sedation Scale (RASS) scores (assessed every four hours) over 28 days. The primary outcome was ventilator-free days through day 28 (VFDs) [3]. Negative binomial regression models adjusted for baseline patient and ICU care characteristics were applied.
Results: Among 9,614 included patients (Fig. 1), 6,952 (72.3%) experienced a proportion of days with RASS mismatch > 0.5. Median age ranged from 65 to 66 years, and approximately 42% of patients were female. Patients with greater proportions of RASS mismatch had higher baseline APACHE II scores (23 (IQR: 19–27)) than those without RASS mismatch (20 (IQR: 17–24), ASD > 0.5). Higher mismatch was also associated with greater median propofol doses (7.3 g [IQR: 2.2–17.0] vs 2.4 g [IQR: 0.0–7.7]; ASD = 0.487) and a higher proportion of medical ICU admissions (84.2% vs 78.5%; ASD = 0.184). In adjusted analysis there was a 2.3% decrease in 28 day VFD (95% CI 1.3–3.3%; $p < 0.001$) per 10% increase in proportion of RASS mismatch. Predictive margins indicated that patients without RASS mismatch had 15.7 VFDs (95% CI 14.5–16.8), compared with 12.4 VFDs (95% CI: 11.9–13.0) in patients with RASS mismatch every day of MV (Fig. 2). In stratified analysis, RASS mismatch where sedation was deeper than target was associated with a 3.6% decrease in VFDs (95% CI 2.7–4.5%; $p < 0.001$) whereas RASS mismatch where sedation was lighter than target was associated with a 3.5% increase in VFDs (95% CI 2.3–4.7%; $p < 0.001$).
Conclusions: Sedation mismatch was associated with fewer VFDs, particularly when sedation was deeper than prescribed. This underscores the importance of sedation target adherence and the need for precision sedation strategies in patients where the goal of light sedation is difficult to achieve.

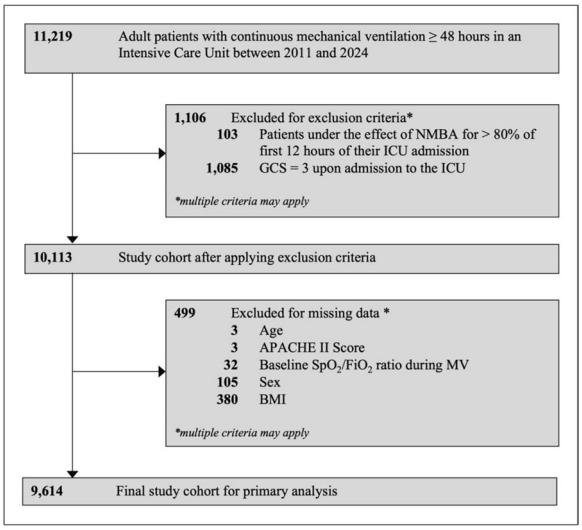


Fig. 1 (abstract 001175) Study flow diagram. *NMBA* Neuromuscular Blocking Agent, *ICU* Intensive Care Unit, *GCS* Glasgow Coma Scale, *APACHE* Acute Physiology and Chronic Health Evaluation, *SpO2* Peripheral Blood Oxygen Saturation, *FiO2* Fraction of Inspired Oxygen, *BMI* Body Mass Index

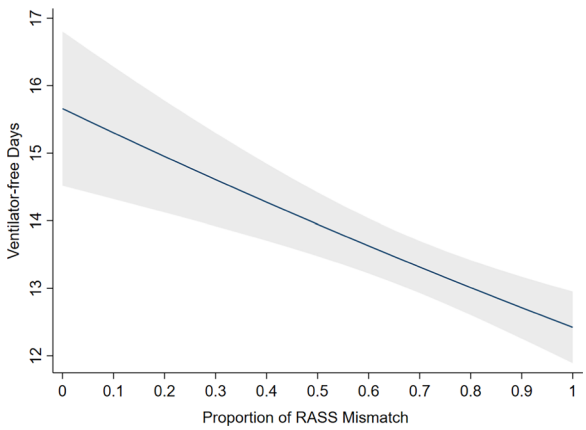


Fig. 2 (abstract 001175) Primary analysis
Predicted ventilator-free days with 95% confidence intervals as a function of RASS mismatch proportion.

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Topic: Sedation, analgesia and delirium

001177

Exploring vasopressin use in septic shock: pioneering data from Turkey: a retrospective cohort study

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Introduction: Septic shock is a leading cause of mortality in critically ill patients and the main indication for vasopressor therapy. Due to reduced vascular responsiveness to norepinephrine and a relative vasopressin deficiency, norepinephrine is used as the first-line agent.
Methods: We included all adult patients admitted to the ICU, between 1 January 2024–15 December 2024, with the diagnosis of septic shock according to SSC guidelines; who received noradrenalin alone and both noradrenalin with vasopressin as an adjunctive vasopressor. The primary endpoint was to evaluate the impact of vasopressin, used as a second-line agent, on hemodynamic and physiological parameters. The secondary endpoint was mortality.
Results: A total of 146 septic shock patients were included in the study, with 113 (77.4%) in the noradrenaline group and 33 (22.6%) in the adjunctive vasopressin-treated group. Patients in the vasopressin group had significantly higher severity of illness at at the time of septic shock. APACHE II scores were significantly higher in the vasopressin group compared to controls (26 vs. 19, $p = 0.007$), similarly, SOFA scores were higher (9 vs. 8, $p = 0.030$). Overall survival and 28-day survival were identical between groups. Overall survival: 24.2% in adjunctive vasopressin group vs. 24.8% in noradrenaline group ($p = 1.000$). The Kaplan–Meier survival curves was shown as Fig. 1. In terms of vasopressor requirements, the median norepinephrine dose decreased significantly from 0.55 mcg/kg/min (IQR: 0.44–0.84) at baseline to 0.43 mcg/kg/min (IQR: 0.27–0.72) by the 6th hour ($p = 0.010$), supporting a vasopressor-sparing effect of vasopressin. Change in physiological and hemodynamic parameters are also given in Table 1; Fig. 2).

Table 1 (abstract 001177) Comparison of time-dependent values after vasopressin *, †

Hours after vasopressin initiation				
	Hour 0	**2nd hour**	**6th hour**	**p value**
Heart rate – beat/min	110 (97,5–120)a	110 (100–123,75)a,b	97,5 (88,75–120,5)b	0,003
Systolic pressure – mmHg	80 (70–92,5)a	90 (80–105)b	95 (77,5–120)b	0,002
Diastolic pressure– mmHg	50 (40–50)a	50 (50–60)b	60 (50–60)b	0,001
Mean arterial pressure – mmHg	60 (54–66)a	70 (63.08–75.75)b	74 (61,75–83,5)b	< 0,001
pH	7.26 (7.19–7.32)a	7.28 (7.19–7.36)a	7.31 (7.17–7.37)a	0,07
Laktat – mmol/L	4,5 (3,55–7,05)a	4 (3.1–6.4)b	3.25 (2.7—7.45)b	< 0,001
Vazopressin dose – U/dak	0,01 (0,01–0,03)a	0,02 (0,01–0,03)a	0,02 (0,01—0,03)a	0,016
Noradrenalin dose – mcg/kg/dak	0,55 (0,44–0,84)a	0,55 (0,36–0,7)a,b	0,43 (0,27–0,72)b	0,010

* Upper letters donates statistically significant diffence within the group according to Related-Samples Friedman's Two-Way Analysis of Variance. † Data were shown as n (%)

The timing of adjunctive vasopressin initiation time was 14 h (IQR 5–25 h), and the initial norepinephrine dose at the time of vasopressin introduction was, 0.56 mcg/kg/min (IQR 0.445–0.880 mcg/kg/min).
Conclusions: This single center study with a limited number of patients is valuable as it reflects the first national experience with vasopressin use. In this study, no difference in mortality was observed between patients receiving norepinephrine alone and those receiving vasopressin in combination with norepinephrine. Adjunctive vasopressin was associated with an immediate noradrenaline sparing effect and a rapid reduction in, lactat levels, tachycardia and a notable hemodynamic improvement, characterized by a significant rise in mean arterial pressure.

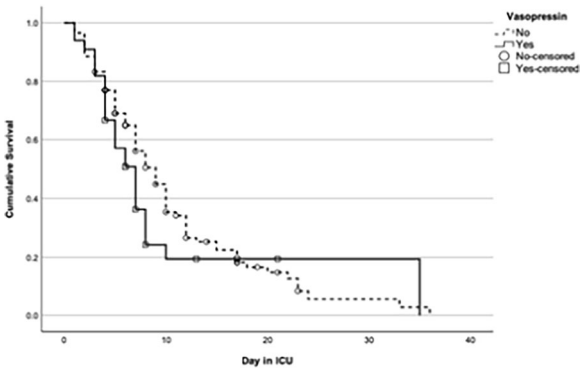


Fig. 1 (abstract 001177) Kaplan–Meier analyses of mortality between groups

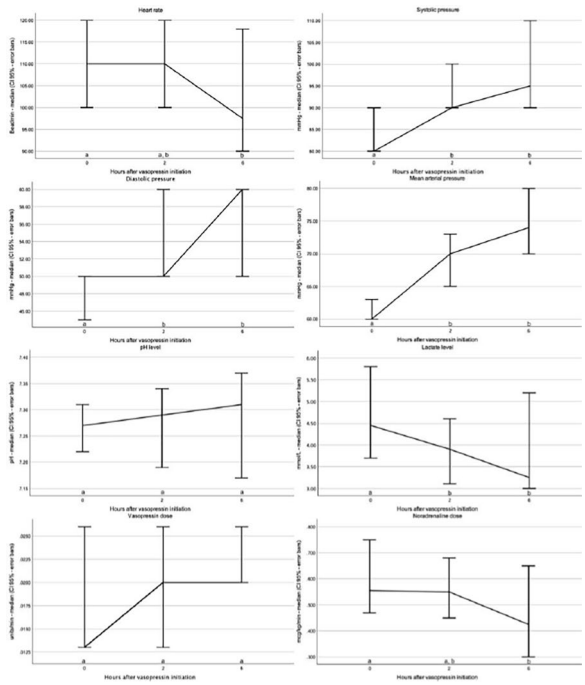


Fig. 2 (abstract 001177) G raphics of time-dependent values after vasopressin initiation *

Topic: Sepsis

001181

Association of inhalation injury with ventilator-associated pneumonia and clinical outcomes in critically ill patients with burns: a retrospective study

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Introduction: Inhalation injury is a major indication for mechanical ventilation (MV) in patients with burns, contributing to prolonged MV and increased hospital costs (1).
Objectives: This study aimed to evaluate the impact of inhalation injury on the outcomes of patients with burns, especially ventilator-associated pneumonia (VAP) and mortality.
Methods: A single-center retrospective cohort study of patients admitted to the intensive care unit (ICU) with burn injuries. Data were obtained from medical records. The primary outcome was the incidence of VAP in patients with or without inhalation injury. Secondary outcomes included need and duration of mechanical ventilation (MV), incidence of acute respiratory distress syndrome (ARDS), need for prone positioning, rates of reintubation and tracheostomy, need for vasopressors and renal replacement therapy (RRT), length of ICU and hospital stay, hospital mortality, and comparison between survivors and nonsurvivors.
Results: From January 2017 to December 2022, a total of 242 patients with a median burn surface area of 23% (15%-37%) were included. Third-degree burns occurred in 64% of patients. The incidence of inhalation injury was 9.9% ($n = 24$). The overall incidence of VAP was 23%. VAP incidence was significantly higher in patients with inhalation injury than in those without inhalation injury (RR 2.1, CI 1.9–3.8) ($p < 0.012$). After adjustment for age, burn surface area, and duration of MV, the RR remained significant (2.1, CI 1.2–3.7) ($p = 0.009$). Patients with inhalation injury had higher rates of reintubation (12.5% vs. 2.8%, $p = 0.048$) and tracheostomy (54.2% vs. 21.6%, $p < 0.001$). The incidence of inhalation injury was similar in survivors and non-survivors (11.2% vs. 5.6%, $p = 0.305$), but non-survivors had a higher burn surface area than survivors (40% vs. 20%, $p < 0.01$).
Conclusions: The incidence of VAP was higher in patients with inhalation injury than in those without inhalation injury; however, the mortality rate was similar.

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Topic: Trauma

001182

Unmasking the hidden threat: ventilator-associated pneumonia and gram-negative dominance

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Introduction: Ventilator-associated pneumonia (VAP), also known as pneumonia associated with intubation, is a severe nosocomial infection affecting critically ill patients under invasive mechanical ventilation. This complication is linked to significant morbidity and mortality, with reported mortality rates ranging from 20 to 70%. Frequently implicated pathogens include Gram-negative bacilli—notably *Klebsiella* spp. and *Pseudomonas aeruginosa*.
Objectives: To analyse cases of VAP in an adult mix intensive care unit (ICU) between 2022 and 2024, with a focus on the predominant microbial agents, patient mortality, and the duration of intubation and invasive mechanical ventilation.
Methods: A retrospective observational study was conducted in an adult mix Portuguese ICU, including all patients who developed VAP between January 2022 and December 2024. VAP was defined as pneumonia occurring after 48 h of endotracheal intubation, diagnosed based on clinical criteria (fever, leucocytosis or leukopenia, purulent secretions and new pulmonary infiltrates) and/or microbiological confirmation from respiratory cultures. Data collected included demographics, gravity scores, causative microorganisms, antibiotic therapy and outcomes (tracheostomy, duration of mechanical ventilation and ICU stay, ICU mortality). Data were analysed descriptively and survivors were compared to non-survivors.
Results: Among 23 VAP cases, the median age was 65 years (65% male), and 70% were medical admissions (30% trauma). Median SAPS II and SOFA scores on admission were 35 and 7, respectively, indicating moderate illness severity.
The diagnosis of VAP was typically established during the first two weeks of ventilation (median on day 8). Microbiological confirmation was obtained in 83% of cases, predominantly Gram-negative bacilli: *Klebsiella* spp. (39%) and *Pseudomonas aeruginosa* (26%). All patients received broad-spectrum antibiotics.
Median duration of mechanical ventilation was 29 days (with a maximum of 96 days), and 61% of patients required tracheostomy. The median ICU length of stay was 30 days (mean 43.6 ± 23.5). Other nosocomial infections occurred in 43% of patients (mostly bloodstream or urinary tract infections). ICU mortality was 35%, with no significant differences between years or by pathogen, and no association with

age or severity scores. No further in-hospital or 3-month mortality was recorded.
Conclusions: VAP remains a critical complication among ventilated ICU patients, predominantly involving Gram-negative pathogens and associated with significant mortality and prolonged durations of mechanical ventilation. These findings underscore the necessity for stringent preventive measures—such as ventilator care bundles—and early, targeted antibiotic therapy to improve clinical outcomes.

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Topic: Infections and prevention

001184

Clinical characteristics and outcomes of intensive care unit patients with acute poisoning: a 14-year retrospective cohort

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Introduction: Acute poisonings remain a frequent cause of Intensive Care Unit (ICU) admission, often involving psychiatric comorbidities and requiring intensive supportive care. While polypharmacy with psychotropic drugs is increasingly common, pesticide-related exposures remain particularly severe and are frequently associated with worse outcomes in specific patient profiles. Understanding gender-related patterns and toxicological profiles may help guide targeted interventions.
Objectives: To describe the clinical profile of ICU patients admitted for acute poisoning, identify predictors of mortality, and examine associations between gender, type of intoxication and outcomes, with a dedicated analysis of pesticide-related cases.
Methods: We conducted a retrospective study of all adult patients admitted to a Portuguese ICU between 2010 and 2024 with acute poisoning. Variables included demographics, origin, APACHE II and SAPS II scores, psychiatric and alcohol-related history, previous intoxications, substances involved, organ dysfunctions, interventions (vasopressors, renal replacement therapy—RRT, gastric lavage, activated charcoal, antidotes), and outcomes. Statistical tests included chi-square, *t* test, and logistic regression. A dedicated subgroup analysis was performed for pesticide cases.
Results: A total of 106 ICU admissions were included (mean age 51.8 years; 50% male), mostly from the emergency department (92.5%). Psychiatric illness was documented in 56.6%, alcohol abuse in 19.8%, and 16.0% had previous intoxications. Most cases involved psychotropic drugs ($n = 42$), often combined with alcohol. Pesticide exposure was identified in 26 cases (24.5%), mainly organophosphates.
There was a significant association between gender and type of intoxication ($p = 0.013$), with 73.1% of pesticide cases in men and 86.8% of psychotropic intoxications in women. Neurological dysfunction occurred in 93.4%, cardiovascular in 33.0%, and renal in 15.1%. Interventions included vasopressors (22.6%), RRT (11.3%), gastric lavage (76.4%), activated charcoal (7.5%), and antidotes (43.4%). ICU mortality was 14.2%. Nonsurvivors were older (59.9 vs. 50.5 years, $p = 0.057$) and had higher APACHE II ($p = 0.011$; OR = 1.11, 95% CI 1.02–1.20) and SAPS II scores ($p = 0.017$; OR = 1.06, 95% CI 1.01–1.11). Other variables were not significantly associated with mortality.
Among pesticide cases, the mean age was 63.0 years, with 73.1% male. Mortality was 26.9%. These patients required vasopressors (50.0%), RRT (23.1%), lavage (92.3%) and antidotes (80.8%), reflecting greater clinical severity. Although time to medical contact was relatively short (mean: 3.6 h), outcomes remained poor.
Conclusions: ICU admissions for acute poisoning involve a clinically diverse population, frequently with psychiatric comorbidity and need for organ support. Gender was associated with the type of substance used, with psychotropic drugs more frequent in women and pesticides in older men. Pesticide-related poisonings showed higher severity and mortality. APACHE II and SAPS II were the strongest predictors of mortality, supporting their role in early risk stratification. These findings highlight the need for improved documentation, toxicovigilance and targeted public health strategies.

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Topic: Pharmacology and Toxicology/Poisoning

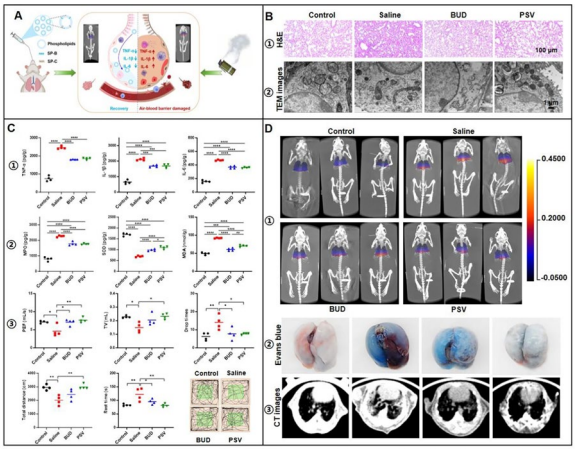
001185

$ZnCl_2$ smoke-induced acute lung injury: mechanism and prevention

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Intensive Care Medicine Experimental 2025,* 13(1)*:001185

Introduction: Zinc chloride ($ZnCl_2$) smoke, a hazardous combustion byproduct generated during military and firefighting training exercises using smoke grenades, represents a significant etiological factor in acute lung injury (ALI). Despite the critical nature of this iatrogenic exposure, clinical management remains limited to supportive care, with no targeted prophylactic interventions currently available.
Objectives: This study aimed to explore the pathogenesis of ZnCl2 smoke-induced ALI, evaluate the protective efficacy of pulmonary surfactant vesicles (PSV), derived from natural bovine surfactants, administered via inhalation.
Methods: A murine model of ALI was induced by exposing mice to ZnCl2 smoke for 3 min in a sealed chamber. Animals were randomly divided into four groups: sham, $ZnCl_2$-exposed, ZnCl2 + PSV, and ZnCl2 + budesonide (BUD; positive control). PSV and BUD were respectively administered intratracheally 30 min prior to smoke exposure. After smoke exposure, the respiratory function of the mice was assessed 48 h later. Lung injury was assessed by histopathological analysis, quantification of proinflammatory cytokines (TNF-α, IL-6, IL-1β), oxidative stress markers (myeloperoxidase [MPO], malondialdehyde [MDA], and superoxide dismutase [SOD]), and apoptosis indicators (Bcl-2 expression and TUNEL staining). Ultrastructural alterations were examined using transmission electron microscopy. The integrity of the air-blood barrier was evaluated using Evans blue dye extravasation and three-dimensional magnetic particle imaging (3D-MPI).
Results: ZnCl2 smoke exposure led to severe alveolar collapse, inflammatory infiltration, oxidative damage, and apoptotic cell death, along with disruption of the air-blood barrier and pulmonary edema. Pre-treatment with PSV significantly reduced the levels of inflammatory cytokines, oxidative stress markers, and apoptosis. Notably, PSV preserved alveolar architecture, maintained barrier integrity, and improved both CT density and MPI ventilation signal. Compared to

BUD, PSV provided superior protection in preventing ZnCl2-induced damage and promoting lung function recovery.
Conclusions: This study reveals the critical role of air-blood barrier disruption in ZnCl2 smoke-induced ALI and supports the use of inhaled PSV as a promising prophylactic strategy. These findings provide translational evidence for non-invasive surfactant therapy in managing toxic inhalation-related respiratory injury.



(abstract 001185) Protective effects of PSV against ZnCl2 smoke-induced ALI in mice. **A** Graphical abstract showing study design and treatment strategy. **B** Lung tissue morphology: (①)Representative H&E staining of lung tissues.(②)Transmission electron microscopy images of mitochondrial ultrastructure. **C** PSV efficacy in aspiration lung injury: (①) Proinflammatory cytokines (TNF-α, IL-1β, IL-6) levels (n = 4/group). (②) Oxidative stress markers (MPO, SOD, MDA) (n = 4/group). (③) Respiratory function and physical activity at 48 h post exposure. **D** Alveolar–capillary barrier:(①)Evans blue-stained lung appearance. (②) CT scans showing changes in lung. (③) 3D-MPI imaging noninvasively evaluated the protective effects of PSV on the alveolar-capillary barrier (n = 3/group)

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Topic: Infections and prevention

001186

Impact of telemedicine on reducing infections, response time of consultation, accuracy, and efficacy through real-time communication

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Introduction: Telemedicine has emerged as a transformative solution in modern healthcare, enabling remote consultation and care delivery through real-time communication technologies. As healthcare systems strive to improve efficiency, safety, and patient outcomes, telemedicine presents a promising approach to address key challenges, including infection control, clinical responsiveness, and care quality.
Objectives: The study aims to evaluate the impact of telemedicine on reducing healthcare-associated infections (HAIs), assess improvements in consultation response times through telemedicine, and compare the accuracy of clinical decisions between telemedicine and traditional consultations. It also seeks to examine patient satisfaction and overall care efficacy using telemedicine. Lastly, the study will identify key factors influencing telemedicine adoption and implementation in real-time care.
Methods: A mixed-methods design was used, combining quantitative and qualitative data collection.
Quantitative:A comparative observational study was conducted with 400 patients (200 telemedicine, 200 traditional care). The data from Electronic Health Records (EHRs) and hospital systems were analyzed to assess:

- Healthcare-associated infection (HAI) rates
- Consultation response times
- Diagnostic accuracy (based on follow-up outcomes)
- Patient satisfaction (5-point Likert scale)

Statistical analysis included chi-square tests for categorical data and independent t tests for continuous variables.
Qualitative: Semistructured interviews and focus groups were conducted with 15 healthcare providers and 20 patients**.** Thematic analysis was used to explore experiences, effectiveness, and barriers to telemedicine adoption.
Results: Data from 400 patients revealed the following key findings:

- HAIs were significantly lower in the telemedicine group (4%) compared to the traditional group (9%), $\chi^2(1, N = 400) = 12.5$, $p < 0.001$
- Average consultation response time was faster in the telemedicine group (15 min vs. 45 min), $t(398) = 8.9$, $p < 0.001$
- Clinical decision accuracy was higher with telemedicine (92% vs. 85%), $\chi^2(1, N = 400) = 10.8$, $p = 0.001$
- Patient satisfaction was significantly greater in the telemedicine group (4.7 vs. 3.8 out of 5), $t(398) = 6.7$, $p < 0.001$

Conclusions: This study provides robust evidence that telemedicine enhances healthcare delivery by reducing infection rates, improving response times, increasing diagnostic accuracy, and elevating patient satisfaction. These findings support the integration of telemedicine into routine clinical practice and inform healthcare policies aimed at expanding access and quality of care. Continued investment in technology, training, and regulatory support is essential to fully realize the benefits of telemedicine.

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Topic: Health Services Research and Outcome

001187

Prevalence of burnout syndrome, stress, anxiety and depression among in ICU healthcare professionals: Maracaibo, Venezuela

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Introduction: Mental health state in ICU workers determines quality of practicing and patient security. It is a challenge to keep mental balance between excessive workload and high demands of care and lack of medical resources and extremely poor conditions. ICU healthworkers are in high risk to develop Burnout Syndrome (BS), stress, anxiety and depression.
Objectives: The aims of this study was to assess the current prevalence of burnout syndrome, stress, anxiety and depression among ICU healthcare professionals in ICUs in Maracaibo, Venezuela.
Methods: A standarized questionnaire was administrated to doctors and nurses in 3 public ICUs and 1 private ICU in Maracaibo, Venezuela during March 2025, sent online. It was strictly confidential and anonymous. The survey consisted of 4 parts: sociodemographic information followed by 3 validated psychometric instruments: Maslach Burnout inventory-Human Services Survey (MBI-HSS) for burnout, Cohen Perceived Stress Scale (CPSS-14) for stress and Patient Health Questionnare Screening (PHQ-4) for anxiety and depression. Their reliability was assessed by Cronbach's alpha value.
MBI-HSS is a 22-item questionnaire that explores three dimensions: emocional exhaustation (EE), despersonalization (DP) and personal accomplishment (PA). Professional SB was defined by scores of EE $\geq$ 26pts and DE $\geq$ 9pts or EE $\geq$ 26pts and PA $\leq$ 34. CPPS-14 total score was categorized in low stress (0–18), moderate stress (19–37) and high stress ($\geq$ 38). In the PHQ-4, scores $\geq$ 3pts for the first two items-measure anxiety and scores $\geq$ 3pts for the last two-items measure depression.
Central tendency and dispersion measures means and standards desviations or medians and interquartile ranges were used, depending on variables distribution, according to the Kolmogorov–Smirnov test. Comparision was made using independent sample *t* test and ANOVA one way. IBM SPSS Software version 2024 was used. A *p* value of $\leq$ 0.05 was considered significant.
Results: The study population consisted in 105 participants, corresponded to a response rate of 61% (inicial number: 172 invited), including professionals between 18 and 60 years. Most of them, were women (76.2%), singles (62.9%) and involved nurses (71.4%) y doctors (28.6%) (Table 1).
Burnout syndrome was detected in 27.6% (29/105) in this population, showing higher prevalence in 18–40 years old participants compared to 40–60 years old (37.7% vs 17.3%, $p = 0.028$). The major components of BS in this study were emocional exhaustion (35.2%) and despersonalization (29.5%) (Table 2). In addition, professionals who had < 5 years of experience working in ICU exhibited higher prevalence of BS than groups who have worked in ICU 5–10 years and > 10 years (43.3% vs 28.2% vs 13.9%, $p = 0.029$). Doctors experienced increased levels of BS compared to nurses (43.3% vs 21.3%, $p = 0.023$). Marital status and type of institution were not associated to BS ($p = 0.42$ and $p = 0.09$).
Moderate stress was diagnosed in the study (21.06 $\pm$ 8.6). The 40–60 years group (18.7 $\pm$ 8.6, $p = 0.007$) and the one who had > 10 years of experience (16.1 $\pm$ 8.7, $p = 0.001$) showed less stress levels (Table 3).
Anxiety diagnose was more common in 18–40 years group than the oldest one but not significant (32.1% vs 17.3%, $p = 0.08$). As well, anxiety was highly observed in the group that had less experience in contrast > 10 years of experience professionals (46.7% vs 2.8%, $p = 0.001$). Similar behaviour for depression was found (33.3% vs 5.6%, $p = 0.012$) (Table 3), as shown highest scores in moderate and severe category in the less experience group ($p = 0.009$) (Table 4).Stress, anxiety and depression were associated to SB ($p = 0.001$, $p = 0.001$ and $p = 0.014$).
Conclusions: In our study, being younger and having less professional experience in ICU were associated to BS, stress, anxiety and depression. Doctors showed higher levels of BS than nurses. This is the first study in Venezuela to our knowledge, and results are important for creating programs to promote wellbeing and mental health in new generations ICU healthworkers. The sample size was a limitation of the study and it is not representative of all the country.

Demographics Characteristics	Frequency (%)
Age	
18-40 years	53 (50.5%)
41-60 years	52 (49.5%)
Gender	
Female	80 (76.2%)
Male	25 (23.8%)
Marital Status	
Single	66 (62.9%)
Married	39 (37.1%)
Type of professional	
Nurse	75 (71.4%)
Doctor	30 (28.6%)
Years of working experience (years)	
< 5 years	30 (28.6%)
5-10 years	39 (37.1%)
> 10 years	36 (34.3%)
Type of Hospital	
Public	83 (79%)
Private	22 (21%)

Variables are expressed in absolut and relative frequencies.

MBI-HSS survey	Total (n=105)	18-40 years (n=53)	41-60 years (n=52)	P value
Emotional exhaustion				
Low	44 (41.9%)	16 (30.2%)	28 (53.8%)	***0.042***
Moderate	24 (22.9%)	15 (28.3%)	9 (17.3%)	
High	37 (35.2%)	22 (41.5%)	15 (28.85%)	
Despersonalization				
Low	54 (51.4%)	19 (35.85%)	35 (67.3%)	***0.040***
Moderate	20 (19.1%)	13 (24.53%)	7 (13.46%)	
High	31 (29.5%)	21 (39.62%)	10 (19.23%)	
Personal Accomplisment				
Low	16 (15.2%)	12 (22.64%)	4 (7.7%)	***0.080***
Moderate	19 (18.1%)	13 (24.53%)	6 (11.54)	
High	70 (66.7%)	28 (58.83%)	42 (80.77)	
Burnout Syndrome	29 (27.6%)	20 (37.7%)	9 (17.3%)	***0.028***

Variables are expressed in absolut and relative frequencies. Proportions between groups were compared using chi-square test. $P \leq 0.05$ is consider significant. MBI-HSS: Maslach Burnout Inventory-Health Services Survey.

	<5years	5-10years	>10years	Total	*p value*
Burnout Syndrome	13 (43.3%)	11% (28.2)	5 (13.9%)	29 (27.6%)	***0.029***
Stress	21 (70%)	26 (66.7%)	12 (33.3%)	59 (56.2%)	***0.002***
Anxiety	14 (46.7%)	11 (28.2%)	1 (2.8%)	26 (24.8%)	***0.001***
Depression	10 (33.3%)	11 (28.2%)	2 (5.6%)	23 (21.9%)	***0.012***

Variables are expressed in absolut and relative frequencies. Proportions between groups were compared using chi-square test. $P \leq 0.05$ is consider significant.

PHQ-4	Categories	<5years	5-10years	>10years	Total	*p value*
	None	7 (23.3%)	15 (38.5%)	20 (55.6%)	42 (40%)	
	Mild	12 (40%)	15 (38.5%)	16 (44.4%)	43 (41%)	
	Moderate	6 (20%)	6 (15.4%)	0 (0%)	12 (11.4%)	
	Severe	5 (16.7%)	3 (7.7%)	0 (0%)	8 (7.6%)	
						0.009

Variables are expressed in absolut and relative frequencies. Proportions between groups were compared using chi-square test. $P \leq 0.05$ is consider significant.

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Topic: Ethics and end of life care

001188

Impact of ICU design on staff burnout: a comprehensive investigation

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Introduction: Intensive care units (ICUs) are high-stress environments where healthcare professionals, particularly nurses and physicians, are exposed to physically and emotionally demanding situations. Burnout in ICU staff is increasingly recognized as a major concern, impacting not only individual well-being but also patient safety and care quality. Although workload and patient acuity are commonly examined, the role of the physical design of the ICU—such as noise levels, lighting, and spatial layout—has received limited empirical attention. This study aims to explore how ICU design influences staff burnout and to identify key environmental factors that contribute to or mitigate stress.
Objectives: The primary objective was to investigate the relationship between ICU design and burnout among staff. Secondary objectives included assessing the correlation between specific design elements (e.g., lighting, noise, layout) and burnout levels, and exploring the mediating roles of perceived workload and job satisfaction in this relationship.
Methods: A mixed-methods design was employed, combining quantitative and qualitative data collection and analysis. The quantitative component involved a comparative observational study of 200 ICU nurses and physicians across multiple hospitals. Participants completed standardized questionnaires, including the Maslach Burnout Inventory (MBI) and ICU-specific environmental assessments. Data were analyzed using correlation and regression analyses to determine relationships between ICU design factors and burnout scores.
The qualitative component involved semi-structured interviews with 15 ICU staff and focus groups with 20 participants from both well-designed and poorly designed ICUs. Thematic analysis was used to identify perceptions of environmental stressors and suggestions for improvement.
Results: The average burnout score among participants was 30, indicating moderate burnout. There was a strong positive correlation ($r = 0.65$, $p < 0.001$) between poor ICU design and higher burnout levels. Specific findings include:

- Noise levels significantly predicted increased burnout ($\beta = 0.4$, $p < 0.01$).
- Natural lighting was associated with significantly lower burnout scores ($M = 24$) as compared to poorly lit environments ($M = 34$; $t(198) = 4.5$, $p < 0.001$).
- Efficient unit layout was associated with reduced perceived workload and burnout ($\beta = -0.35$, $p < 0.05$).

Qualitative data supported these findings, with staff citing noise, lack of privacy, poor lighting, and inefficient workspace arrangements as major contributors to stress and exhaustion. Many participants reported that better design would enhance their job satisfaction, performance, and emotional resilience.
Conclusions: This study provides strong evidence that ICU design plays a significant role in shaping staff burnout. By identifying specific

environmental stressors, the research offers actionable insights for healthcare planners and administrators seeking to redesign ICU spaces. Improvements in lighting, acoustics, and spatial efficiency could serve as strategic interventions to reduce burnout, improve staff retention, and ultimately enhance the quality of patient care. Future studies should examine the long-term effects of such design interventions and expand research across diverse healthcare settings.

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Topic: Health services research and outcome

001189

Natural agent cynaropicrin alleviates sepsis-induced ARDS via covalent targeting NLRP3 in macrophages

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Introduction: The excessive activation of NOD-like receptor family pyrin domain containing 3 (NLRP3) inflammasome plays a critical role in the development of sepsis-induced acute respiratory distress syndrome (ARDS) by inducing the production of pro-inflammatory cytokines and driving pathological processes. Pharmacological inhibition of the NLRP3 inflammasome emerges as a discernible therapeutic strategy in the treatment of ARDS. However, FDA has authorized no NLRP3 inhibitor for therapeutic application in treating ARDS.
Objectives: Our laboratory commits to discovering potential NLRP3 inhibitors as effective drugs against sepsis-induced ARDS. Cynaropicrin inhibited the secretion of Caspase-1 and IL-1β, and suppressed NLRP3 inflammasome-mediated pyroptosis in macrophages. We hypothesize that Cynaropicrin is an effective drug against sepsis-induced ARDS. This study aims to investigate the therapeutic efficacy of Cynaropicrin in sepsis-induced ARDS and clarify its underlying pharmacological mechanism.
Methods: The therapeutic effect of Cynaropicrin was evaluated in murine LPS-induced ARDS models. Lung tissue and bronchoalveolar lavage fluid were collected for pathological examination. Immunoblotting and ELISA assays were performed for inflammatory detection. Proteomic analysis of lung tissue was performed to discover the pharmacological mechanism of Cynaropicrin. In vitro studies were conducted on primary mouse macrophages to investigate how Cynaropicrin inhibited the NLRP3 inflammasome.
Results: Cynaropicrin has an obvious therapeutic effect on the murine ARDS model through inhibiting the NLRP3 inflammasome pathway in alveolar macrophages. Cynaropicrin treatment significantly reduced lung tissue trauma and disruption of air–blood barrier. It also decreased total cell infiltration and neutrophil invasion after LPS challenge. The secretion of the crucial inflammatory factors and proteins; namely, IL-1β and Caspase-1, associated with the NLRP3 inflammasome pathway showed a notable decrease in response to Cynaropicrin administration. In contrast, the therapeutic efficacy of Cynaropicrin was abolished in GsdmdKO and Nlrp3KO mouse ARDS models. In vitro studies revealed Cynaropicrin specifically inhibited the activation of NLRP3 inflammasome in primary mouse macrophages and primary human peripheral blood monocytes. The assembly of NLRP3 inflammasome was interrupted under CYN treatment via inhibiting the complex of NLRP3–NEK7 and NLRP3–ASC. From a molecular structure perspective, Cynaropicrin directly bound to the NACHT domain of NLRP3, covalently bound to cysteine 417 (Cys415 in mouse) and reduced NLRP3 oligomerization via suppressing its ATPase activity.
Conclusions: Cynaropicrin, for the first time, was identified as a natural covalent inhibitor of NLRP3 and as a new lead compound for the treatment of NLRP3-mediated ARDS. Cynaropicrin has promising clinical applications and development potential for the treatment of ARDS.

Topic: Pharmacology and toxicology/poisoning

001190

Disseminated cryptococcal meningitis in an immunocompetent patient: a diagnostic challenge

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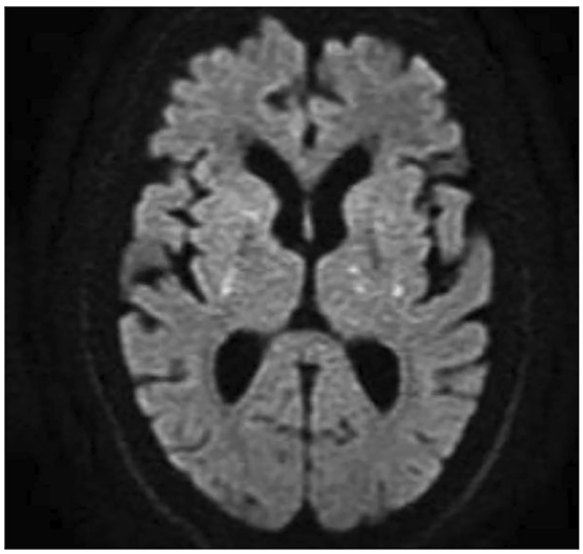
Introduction: Cryptococcal meningitis is the most common cause of fungal meningitis and typically affects immunocompromised hosts, particularly those with HIV/AIDS, solid organ transplants, or chronic immunosuppressive therapy. However, around 20% of cases occur in individuals without identifiable immunodeficiency. In such cases, clinical suspicion is often low, leading to diagnostic delays. Presentations may be atypical or subtle, contributing to morbidity and mortality. We report a case of disseminated cryptococcosis in LMIC in a previously healthy 55-year-old male, initially misdiagnosed despite multiple healthcare encounters, which eventually led to fatal outcomes.
Objectives: Cryptococcal meningitis, a life-threatening fungal infection, predominantly affects immunocompromised individuals. However, a rising number of cases have been reported in immunocompetent patients, where diagnosis is often delayed due to atypical presentations.
Methods: A 55-year-old male, with no known comorbidities, presented to the emergency department with a one-week history of flu-like symptoms, non-productive cough, and 15 h of palpitations. He denied fever, dyspnea, gastrointestinal symptoms, neck stiffness, photophobia, or recent infections. No history of chronic illness, immunosuppressive therapy, or substance use was reported.Two months earlier, he had presented with aphasia, left lower limb numbness, and jerky limb movements. MRI brain showed leptomeningeal enhancement, but CSF analysis was normal. He was discharged on antiepileptic medication. A follow-up MRI showed new multifocal infarcts, and his seizure regimen was adjusted.
On examination, he was alert, oriented, and hemodynamically stable, except for tachycardia (HR 109 bpm). Vitals: BP 103/58 mmHg, RR 20/min, SpO_2 99% RA. Neurological exam showed no focal deficits, and meningeal signs were absent. Chest X-ray showed subtle bilateral infiltrates, and CRP was elevated. ECG revealed sinus tachycardia.

Empirical antibiotics were initiated for suspected atypical pneumonia. Respiratory viral panels including COVID-19, influenza, and RSV were negative. He developed seizures (stiffening and staring spells) in the ED, followed by hypoxia requiring NIV, and was subsequently intubated.CT pulmonary angiography showed bilateral ground-glass opacities and a "tree-in-bud" appearance, with no pulmonary embolism. Repeat MRI brain revealed new lacunar infarcts. A lumbar puncture showed:• Opening pressure: Elevated• CSF glucose: < 2 mg/dL• Protein: 193 g/dL• WBC count: 20 cells/μL, 98% lymphocytesAFB smear and PCR for TB in CSF and tracheal aspirate were negative. However, India ink staining revealed budding yeasts, and cryptococcal antigen was strongly positive (1:2560 in CSF and serum). Blood cultures also confirmed *Cryptococcus neoformans*.

The patient was HIV, hepatitis B, and C negative. Workup for malignancy, sarcoidosis (ACE levels), and plasma cell dyscrasias was unremarkable. He was diagnosed with disseminated cryptococcosis, including pulmonary and CNS involvement.He was initiated on intravenous amphotericin B (1 mg/kg/day) and high-dose fluconazole (1200 mg/day). By Day 14, repeat CSF cultures and India ink were negative. His GCS improved and he was extubated, but later developed ventilator-associated pneumonia, necessitating re-intubation and tracheostomy. He remained septic and unfortunately succumbed to multiorgan failure.

Results: India ink staining and cryptococcal antigen testing confirmed cryptococcal meningitis with systemic dissemination. Despite antifungal therapy with amphotericin B and fluconazole, the patient developed ventilator-associated pneumonia and succumbed to sepsis. Cryptococcal infection must be considered in patients with subacute neurological symptoms, regardless of HIV status. Early lumbar puncture with fungal staining and antigen testing is crucial in CNS presentations.

Conclusions: This case highlights the growing need to consider cryptococcal infection in immunocompetent individuals presenting with neurological symptoms, especially in cases where initial workup is non-revealing. Early CSF testing and fungal diagnostics may be lifesaving. Consent to publish had been obtained.



Thromboembolic phenomenon in cryptococcal meningitis.

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Topic: Infections and prevention

001191

Early versus late initiation of second-line vasopressors with norepinephrine and short-term prognosis in septic shock: a retrospective cohort study

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Introduction: The current guidelines recommend combining second-line vasopressors with norepinephrine for patients experiencing refractory shock in the intensive care unit (ICU). However, there is limited evidence regarding the optimal timing for initiating second-line vasopressors. This study aims to evaluate the effects of early versus late initiation of second-line vasopressors in patients with septic shock.

Methods: This single-center, retrospective observational study examined patients with septic shock who were admitted to the ICU of the First Affiliated Hospital of Sun Yat-Sen University between June 2016 and December 2023. The inclusion criteria for the study were: (i) adult patients with septic shock admitted to our ICU within 48 h of onset, and (ii) patients requiring at least two vasopressors to maintain a mean arterial pressure (MAP). The primary outcome is the total dose of norepinephrine during first seven days of ICU stay. The secondary outcomes include ICU length of stay (LOS), hospital LOS, mechanical ventilation free days, fluid balance,7-day ICU mortality and hospital mortality. The second-line vasopressors considered in the study were epinephrine, metaraminol, and terlipressin. Patients were categorized into the early and late groups based on whether a second-line vasopressor was added to the norepinephrine treatment. The median time for initiating second-line vasopressors in our cohort served as the cut-off value to distinguish between these two groups. To compare the two groups, we used univariate and multivariate Cox regression proportional hazards analysis. Continuous variables were assessed using either a t test or a rank-sum test, while categorical variables were analyzed using Fisher's exact test. A two-sided p value of less than 0.05 was considered statistically significant.

Results: In total, 176 septic shock patients (71% male) were included with mean Sequential Organ Failure Assessment (SOFA) scores of 12 (10–14). The median time for initiating the second-line vasopressors was 9 (5–12) hours. The cohort was thus separated into two groups: early gourp (< 9 h, $n = 90$) and late group (≥ 9 h, $n = 86$). The mean dose of norepinephrine when the second-line vasopressors were initiated was 0.5 (0.1–1.1) mcg/kg/min in the early group and was 0.6 (0.3–1.0) mcg/kg/min in the late group ($p = 0.094$). There are no difference between two groups of patients except that there are more post-operation patients in early group than in late group (92.2% vs. 74.4%, $p = 0.001$). Besides, the lactate level was higher in the early group than in the late group (9.3 (3.8–15.0) vs. 5.2 (2.6–10.9), $p = 0.004$). Regarding the primary outcome, although the mean (early: 0.7 (0.3–1.1) *vs.* late: 0.5 (0.2–1.0) mcg/kg/min, $P = 0.069$) and maximal (early: 1.1 (0.6–1.8) *vs.* late: 0.8 (0.4–1.5) mcg/kg/min, $P = 0.027$) dose of norepinephrine was higher in the early group than in the late group during the first nine hours of ICU admission, the total dose of norepinephrine was less in early group compare to late group (249.1 (118.5–403.8) vs. 274.2 (149.5–594.8) mcg/kg/min, $p = 0.235$). The 7-day survival rate of the early group was higher than that of the late group throughout the entire observation period. The Log-rank test indicated that the difference in survival curves between the two groups was statistically significant ($p = 0.039$). The Cox regression analysis shows that late initiation of second-line vasopressors (Hazard ratio (HR): 3.25 (1.61–6.58),

$p = 0.001$), the lactate level at the ICU admission (HR: 1.03 (0.95–1.11), $p = 0.497$) and the mean dose of norepinephrine during the first nine hours of ICU admission (HR: 1.78 (1.14–2.79), $p = 0.012$) were the independent risk factors for the 7-day ICU mortality. There were no difference between early and late groups regarding ICULOS, hospital LOS, mechanical ventilation free days, fluid balance and hospital mortality.
Conclusions: In septic shock patients, early initiation of second-line vasopressors could significantly reduce the use of norepinephrine in the early phase and was associated with an improvement in 7-day ICU mortality.

Topic: Sepsis

001193
An investigation of the relationship between disgust propensity and sensitivity and professional quality of life among intensive care nurses
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Intensive Care Medicine Experimental 2025,* 13(1)*:001193

Introduction: Intensive care nurses frequently come into contact with the human body and bodily fluids due to the nature of their profession. This exposure may lead to disgust sensitivity in some nurses, potentially affecting their professional performance, job satisfaction, and psychological resilience.
Objectives: This study aimed to examine the relationship between disgust propensity and sensitivity and the subdimensions of professional quality of life among intensive care nurses.
Methods: This descriptive and correlational study was conducted using a snowball sampling method. An online questionnaire was initially distributed to intensive care nurses working in different geographical regions of Turkey. Participants were also encouraged to share the survey with other colleagues working in similar intensive care settings to increase sample diversity and reach. Although the questionnaire was sent to a larger pool of nurses, the study was completed with $n = 209$ intensive care nurses who fully completed the data collection form and correctly answered the control validation item, ensuring the accuracy and reliability of their responses. Descriptive statistics, Kruskal–Wallis and Mann–Whitney U tests were used for group comparisons, and Spearman correlation analysis was conducted to assess the relationships between variables.
Data were collected through two validated instruments: the Professional Quality of Life Scale (ProQOL), and the Disgust Propensity and Sensitivity Scale (DPSS), which assesses an individual's tendency to feel disgust and the intensity of the response.
Results: The mean age of the intensive care nurses was 31.33 ± 6.91 years, and 62.2% were female. Disgust sensitivity was positively correlated with compassion fatigue (secondary traumatic stress) ($r = 0.551$; $p < 0.01$) and burnout subdimentions. ($r = 0.376$; $p < 0.01$), and negatively correlated with compassion satisfaction subdimention ($r = -0.140$; $p < 0.05$). Nurses who were frequently exposed to disgust-inducing situations and reported that their performance was seriously affected had significantly higher levels of disgust sensitivity, burnout, and compassion fatigue ($p < 0.001$). Those who reported considering leaving the profession due to disgust had significantly lower compassion satisfaction and higher levels of burnout and compassion fatigue ($p < 0.001$). Statistically significant differences were also found by age, gender, years of experience, and education level. Older and more experienced nurses had higher compassion satisfaction and lower burnout levels ($p < 0.05$). Female nurses had significantly higher disgust sensitivity as compared to male nurses ($p = 0.011$).
Conclusions: Disgust propensity and sensitivity negatively affect various dimensions of professional quality of life among intensive care nurses. Structured training programs to strengthen coping skills and emotional resilience are recommended to support nurses in managing disgust-related stressors in clinical settings.

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6. The authors have submitted funding applications to their national institutions for the presentation of this study at ESICM ***2025,*** which are currently under evaluation.

Topic: Nursing care and physiotherapy

001194
Switching from controlled to assisted mechanical ventilation: a multicenter retrospective study (SWITCH)
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Intensive Care Medicine Experimental 2025,* 13(1)*:001194

Introduction: Switching from controlled to assisted ventilation is crucial in the trajectory of intensive care unit (ICU) stay, but no guidelines exist. We described current practices, analysed patient characteristics associated with switch success or failure, and explored the feasibility to predict switch failure.
Methods: In this retrospective study, we obtained highly granular longitudinal ICU datasets from three medical centers, covering demographics, severity scores, vital signs, ventilation, and laboratory parameters. The primary endpoint was switch success, considering a switch attempt to be successful if a patient remained on assisted ventilation for the next 72 h while alive, and to be failed otherwise. We compared the characteristics of patients with successful versus failed first switch attempts at ICU admission, immediately before, and three hours after the attempt. We trained LASSO logistic regression models to predict switch failure.
Results: In 4,524/6,715 (67%) patients attempting a switch, the first attempt failed. The first switch attempt, regardless of success or failure, was generally made at normalized PaCO2 and pH levels, with PEEP < 10 cmH2O and PaO2/FiO2 indicating mild injury. Despite very similar baseline disease severity, switch failure was associated with significantly worse outcomes, including a 28-day mortality of 27% vs. 16% and median ventilator-free days of 16 vs. 22 ($P < 0.001$). Failed attempts were initiated significantly earlier than successful ones

(median 1.8 vs. 1.3 days, $p < 0.001$). PaO2/FiO2 was lower before the switch in patients with switch failure (185 vs. 205 mmHg, $P < 0.001$) if measured at PEEP > 10 cmH2O (Fig. 1), and they experienced greater deterioration in gas exchange and minimal improvement in ventilatory parameters post-switch. Contrary to our hypotheses, however, patient characteristics for failed vs successful switches were surprisingly similar, resulting in prediction models with limited discriminative performance.

Conclusions: Approximately two-thirds of attempts to switch to assisted ventilator modes fail, which are associated with significantly worse clinical outcomes, despite similar baseline disease severity. Contrary to our hypotheses, patients with successful and failed attempts showed similar characteristics, making switch failure difficult to predict. These findings underscore the importance of preventing switch failures and, given the retrospective nature of our study, highlight the need for prospective studies to better understand the reasons for switch failure and when spontaneous breathing can be safely initiated.

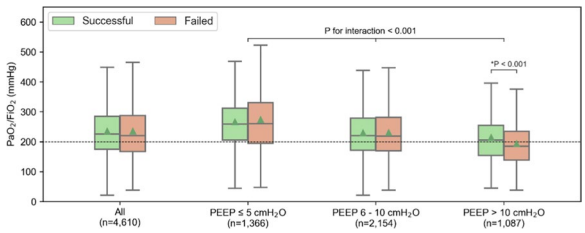


Fig 1 (abstract 001194) PaO2/FiO2 at the switch attempts, for patients with successful vs. failed switches, for all patients and stratified for the set PEEP at the time of measurement. The p value for interaction denote that PEEP significantly modified the association between the PaO2/FiO2 and switch success

Reference

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Topic: Acute respiratory failure and mechanical ventilation

001195

Sivelestat sodium alleviates acute lung injury in heat stroke rats by protecting the endothelial glycocalyx

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Intensive Care Medicine Experimental 2025,* 13(1)*:001195

Introduction: Heat stroke (HS) represents a life-threatening systemic disorder characterized by rapid elevation of core body temperature resulting from exposure to extreme heat and humidity. This condition frequently leads to multiorgan dysfunction, including acute lung injury (ALI), and is often accompanied by neurological impairment with significantly high mortality rates. Based on the etiological factors, HS is clinically classified into two distinct forms: exertional heat stroke (EHS) and classic heat stroke (CHS). The escalating global temperatures coupled with demographic aging have precipitated a marked increase in CHS incidence among elderly populations. Advanced age confers particular vulnerability to CHS due to age-related deterioration in circulatory function and diminished capacity for thermoregulatory adaptation. The current therapeutic strategies for HS primarily focus on three key interventions: rapid core temperature reduction, systemic inflammatory response modulation, and comprehensive organ function support. Sivelestat sodium (SIV), a specific neutrophil elastase (NE) inhibitor, has demonstrated therapeutic potential through its dual mechanism of action: suppressing protease-mediated inflammatory cascades while preserving the structural integrity of the pulmonary vascular endothelial glycocalyx (EG). These pharmacological properties suggest SIV may offer protective effects against HS-induced ALI and pulmonary tissue damage. Notably, the potential efficacy of SIV in preventing or treating CHS-associated lung injury in aging populations remains unexplored in the current scientific literature.

Objectives: To investigate the effects of Sivelestat sodium (SIV) on acute lung injury in heat stroke (HS) rats and its potential mechanisms.

Methods: A total of 125 rats were randomly divided into five groups (25 rats/group): Control (Ctrl), Heat Stroke 12 h (HS-12 h), Low-dose SIV (HS + SIV 1.6 mg/kg), Medium-dose SIV (HS + SIV 4.8 mg/kg), and High-dose SIV (HS + SIV 10 mg/kg). SIV was administered via tail vein 2 h prior to modeling at respective dosages. The survival rates of all groups were recorded over 72 h. Histopathological changes were assessed using HE staining; lung vascular permeability was evaluated with Evans blue dye; pulmonary edema was measured by dry/wet weight ratio; TUNEL staining was used for apoptosis analysis; neutrophil counts in bronchoalveolar lavage fluid (BALF) were determined by Wright–Giemsa staining; ELISA was conducted to measure inflammatory mediators TNF-α, IL-6, IL-1β levels, and NE activity; serum NE activity and glycosaminoglycans (HA, HS, CS, SDC1) were quantified; Western blot (WB) was performed to evaluate the expression of HS, glypican-1, SDC1, Toll-like receptor 4 (TLR4), and Heparanase (HPSE) in lung tissues; immunohistochemistry was utilized to observe syndecan-1 expression in pulmonary endothelial cells; transmission electron microscopy was employed to assess the structure of the endothelial glycocalyx.

Results: SIV administration significantly increased survival rates in HS rats ($P < 0.01$) in a dose-dependent manner (Fig. 1). Lung tissue pathology, dry/wet weight ratios, vascular permeability, and apoptosis were markedly reduced in SIV-treated groups. Furthermore, levels of inflammatory factors (IL-1β, IL-6, TNF-α), neutrophil counts, and NE activity in BALF and serum were lowered (Fig. 2). Notably, expression of HS, syndecan-1, and glypican-1 in lung tissues increased significantly, while TLR4 and HPSE expressions decreased. Serum levels of HS, HA, CS, and SDC1 were significantly reduced(Fig. 3).Immunohistochemical and electron microscopy results demonstrated enhanced expression of syndecan-1 in pulmonary endothelium along with the progressive integrity of the endothelial glycocalyx with increased dosages of SIV (Fig. 4).

Conclusions: SIV alleviates HS-induced acute lung injury by inhibiting NE activity in lung tissue, reducing neutrophil release and inflammatory factor levels, and protecting the integrity of the endothelial glycocalyx, thereby mitigating vascular endothelial damage.

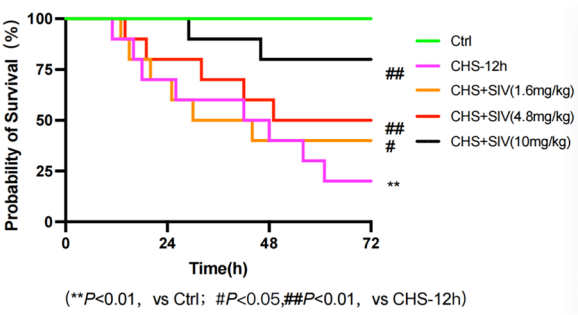


Fig. 1 (abstract 001195) Effect of SIV on survival rate of CHS rats

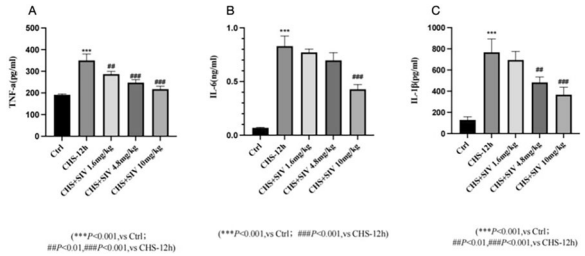


Fig. 2 (abstract 001195) ELISA kit was used to detect the expression of inflammatory factors **A** TNF-α, **B** IL-6 and **C** IL-1β in BALF of CHS rats after SIV intervention

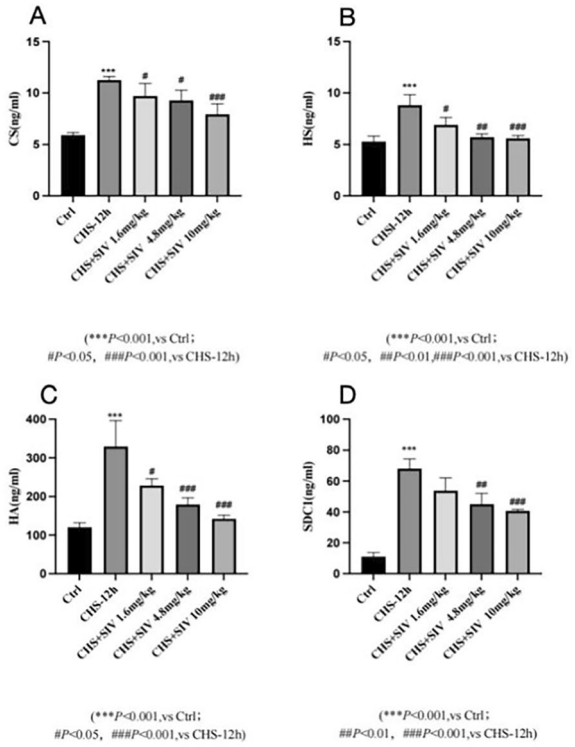


Fig. 3 (abstract 001195) The effects of SIV on the expression levels of **A** HS, **B** HA, **C** CS and **D** syndecan-1 in serum of CHS rats were detected by ELISA

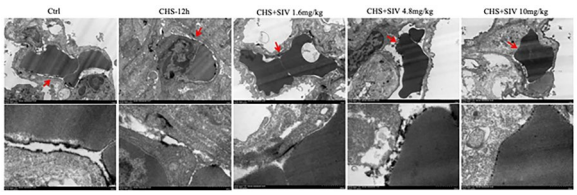


Fig. 4 (abstract 001195) The changes of calyx in lung tissue were observed by transmission electron microscope(× 10.0 k, × 50.0 k). (Red arrow marks sugar calyx)
Topic: Systemic diseases

001196

High-flow tracheal oxygenation: an alternative to T-tube oxygen therapy in tracheostomized patients during weaning from mechanical ventilation

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Intensive Care Medicine Experimental 2025,* 13(1)*:001196

Introduction: High-flow nasal cannula oxygen has been proposed to facilitate weaning from mechanical ventilation [1]. High-flow oxygen can be also delivered through tracheostomy during the weaning process although its physiologic effects and clinical benefits have not been clearly established [2].
Objectives: To describe the characteristics of patients admitted to the intensive care unit (ICU) who required tracheostomy in the process of weaning from mechanical ventilation (MV) and to compare the T-tube disconnection strategy with high-flow tracheal oxygenation therapy (HFOT).
Methods: A retrospective observational study was conducted. Adults ≥ 18 years old admitted to a mixed ICU of a university hospital during the year 2022 for more than 24 h who required tracheostomy during the MV weaning process were included. Demographic variables (sex, age), past medical history, APACHE II, reason for admission, time of tracheostomy, time of start of disconnection and method used (T-tube oxygen vs. HFOT), time until definitive disconnection, ventilatory mode during reconnections and mortality were collected. A descriptive study was performed with percentages and medians and Mann–Whitney *U* test for the comparison of variables.
Results: In 2022, 208 patients admitted to the ICU required MV for more than 24 h, of whom 58 (28%) were tracheostomized. Among these subjects, 74% were men with an interquartile median age of 66 years (54–73) and APACHE II of 15 ± 6.7. One or more cardiovascular risk factors (hypertension, diabetes, dyslipemia, obesity) were present in 57% of the subjects, while 24% had immunosuppression/malignancy, 14% chronic renal failure, 17% chronic liver disease/enolism, 7% COPD and 7% previous coronary artery disease. The reason for admission was septic shock in 31%, stroke in 14%, SARS-COV-2 pneumonia in 12%, TBI in 9%. The average length of stay in the ICU was 37 days (28–57). Six patients died (10% mortality), 4 of them before the start of weaning from MV. Among the included subjects, 7 (13.4%) underwent direct disconnection and the rest followed a progressive longer periods of unassisted breathing strategy. The average time until tracheostomy was performed was 14 days (9–18) since admission and it took an average of 5 more days (3–13) to initiate the unassisted breathing periods. T-tube oxygen therapy was the disconnection strategy chosen for 46 patients (88%), whereas 6 patients (12%) were disconnected from the beginning with HFOT. Pressure support was the most used modality during reconnections (85%). The average time until definitive disconnection was 4 days in the T -tube group (2–6) and 1 day in the HFOT group (0–2, $p = 0.015$). Among the patients who initiated T-tube therapy, 22% switched to HFOT, with an average disconnection time for these patients of 8 days (4–15). Including this group, the mean time to definitive disconnection was 3,75 days (2–6) in the T group and 4,25 days in HFOT group (2–13, $p = 0.028$).
Conclusions: High-flow oxygenation therapy in tracheostomized patients during mechanical ventilation weaning process is a reasonable alternative to T-tube oxygenation therapy, although more studies are needed to define the target subject who can benefit most from this therapy.

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Topic: Acute respiratory failure and mechanical ventilation

001197

Effect of sepsis and organ dysfunction severity on inflammatory citoquine kinetics

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001197

Introduction: The pathophysiology of sepsis involves a complex interplay between the infectious agent and the host immune system. Early detection and treatment of sepsis are critical to improve patient outcomes, but biomarkers have not yet demonstrated clinical utility for early diagnosis of sepsis. A better understanding of the dynamics and kinetics of the inflammatory response and its interaction with the diagnosis of sepsis and the severity of organ dysfunction would help to develop better diagnostic tools and improve outcome prediction.
Objectives: We aimed to evaluate the effect of the diagnosis of sepsis on the kinetics of inflammatory biomarkers and the effect of the severity of organ dysfunction on the values of biomarkers measured at three times during the first 24 h.
Methods: We conducted a prospective observational cohort study of patients with suspected infections at high risk of developing sepsis (measured by a NEWS scale $\geq$ 3). Sepsis was defined according to the Sepsis 3 definition by two blinded investigators. Samples were collected between 0 h, 4 h and 24 h after admission to the emergency department. SOFA score was calculated at the same time. Biomarker trajectories (IL-10, IL-6, IL-8, IL1-RA, MCP.1 and TNF.RI) over time were analysed using general mixed model analysis, where a linear regression model was fitted to logarithmically transformed data, with group (sepsis or no sepsis), time and their interaction as fixed effects, and patient-specific intercept and slope of time as random effects. For severity of organ dysfunction a mixed model analysis was fitted to logarithmically transformed data, with SOFA score and time as fixed effects and patient-specific intercept and slope of time as random effects.
Results: We included 176 patients, of whom 139 (78%) developed sepsis within the first 24 h. The median SOFA score was 1 (IQR 1–1) for those without sepsis and 3 (IQR 2–5) for those with sepsis. For all biomarkers except IL-6, the SOFA score has a significant positive effect on the mixed models. Figure 1A shows the fitted prediction of biomarker levels according to SOFA score at the three time points. IL-6 was the only biomarker where mixed models showed a significant interaction between diagnosis of sepsis and time, observing a significant difference in slope over time (Fig. 1b).
Conclusions: Higher SOFA score increased levels of biomarkers differently at three time points, and the diagnosis of sepsis only altered the dynamics of IL-6 during the first 24 h.

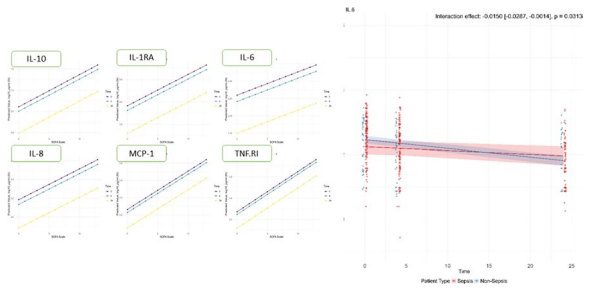


Fig. 1 (abstract 001197) On the left, the prediction of biomarkers fitted to the SOFA score at three time points. On the right, the evolution of IL-6 levels according to the diagnosis of sepsis. A significant interaction between diagnosis and time was observed

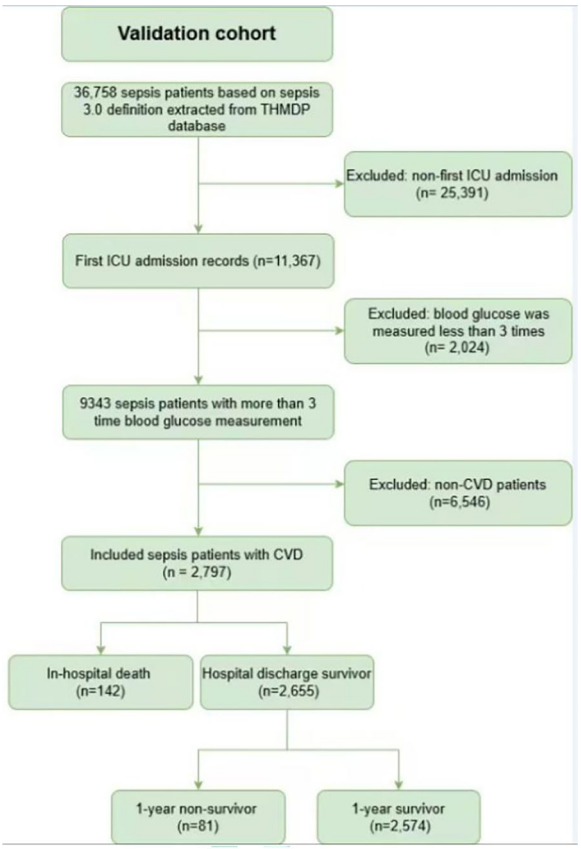
Topic: Sepsis

001198

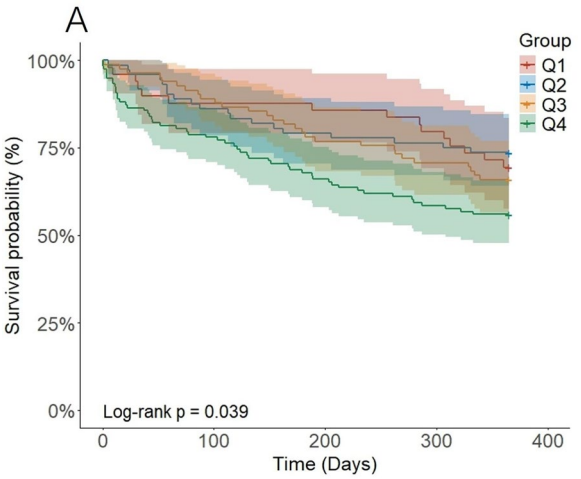
Association of glycemic variability with mortality among septic patients with cardiovascular disease: a multicenter cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001198

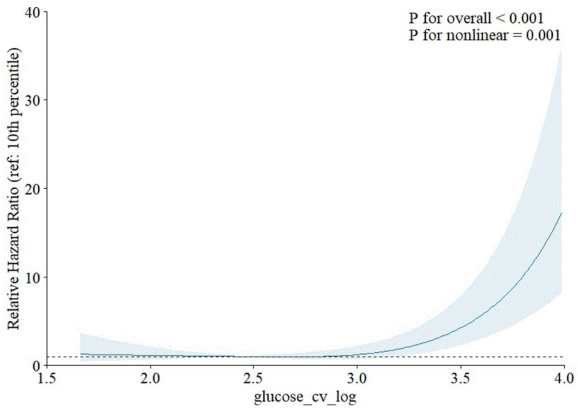
Introduction: Septic patients with cardiovascular disease (CVD) face elevated mortality risks, potentially exacerbated by glycemic variability (GV). This study aimed to investigate the association between GV and in-hospital and 1-year mortality in septic patients with CVD.
Methods: We conducted a retrospective analysis using data from the Tianjin Health and Medical Database Platform (THMDP) as the validation cohort. Patients with sepsis and CVD who had at least three blood glucose measurements during their ICU stay were included. Glycemic variability was defined as the coefficient of variation (CV) of blood glucose levels, categorized into quartiles (Q1–Q4). The primary outcome was in-hospital mortality, with 1-year mortality as a secondary outcome. Cox proportional hazards models were used to assess the association between GV and mortality.
Results: In the cohort, higher GV was also associated with in-hospital mortality (adjusted HR 1.56, 95% CI 1.25–1.93, $P = 0.001$) but not 1-year mortality (adjusted HR 0.17, 95% CI 0.85–3.24, $P = 0.134$). A meta-analysis of both cohorts confirmed a significant association with in-hospital mortality (adjusted HR for Q4 vs. Q1: 1.65, 95% CI 1.34–2.03, $P = 0.001$), while the association with 1-year mortality was weaker (adjusted HR 1.24, 95% CI 0.89–1.73, $P = 0.204$). RCS analyses in the discovery cohort revealed a nonlinear relationship between GV and in-hospital mortality (P for nonlinearity < 0.001). KM survival curves showed reduced survival probability in the highest GV group for the whole discovery cohort.
Conclusions: Higher GV is independently associated with increased in-hospital and 1-year mortality in septic patients with CVD. These findings suggest that stabilizing GV may be a critical therapeutic target in this population. Monitoring and managing GV may improve outcomes in this patient population.



Flowchart of patient selection for the THMDP cohort.



Kaplan–Meier survival curves for the cohort.



Restricted cubic spline (RCS) curves for the cohort.

Patient baseline demographic and clinical characteristics of the cohort

Characteristic	Overall N = 2797	Q1 (<2.688) N = 706	Q2 (2.688–2.944) N = 696	Q3 (2.944–3.208) N = 702	Q4 (>3.208) N = 693	p-value
Age (Mean ± SD)	64.59 ± 19	65.43 ± 19.26	64.74 ± 18.57	64.84 ± 18.81	64.76 ± 19.36	0.889
Gender						0.12
Female	1016 (36%)	458 (65%)	463 (67%)	439 (63%)	421 (61%)	
Male	1781 (64%)	248 (35%)	233 (33%)	263 (37%)	272 (39%)	
RBC	2.97 ± 1.04	2.97 ± 1.06	3 ± 1	2.96 ± 1.05	2.95 ± 1.05	0.023
WBC (Mean ± SD)	11.91 ± 14.69	12.2 ± 15.47	11.61 ± 13.52	12.1 ± 15.45	11.73 ± 14.2	0.016
PLT (Mean ± SD)	153.01 ± 127.38	146.63 ± 122.01	164.61 ± 134.94	150.52 ± 127.64	149.37 ± 122.35	<0.001
HB (Mean ± SD)	79.59 ± 39.06	36.84 ± 34.29	78.18 ± 36.15	75.77 ± 36.55	84.22 ± 39.63	<0.001
K (Mean ± SD)	3.94 ± 0.69	3.94 ± 0.92	3.92 ± 0.64	3.96 ± 0.62	3.93 ± 0.66	<0.001
NaMean ± SD)	138.3 ± 7.01	136.3 ± 6.97	138.09 ± 7.28	138.44 ± 6.96	137.9 ± 6.79	<0.001
CL (Mean ± SD)	104.12 ± 19.01	104.26 ± 18.88	104.19 ± 11.24	104.17 ± 12.12	103.89 ± 30.48	0.391
TC(Mean ± SD)	3.9 ± 1.62	3.39 ± 1.68	3.37 ± 1.61	3.39 ± 1.7	3.4 ± 1.43	0.975
TG (Mean ± SD)	1.76 ± 2.15	1.72 ± 2.15	1.93 ± 1.72	1.68 ± 1.24	1.74 ± 2.61	0.005
HDL (Mean ± SD)	0.87 ± 0.39	0.87 ± 0.37	0.86 ± 0.42	0.88 ± 0.39	0.87 ± 0.38	0.760
LDL (Mean ± SD)	2.23 ± 1.1	2.19 ± 1.11	2.24 ± 1.09	2.34 ± 1.17	2.15 ± 1.02	<0.001
Lac	2.44 ± 1.92	2.68 ± 1.86	2.47 ± 1.98	2.36 ± 1.87	2.4 ± 1.97	<0.001
Myocardial infarct						0.742
No	2,600 (93%)	657 (93%)	643 (92%)	650 (93%)	650 (94%)	
Yes	197 (7%)	49 (7%)	53 (8%)	52 (7%)	43 (6%)	
Coronary artery disease						0.792
No	1,922 (69%)	489 (70%)	470 (68%)	479 (68%)	484 (70%)	
Yes	875 (31%)	217 (30%)	226 (32%)	223 (32%)	209 (30%)	
Hypertension						0.330
No	2,693 (96%)	675 (96%)	673 (97%)	682 (97%)	663 (96%)	
Yes	104 (4%)	31 (4%)	23 (3%)	20 (3%)	30 (4%)	
Diabetes						<0.001
No	2220 (79.3%)	554 (78.5%)	561 (80.6%)	558 (79.4%)	547 (78.9%)	
Yes	557 (20.7%)	152 (21.5%)	135(19.4%)	144 (20.6%)	146 (21.1%)	

[1]n (%); Median (Q1, Q3)
[2]Kruskal-Wallis rank sum test; Pearson's Chi-squared test

Baseline characteristics of the validation cohort (THMDP) stratified by GV quartiles.

Topic: Sepsis

001199

Bacterial infections after liver transplantation: prevalence, impact, and risk factors

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Intensive Care Medicine Experimental 2025,* 13(1)*:001199

Introduction: Infections after liver transplantation (LT) account for the main cause of mortality and morbidity. This study analyzes the incidence, burden, and immediate risk factors associated with infections within the first year after LT.
Methods: Retrospective, single-center cohort study including adult patients who underwent LT between January 2021 and October 2023. Patients were classified into two groups based on whether they presented bacterial infections during the first year after LT. Demographic and evolutionary variables were collected. The results are presented as median (IQR) or %, with differences analyzed using the *U* Mann–Whitney test or chi-square test, respectively. Multivariate logistic regression analysis was performed to identify independent predictors of infections

within the first year after LT. Kaplan–Meier curve was plotted to explore the influence of bacterial infection during the first year on graft survival at 1 year. A $p < 0.05$ was considered statistically significant.

Results: We included 82 LT procedures. Risk factors for infections are shown in Table 1 and 2. Bacterial infections occurred in 25 patients (30%) with a total of 53 episodes of infection (respiratory infections, 30.2%; urinary tract infections, 20.75%; bacteremia, 9.43% and cholangitis 13.2%, among others). MDRB were isolated in 11 infections (20.7%). *Klebsiella pneumoniae* (11.3%), *Escherichia coli* (5.6%) and *Enterococcus* (5.6%) were the most frequently isolated microorganisms. In multivariate analysis, there were no factors identified as independent predictors of bacterial infections during the first year (Table 1). There was a significant decrease in graft survival at 1 year (defined as absence of graft failure requiring re-transplantation or patient death) in patients with bacterial infections (Fig. 1).

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Table 1 (abstract 001199) Risk factors and multivariate analysis for the development of bacterial infections 1-year after liver transplantation

	Total ($n = 82$)	No infection ($n = 57$)	Infection ($n = 25$)	*p* value	Multivariate OR (95% CI)	*p* value
CIT (IQR)-min	338 (280–452)	340 (300–380)	310 (240–380)	0,51		
WIT (IQR)-min	45 (35–55)	48 (31–65)	45 (32–68)	0,39		
Colloids (IQR)-ml	1000 (500–1500)	1000 (300–1700)	500 (250–1250)	0,94		
Crystaloids (IQR)-ml	1500 (1000–2000)	1500 (500–2000)	1500 (1000–2000)	0,91		
PRBC, (IQR)-ml	750 (250–1750)	750 (250–1500)	1000 (250–1750)	0,88		
Platelets, (IQR)-ml	250 (0–500)	250 (0–500)	250 (0–500)	0,63		
FFP, (IQR)-ml	1000 (500–2000)	1000 (500–2000)	1000 (500–2000)	0,57		
AKI, n(%)	43 (52,4)	29 (51)	14 (56)	0,67		
EAD, n(%)	19 (24,1)	13 (23)	3 (12)	0,89		
SOFA score at admission	9 (8–11)	10 (7–13)	8 (5–11)	0,28		
APACHE II	13 (7–19)	12 (8–16)	14 (7–21)	0,37		
ICU stay (IQR)-d	5 (3–8)	4 (1–7)	7 (3–11)	0,003	1,001 (0,995–1,006)	0,758
Hospital stay (IQR)-d	16 (10.5–28)	12 (4–20)	29 (12–46)	< 0,001	0,999 (0,994–1,004)	0,673

Conclusions: Bacterial infections are highly prevalent after LT and have a significant impact on prognosis. *Klebsiella pneumoniae* is the most frequently isolated microorganism.

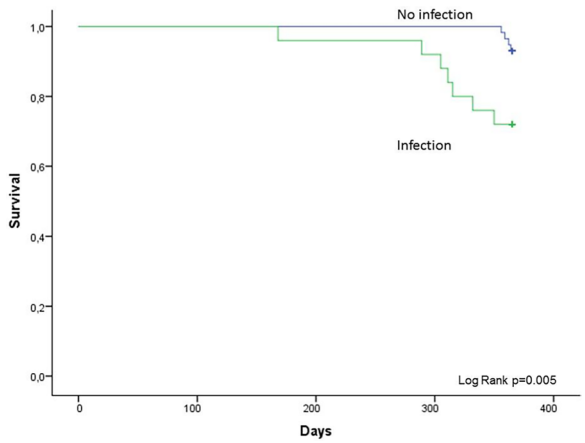


Fig 1 (abstract 001199) Graft survival at 1 year (defined as absence of graft failure requiring re-transplantation or patient death) stratified analysis according to the development of bacterial infections Survival analysis. Log-rank test

Topic: Infections and prevention

001200

Repetitive capillary refill time (CRT) assessment to evaluate local ischemic preconditioning in the finger skin of healthy volunteers

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Introduction: Capillary refill time (CRT) is a noninvasive vaso-occlusive test (VOT) used to assess skin perfusion and microcirculatory function (1,2). A VOT induces transient ischemia, resembling the mechanism of ischemic preconditioning (3). Prolonged CRT indicates impaired capillary perfusion and has been associated with increased organ dysfunction and mortality among intensive care unit (ICU) patients (4–7). Moreover, normalization of CRT following resuscitation in patients with septic shock has been linked to better outcomes (8). Consequently, frequent CRT assessments are recommended in the management of septic shock (9). Given that CRT measurement entails a brief, localized vascular occlusion, we hypothesized that repeated assessments might trigger an ischemic preconditioning response.

Objectives: This study aimed to determine whether consecutive CRT measurements induce a preconditioning effect.

Methods: This interventional study was conducted in the Department of Intensive Care at Erasme University Hospital (Brussels, Belgium). Thirty healthy volunteers were evaluated in a quiet, temperature-controlled room after resting for 15 min before each experimental session. On day 1, CRT was measured twice on the index and middle fingers of the dominant hand and the index finger of the non-dominant hand at 15-min intervals. On day 2, CRT was assessed twice on the same fingers at 30-min intervals. CRT was measured by applying firm pressure to the ventral surface of the distal phalanx using a glass microscope slide until blanching occurred, maintained for 10 s, and then released. The time taken for the skin to return to baseline color was recorded with a chronometer. Heart rate (HR) and respiratory rate (RR) were also monitored noninvasively.
Results: The median age of participants was 34 (IQR: 30–46), and 13 of 33 (43.3%) were males (Table 1). No statistically significant differences in CRT were observed following repeated measurements at either 15- or 30-min intervals (Table 2). Baseline CRT values did not differ significantly between fingers of the dominant and nondominant hands on either study day (Table 2).
Conclusions: In healthy volunteers, repeated CRT assessments at intervals commonly used in clinical practice do not appear to induce a detectable preconditioning effect in the fingers.

Variable	Experiment Day
Subjects (n)	30
Men (n, %)	13 (43.3)
Age (years)	34 (30-46)
Body mass index (Kg/m²)	23.8±3.0

Main characteristics of the cohort of healthy volunteers.

	Day 1= 15 min			Day 2= 30 min		
	Finger 1	Finger 2	Finger 3	Finger 1	Finger 2	Finger 3
Before	0.60 (0.55 - 0.65)	0.59 (0.54 – 0.65)	0.59 (0.54 – 0.64)	0.62 (0.57 – 0.67)	0.62 (0.57 – 0.68)	0.63 (0.57 – 0.68)
After	0.60 (0.55 – 0.65)	0.61 (0.56 – 0.66)	0.59 (0.54 – 0.64)	0.62 (0.57 – 0.67)	0.64 (0.58 – 0.69)	0.63 (0.57 – 0.68)

Data are reported as mean and 95% confidence interval.
Finger 1= index of the dominant hand; Finger 2= middle of the dominant hand; Finger 3= index of the non-dominant hand.
Significant at 5%: * vs Finger 1, [&] vs Finger 2.

Changes in repeated CRT measurements and comparisons of baseline CRT between the fingers of the dominant and nondominant hands for each study-day experiment.

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Topic: Sepsis

001201

Prognostic significance of POCUS in ICU patients with community-acquired pneumonia

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Intensive Care Medicine Experimental 2025,* 13(1)*:001201

Introduction: Early identification of high-risk patients with sepsis due to community-acquired pneumonia (CAP) is vital for enhancing outcomes through timely and aggressive treatment strategies that can reduce length of ICU stay and improve survival (1). Point-of-Care Ultrasound (POCUS) has emerged as an essential tool for assessing lung pathology and predicting mortality in critically ill patients (2).
Objectives: To evaluate the prognostic significance of POCUS in predicting mortality among patients with sepsis due to CAP.
Methods: A retrospective observational study was conducted at a tertiary care center in India, reviewing the medical records of patients with sepsis due to CAP admitted to the ICU from January 2021 to December 2023. Patients meeting Sepsis-3 criteria aged 18 years or older were included, while those with incomplete records were excluded. Demographic and clinical data were collected, along with POCUS findings, which included the Cumulative Lung Ultrasound Score (CLUS), lung consolidations, pleural effusions, and cardiac function parameters. Statistical analyses were performed to identify predictors of mortality.
Results: A total of 345 patients were assessed for eligibility, with 314 included in the analysis. The overall mortality rate was 36%. Significant differences were observed between survivors and nonsurvivors in terms of respiratory rate and SOFA score, with higher values in nonsurvivors ($p = 0.001$). Multivariate logistic regression identified respiratory rate, SOFA score, CLUS, and male sex as independent predictors of mortality ($p < 0.05$ for all).
Conclusions: POCUS, particularly the CLUS, is a valuable prognostic tool for predicting mortality in patients with sepsis due to CAP. Key independent predictors include male sex, respiratory rate, SOFA score, and CLUS. Incorporating POCUS findings into routine clinical

assessments could enhance risk stratification and guide treatment strategies for high-risk CAP patients.

Multivariate logistic regression

Variable	Odds Ratio	95% Confidence Intervals	P-Value
Male Sex	1.83	1.12 - 2.99	**0.016***
Respiratory rate	1.09	1.04 - 1.14	**0.001***
SOFA score	1.08	1.02-1.15	**0.009***
CLUS	1.03	1.01-1.06	**0.021***

*P<0.05

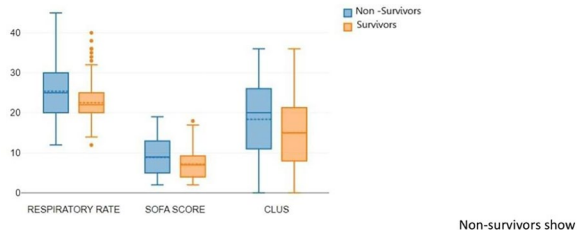
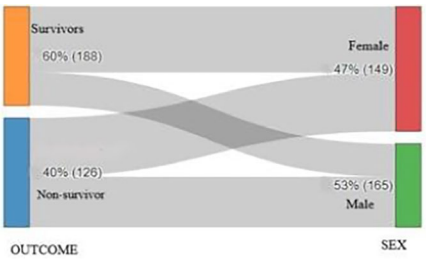


Image 1 (abstract 001201) Box-and-whisker plot compares respiratory rate, SOFA score, and CLUS between survivors and non-survivors



Higher number of males in the non-survivor group

Image 2 (abstract 001201) Sankey diagram shows the distribution of outcomes by sex
Tables and Figures.

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3. NA

Topic: Sepsis

001202

Association between pan-immune inflammation value (PIV), system inflammation response Index (SIRI) and 28-day mortality in sepsis patients: evidence from MIMIC-IV database

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Intensive Care Medicine Experimental 2025,* 13(1)*:001202

Introduction: The system inflammation response index (SIRI) and pan-immune inflammation value (PIV) have been applied as a new predictor in pneumonia, cardiovascular diseases, and cancers. However, the role of them in predicting all-cause mortality in patients with sepsis has not been evaluated. Therefore, this research aimed to probe the connection of SIRI, and PIV with clinical prognosis in sepsis patients based on the Medical Information Mart for Intensive Care IV (MIMIC-IV) database.
Methods: The data of patients with sepsis admitted to an intensive care unit (ICU) were extracted from the MIMIC-IV database. Different models were created to explore the relationship between SIRI and PIV and 28-day mortality of sepsis patients. The two-segment linear regression model and the fitting analysis of the smooth curve were used to identify the threshold effect of SIRI and PIV on their clinical prognosis.
Results: This research calculated the SIRI of 15277 sepsis patients and PIV of 15349 sepsis patients. Among the sepsis patients whose SIRI were recorded, the 28-day mortality was 14.50% (2219/15277); among those PIV recorded the 28-day mortality was 14.60% (2250/15349). After adjustment of covariates, we observed a significant nonlinear association between SIRI/PIV and 28-day mortality (nonlinear $P < 0.001$).
Conclusions: The index of SIRI/PIV was associated with the 28-day mortality of sepsis patients. the measurement of SIRI/PIV could be employed to predict the clinical prognosis of sepsis.

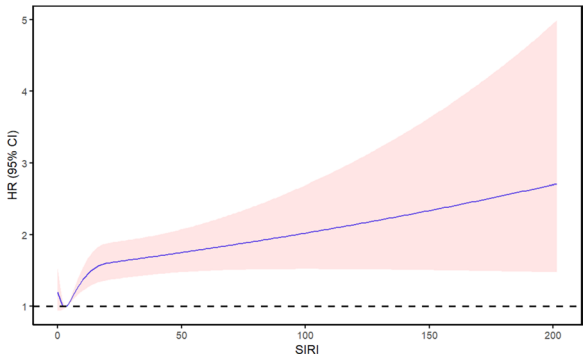


Fig 1 (abstract 001202) Restricted cubic spline for the association between SIRI and mortality

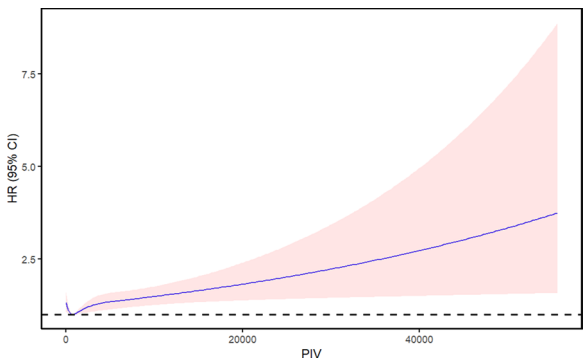


Fig 2 (abstract 001202) Restricted cubic spline for the association between PIV and mortality

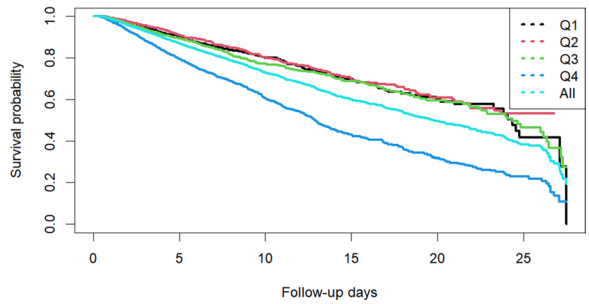


Fig 3 (abstract 001202) Kaplan–Meier survival curve for mortality according to SIRI

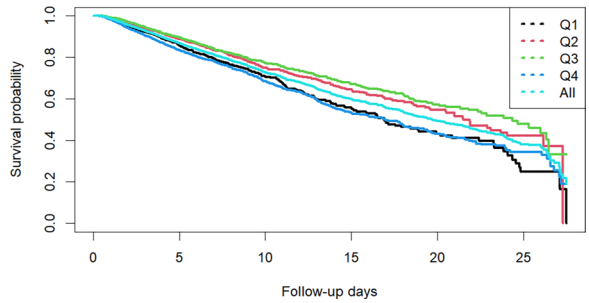


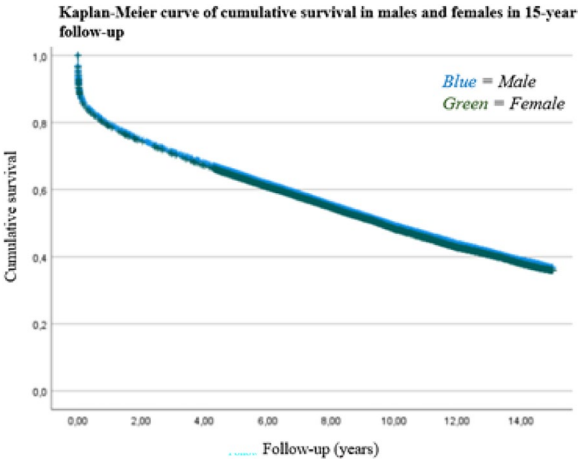
Fig 4 (abstract 001202) Kaplan–Meier survival curve for mortality according to PIV
Topic: Sepsis

001203

Impact of sex on long-term survival rates after ICU admission

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Intensive Care Medicine Experimental 2025,* 13(1)*:001203

Introduction: Females are often underrepresented in intensive care unit (ICU) admissions (1). However, the impact of sex on ICU-related outcomes remains unclear, with often contradictory results in the literature. Most studies focus on specific indications for ICU admission and relatively short-term mortality (2,3). Although females have a higher life expectancy than males in the general population (4), long-term survival differences after ICU admission remain underexplored.
Objectives: To identify the impact of sex on long-term survival in a large general cohort of ICU patients.
Methods: In this retrospective analysis, we included all adult patients admitted to the ICU of the University Medical Center Groningen (UMCG) between 2001 and 2020, irrespective of ICU admission indication. Long-term survival data were obtained from the hospital database and the national personal records database. Kaplan–Meier analysis was performed to assess the long-term survival, and a log-rank test was used to compare the two cohorts.
Results: A total of 54,919 patients (38% female) were admitted to the ICU during the study period. The mean age was comparable in the groups (60.0 vs 59.7 years). The median survival time (95% CI) after ICU admission was 9.8 years (9.6–10.0) for males and 9.5 years (9.3–9.7) for females. The Kaplan–Meier curves showed a linear, persistently decreasing trend for both sexes. The log-rank test showed a significant difference in long-term survival between males and females ($P = 0.021$).
Conclusions: Although fewer females were admitted to the ICU, their long-term survival after ICU admission was slightly worse. This suggests that the survival advantage females have in the general population disappears once they are admitted to the ICU. This finding highlights potential sex-related differences in both ICU admission patterns and long-term outcomes, emphasizing the need for further research into these differences.



Kaplan–Meier curve of cumulative survival in males and females in 15-year follow-up.

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Topic: Health services research and outcome

001204

Limitations of the PaO_2/FiO_2 ratio during V–V ECMO: the role of FiO_2,pulmonary shunt, and the blood flow-to-cardiac output ratio

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Intensive Care Medicine Experimental 2025,* 13(1)*:001204

Introduction: The PaO_2/FiO_2 ratio is widely used for diagnosing, monitoring and severity assessment of acute respiratory distress syndrome (ARDS). However, the Berlin definition of ARDS does not require standardization of the FiO_2 level when assessing the PaO_2/FiO_2 ratio, which may affect the reliability and consistency of hypoxemia severity classification—a key determinants of ARDS severity. In patients supported with venovenous extracorporeal membrane oxygenation (V–V ECMO),

the assessment of the PaO_2/FiO_2 ratio is further complicated by the complex interaction between mechanical ventilation and extracorporeal oxygenation.

Objectives: This study aims to compare PaO_2/FiO_2 ratio measured at clinical FiO_2 versus at FiO_2 of 1.0 in patients receiving V–V ECMO for ARDS. In addition, we evaluated the impact of pulmonary shunt and the ratio of extracorporeal blood flow to cardiac output (BF/CO) on the observed differences between the two measurements.

Methods: We conducted a retrospective analysis of prospectively collected data from ARDS patients supported with V–V ECMO in the ICU of IRCCS San Gerardo Hospital (Monza, Italy) between 2003 and 2024. According to the institutional practice, during mechanical ventilation both the ventilator and extracorporeal oxygenator are maintained at the same FiO_2 level throughout ECMO support. To standardize oxygenation assessment and minimize the impact of ventilation–perfusion mismatch, FiO_2 is increased to 1.0 every morning prior to arterial and mixed venous blood sampling for intrapulmonary shunt calculation. For this study, paired PaO_2/FiO_2 measurements at clinical FiO_2 and at FiO_2 1.0 were compared using the paired Student's t test, with stratification by clinical FiO_2 level. Multivariable linear regression was then performed to identify independent predictors of the variation in PaO_2/FiO_2 values at clinical FiO_2 and FiO_2 1.0, including clinical FiO_2, pulmonary shunt, and BF/CO ratio. Inizio moduloFine modulo.

Results: A total of 242 patients were included, contributing 2282 paired PaO_2/FiO_2 measurements. The median age was 52 years [IQR 43–59], 84 patients (34.7%) were females, and 194 (80%) were referred from other centres. Pneumonia was the predominant cause of ARDS, accounting for (88%), followed by autoimmune disease (6%), trauma (3%), septic shock (1%), and other causes (2%). The median clinical FiO_2 was 60% [IQR 50–70]. The mean PaO_2/FiO_2 ratio was significantly higher at FiO_2 1.0 (258 ± 120) as compared to clinical FiO_2 (137 ± 49), ($p < 0.001$). As shown in Fig. 1, this difference remained statistically significant across all strata of clinical FiO_2 ($p < 0.001$), with a clear trend toward a greater discrepancy at lower FiO_2 levels.

Multivariable analysis confirmed that lower clinical FiO_2 was the strongest independent predictor of greater discrepancies between PaO_2/FiO_2 measured at clinical FiO_2 and at FiO_2 1.0. Other predictors included pulmonary shunt and BF/CO ratio ($p < 0.001$). The increase in shunt reduced the difference between PaO_2/FiO_2 measured at clinical FiO_2 and at FiO_2 1.0, while the increase in BF/CO ratio enlarged this difference.

Conclusions: In patients with ARDS receiving V–V ECMO, the PaO_2/FiO_2 ratio is a highly variable and potentially misleading index of hypoxemia severity. As expected this value is significantly influenced by FiO_2 settings, pulmonary shunt, and the ratio of extracorporeal blood flow to cardiac output, underscoring the need for cautious interpretation in this setting.

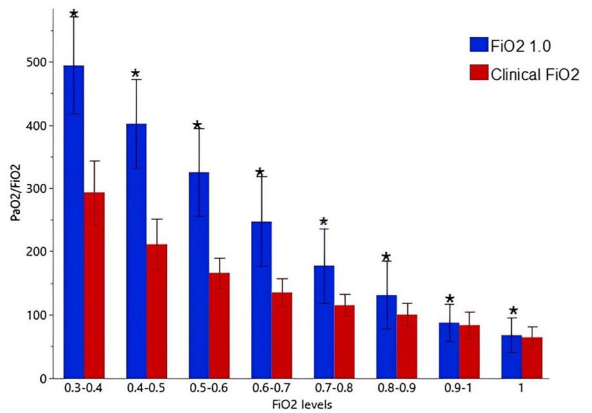


Fig. 1 (abstract 001204) PaO_2/FiO_2 ratio at clinical FiO_2 and FiO_2 1.0, stratified by clinical FiO_2 levels. *$p < 0.001$

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Topic: Acute respiratory failure and mechanical ventilation

001205

CRRT weaning in French ICUs: discrepancy between perceived and actual practices: insights from the PROSECO survey and the multicenter DISCORT study

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Introduction: Acute kidney injury (AKI) is a common and severe complication in critically ill patients, with up to 10% requiring renal replacement therapy (RRT) during their ICU stay. Continuous renal replacement therapy (CRRT) is the preferred modality in hemodynamically unstable patients. Although the recent guidelines and trials have clarified when to initiate CRRT, optimal weaning strategies remain poorly defined. CRRT discontinuation is highly variable in daily practice and primarily based on clinical judgment (1).

Objectives: To better characterize CRRT weaning practices in French ICUs, we combined two complementary studies: PROSECO, a national survey on perceived practices, and DISCORT, a multicenter cohort assessing real-life weaning trajectories. The main objective was to compare stated weaning criteria with actual patient conditions. The secondary objective was identifying gaps between perceived thresholds and clinical scenarios at CRRT discontinuation.

Methods: The PROSECO study was conducted between August and October 2023 via a 45-item electronic questionnaire distributed to 230 ICUs. It explored, among other topics, physician experience, CRRT weaning criteria, fluid balance management, urine output thresholds, and the use of urinary biomarkers. A total of 243 intensivists from 87 ICUs responded. The DISCORT study is a multicenter retrospective cohort including the last 2–5 consecutive adult patients per center admitted for severe septic AKI (KDIGO stage 3, SEPSIS-3 criteria), initiated on CRRT, and subsequently weaned. CRRT weaning was defined as the first discontinuation with the intent to stop, whether or not RRT was resumed later. D0 was defined as the CRRT weaning day. Data were collected from 21 ICUs across France, including detailed clinical, hemodynamic, renal, and fluid parameters over the five days preceding CRRT discontinuation.

Results: In PROSECO, 93% of respondents cited the return of spontaneous diuresis as the main trigger for CRRT discontinuation, with a reported threshold of 612 ± 328 mL/day. Seventy-four percent reported reassessing CRRT continuation daily. Sixty percent used urinary biomarkers, mainly urinary urea, creatinine, or UV/P clearance, and 69% transitioned to intermittent RRT before complete withdrawal. Only 3% reported a formal weaning protocol, while 60% believed delayed CRRT discontinuation could impair renal recovery. The study also revealed variability in the definition of successful weaning: 34% considered it effective after 7 days without CRRT resumption, while others used ICU or hospital discharge as endpoints. Notably, although 81% stated that cost did not influence their decision, nearly

half acknowledged continuing CRRT until filter lifespan completion, even when clinical criteria for weaning were met. In DISCORT, the 111 patients had a mean age of 62 ± 12 years, a mean SAPS II score of 63 ± 22, and a mean SOFA score of 11 ± 4. The median duration from CRRT initiation to final discontinuation was 5 [3–8] days. At D0, 50% of patients remained on vasopressors, with a median norepinephrine dose of 0.15 [0.06–0.30] µg/kg/min. Median urine output on the day before CRRT discontinuation (D-1) was 122 [17–562] mL and 121 [30–630] mL two days before (D-2), well below the self-reported thresholds in PROSECO (Figure). A positive fluid balance was present in 70% of patients on the day of CRRT discontinuation (median: + 4888 [−568 to + 8624] mL). Diuretics were frequently administered on the day of weaning (21%) (D0), and ultrafiltration practices varied considerably across days and centers.

Conclusions: This combined analysis reveals a marked discrepancy between perceived and actual CRRT weaning practices in French ICUs. Although most physicians report relying on objective criteria (urine output, hemodynamic stability, fluid balance), real-life data show frequent discontinuation despite persistent oliguria, ongoing vasopressors, and positive fluid balance. The near-total absence of standardized protocols in PROSECO mirrors the heterogeneity of clinical trajectories in DISCORT. These findings highlight the gap between intention and practice, and the challenge of applying theoretical thresholds in real-world settings. Developing and validating reproducible weaning protocols, including diuresis, vasopressor use, fluid status, and urinary biomarkers, should be a research priority to improve safety and outcomes in septic AKI.

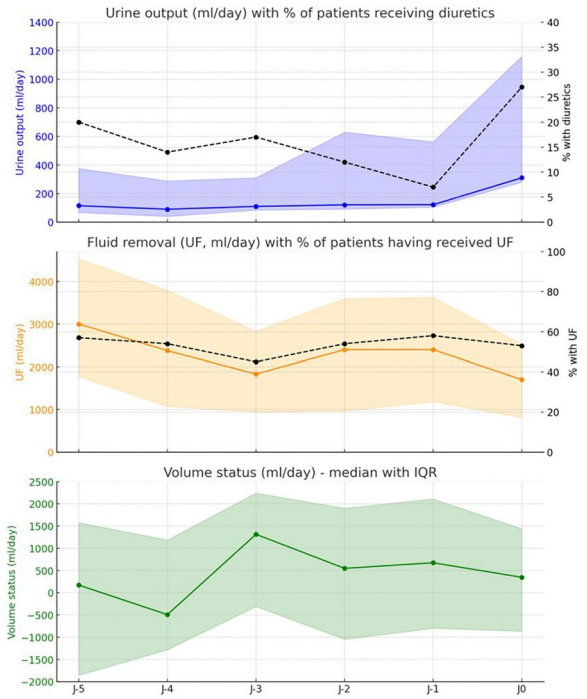


Fig. (abstract 001205) Evolution of urine output, fluid removal via ultrafiltration, and volume status during the five days preceding CRRT discontinuation (D0)
Top panel: Urine output (blue line, left axis) and percentage of patients receiving diuretics (dashed black line, right axis).
Middle panel: Daily fluid removal via ultrafiltration (orange line, left axis) and percentage of patients with ongoing ultrafiltration (dashed black line, right axis).
Bottom panel: Net daily volume balance (green line) expressed as median with interquartile range (IQR).

Topic: Acute kidney injury and hemofiltration

001209

Experience in the management of veno-venous extracorporeal membrane oxygenation at a tertiary hospital in the Canary Islands

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Introduction: Extracorporeal membrane oxygenation therapy has evolved greatly in the recent years, providing supportive treatment for respiratory, cardiac and cardiopulmonary insufficiency, highlighting in our case its use in respiratory insufficiency with veno-venous configuration.

Objectives: To describe the characteristics and evolution of patients with severe respiratory insufficiency and need for assistance with extracorporeal membrane oxygenation (ECMO) veno-venous (VV) admitted to the intensive care unit (ICU).

Methods: A descriptive and retrospective analysis of the patients who were admitted to the Respiratory/Multipurpose Unit of the ICU of the University Hospital of Gran Canaria Dr. Negrín from December 2016 to September 2024, which consists of 16 beds, who needed ECMO-VV support. Demographic data, clinical data and ECMO-related eigenvalues, major complications, as well as ICU survival data were collected at 3 and 6 months. The descriptive statistical analysis was carried out using absolute frequencies for categorical variables, while continuous variables were summarized by means and standard deviation (SD).

Results: 53 patients with ECMO-VV were included. The mean age was 48.4 years (SD 12.1). 39 (73.5%) patients were male, a third (35.8%) had hypertension and only 13.2% and 18.8% diabetes mellitus and dyslipidemia, respectively. 22 patients (41.5%) were obese and 16 (30.1%) were smokers. Only 9 patients had some form of immunosuppression. The main cause of ECMO use was community acquired pneumonia (CAP) (56.5%), followed by SARS-CoV2 infection (26.4%). The average of the indices collected were: APACHE II 18.2 (DS 8.2), CHARLSON 1.8 (DS 2.2) and SOFA 8.9 (DS 3.8). The average hospital stay was 59.5 (SD 36.7), in the ICU 38.2 (SD 20.8) and with ECMO 17.1 (SD 11.9) being 5.8 (SD 8.4) the average of days in the ICU until ECMO placement. Plateau and PEEP ECMO pressure values averaged 31.1 (SD 5.7) and 10.4 (SD 3.4), respectively. Despite this, 43.3% died (23), 95.6% within the hospital. 94.3% were ECMO-femoroyugular configuration. Of the 53 patients included, 9 (16.9%) were transferred from other hospitals in the Canary Islands. During use, almost two-thirds (62.2%) presented complications, the most frequent being overinfection (54.7%) and bleeding (52.8%), followed by thrombocytopenia (50%) and acute renal failure (48.1%). 32 patients (59.3%) were discharged from ICU and 55.6% survived at 3 and 6 months.

Conclusions:CAP was the most frequent cause of ECMO. With an average duration of use of 17 days, noting that overinfection and bleeding were the most frequent complications. Allowing hospital survival around 50%.

Topic: Acute respiratory failure and mechanical ventilation

001214

Impact of inhaled sedation on dead space and respiratory mechanics in mechanically ventilated patients with acute respiratory distress syndrome (ARDS)

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Intensive Care Medicine Experimental 2025,* 13(1)*:001214

Introduction: Inhaled sedation with isoflurane is emerging as a preferred sedative option for patients requiring deep analgosedation in the intensive care unit (ICU). This technique necessitates the use of an

additional device, the SedaConda ACD-S®, which functions as a heat and moisture exchanger with antiviral and antibacterial properties. The device is typically connected between the Y-piece of the ventilator and the endotracheal tube (proximal configuration), resulting in an estimated additional dead space of 50 mL.
Objectives: The aim of this study is to describe the changes in dead space, ventilation, oxygenation, and pulmonary mechanics in ARDS patients undergoing inhaled sedation during the initial hours following device connection.
Methods: This is a prospective, observational, descriptive study including patients over 18 years of age admitted to a multidisciplinary ICU with a diagnosis of ARDS requiring deep analgosedation, and considered candidates for inhaled sedation using the Sedaconda ACD-S® system.
Following the adjustment of protective ventilation parameters and the establishment of optimal PEEP, we recorded epidemiological, clinical, and gasometric variables both before and after the initiation of inhaled sedation.
Results: A total of 31 patients were included, 84% of whom were male ($n = 26$), with a mean age of 66 years (± 14). The initial SOFA score was 8.4 (± 3.4), and the initial APACHE II score was 28.7 (± 7.3). According to ARDS severity classification, 35.5% ($n = 11$) had mild ARDS, 52% ($n = 16$) moderate, and 13% ($n = 4$) severe.

	PREISO	POST ISO (1H)	POST ISO (24H)	*P*
VT/kg	6,57 (± 0.52)	6,79 (± 0.51)		< 0,05
Pplateu	22,70 (± 3,0)	22,26 (± 3,22)		0,17
Driving Pressure (DP)	13,06 (± 6,82)	13,26 (± 6,94)		0,4
Dead Space (VD)	115,36 (± 29,93)	161,61 ± 35,40)		< 0,05
Ventilatory ratio (VR)	1,61 (± 0,369)	1,87 (± 0,45)		
Compliance (C)	41,13 (± 18,62)	48 (± 25,23)		0,12
Resistence (R)	15,06 (± 4,96)	18,52 (± 5,45)		< 0,05
pH	7,37 (± 0,07)	7,35 (± 0,06)		0,5
PC02	44,84 (± 6,54)	47,26 (± 6,38)		< 0,05
Pa02/Fi02	173 (± 59,75)	216 (± 94,80)		0,08

Conclusions: The use of inhaled sedation in proximal settings has been shown to be safe for patients with acute respiratory distress syndrome (ARDS). This approach allows for the maintenance of protective ventilation parameters, with an observed increase in dead space of 46 ml, while demonstrating no significant changes in pH and pCO2 levels. Furthermore, an improvement in compliance and the PaO2/FiO2 ratio was noted, which persisted for 24 h following the initiation of inhaled sedation. However, larger studies are needed to confirm these findings.

Topic: Acute respiratory failure and mechanical ventilation

001215

The core clock gene BMAL1 (ARNTL) is differentially expressed in skeletal muscle of critically ill patients with and without critical illness myopathy

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Introduction: In skeletal muscle, clock genes regulate function and metabolism in a time-of-day-dependent manner. BMAL1 is a central component of the molecular clock network in skeletal muscle and is necessary for the maintenance of muscle homeostasis [1]. In healthy mice, skeletal muscle-specific *Bmal1* knockout causes muscle atrophy, impaired glucose metabolism, and reduced muscle strength [2,3]. Similarly, critical illness requiring treatment in the intensive care unit (ICU) often leads to critical illness myopathy (CIM), including skeletal muscle atrophy, weakness, and impaired glucose metabolism [4]. However, it remains unclear whether the expression of core clock genes in skeletal muscle is altered in critically ill patients with and without CIM.
Objectives: To investigate differential expression of clock genes in skeletal muscle of critically ill patients at risk of developing critical illness myopathy, compared to healthy controls.
Methods: Clock gene expression was compared in skeletal muscle biopsies from $n = 7$ critically ill patients in the ICU (CIM: $n = 3$; no-CIM: $n = 4$), and $n = 6$ control patients who underwent elective orthopedic surgery. These patients represent a subgroup of a previous study cohort for whom transcriptomic exon array data from *M. vastus lateralis* biopsies were available [5]. In the prior prospective clinical study (Ethics vote: Charité EA2/061/06), mechanically ventilated patients with a SOFA Score ≥ 8 were included and received electrophysiological CIM diagnosis [4,5]. Skeletal muscle biopsies were obtained during daytime in critically ill and control patients.
Results: Mean age was 70 years in the CIM group, 55 years in the no-CIM group, and 71 years in the control group. In critically ill patients, the following clock genes were significantly differentially expressed compared to controls (Fig. 1): *BMAL1* (official gene symbol: *ARNTL*, $p = 0.002$), *CRY2* ($p = 0.04$), *NR1D1* ($p < 0.001$), and *CLOCK* ($p = 0.01$). *BMAL1* expression was increased 5.38-fold in critically ill patients. Within the ICU cohort, *BMAL1* expression was decreased 3.67-fold in CIM patients as compared to no-CIM patients. (Fig. 2, $p = 0.005$).
Conclusions: Differences in clock gene expression may be influenced by diurnal variation, which could not be accounted for due to single time-point biopsies taken at non-standardized hours. However, *BMAL1* expression was strongly upregulated in critically ill patients, exceeding the expected range of physiological circadian variation. Interestingly, CIM patients showed significantly lower *BMAL1* expression than those without CIM. Our findings suggest that while *BMAL1* upregulation may reflect a general stress response or compensatory mechanism, a relative reduction could be linked to CIM development. We are currently conducting experimental studies to assess whether circadian rhythm dysregulation in skeletal muscle contributes to the development of muscle atrophy during critical illness.

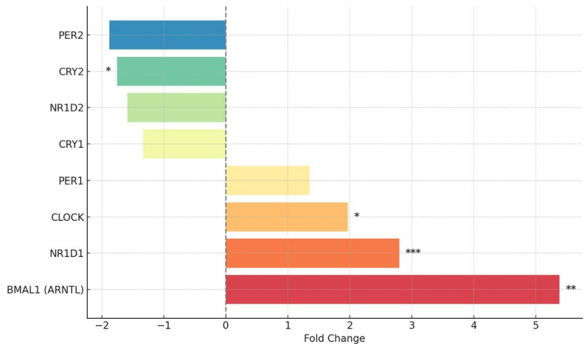


Fig. 1 (abstract 001215) Fold change of core clock gene expression in skeletal muscle. Gene expression in critically ill patients was compared to non-critically ill controls. *BMAL1* (official gene symbol: *ARNTL*). *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

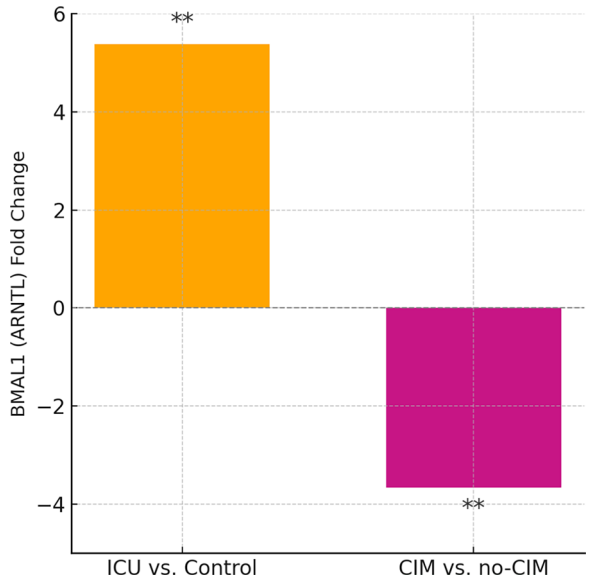


Fig. 2 (abstract 001215) Fold change in *BMAL1* expression in skeletal muscle. Shown are comparisons between critically ill patients and healthy controls (orange), and within the ICU group between CIM and non-CIM patients (magenta). *BMAL1* expression was increased 5.38-fold in critically ill patients compared to controls, but decreased 3.67-fold in CIM patients compared to those without CIM. $^{**}p < 0.01$. *ICU* intensive care unit, *CIM* critical illness myopathy, *BMAL1* (official gene symbol: *ARNTL*)

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Topic: Metabolism, endocrinology, liver failure and nutrition

001216

Predictive ability of transcranial Doppler to detect vasospasm in patients with spontaneous subarachnoid haemorrhage

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Intensive Care Medicine Experimental 2025,* 13(1)*:001216

Introduction: Late cerebral ischaemia is known to be a major cause of morbidity and mortality in patients who have suffered a subarachnoid haemorrhage (SAH). Transcranial Doppler (TCD) helps in its diagnosis, with a lower sensitivity than other tests such as angioCT or arteriography.
Objectives: To analyze the ability to detect angiographic vasospasm and/or cerebral oligohaemia of TCD in patients diagnosed with SAH.
Methods: Prospective, observational study conducted in patients with SAH admitted to the ICU of the HGU Gregorio Marañón (Madrid) between August and December 2024. Epidemiological, clinical and analytical variables, prognostic scales, need for organ support and clinical outcomes were collected. Patients were followed up by daily TCD and imaging tests (simple CT, angio-CT and perfusion CT) according to the unit's protocol (24 h, 5th day, 9th day and any day in case of suspicion) in search of vasospasm and/or late cerebral ischaemia.
In the descriptive analysis, qualitative variables were expressed as percentage and quantitative variables as mean (SD) or median (RIC). The association of presence of TCD vasospasm (Vmed $\geq$ 120 mm/sec with Lindegaard index > 3) with angiographic vasospasm and/or cerebral oligohaemia was performed using Chi-Square. Sensitivity (S), specificity (S), positive predictive value (PPV) and negative predictive value (NPV) of TCD as a diagnostic method were calculated.
Results: 17 cases were included. Age 50 $\pm$ 8 years. Women 59%. Severity scales: APACHE 7 (3–7), SOFA 1 (0–4), H&H 1 (0–2), WFNS 0 (0–1), Fisher 2 (2–3). Aneurysm in anterior circulation 88%. Endovascular treatment 38% and surgical treatment 31%, with an elapsed time of 2 (1–5) days. 53% fulfilled the diagnosis of vasospasm in TCD and 65% in angio-CT and CT perfusion. 47% showed ischaemia on plain CT. ICU stay 17 days (7–34) and hospital stay 36 days (17–47). Poor functional status (Rankin 4–5) 33%, with 12% mortality.
In the analysis performed, there was a significant association between high TCD velocities and vascular involvement and/or CT perfusion (RR 17.50; 95% CI 1.22–250.36), as well as for established ischaemic brain injury (RR 42.00; 95% CI 2.14–825.71). Diagnostic quality indices for TCD were: S 78%, E 83%, PPV 88% and NPV 71%.
Conclusions: Based on the diagnostic indices obtained, transcranial Doppler could allow selection of patients at high risk of vasospasm.

Topic: Imaging in intensive care

001218

Impact of early-phase inhaled sedation on pulmonary mechanics in mechanically ventilated patients

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Introduction: In the recent years, inhaled sedation with isoflurane has been increasingly adopted in intensive care units (ICUs) as a preferred option for patients requiring deep analgosedation. Several studies suggest that isoflurane-based sedation may reduce the need for opioids and neuromuscular blockers, and has been associated with potential secondary benefits, such as shorter duration of mechanical ventilation and faster awakening times.
Preclinical research indicates that isoflurane may exert lung-protective effects through mechanisms potentially relevant to the pathophysiology of Acute Respiratory Distress Syndrome (ARDS).

The use of inhaled sedation requires the integration of an additional device (SedaConda ACD-S®), which functions as a heat and moisture exchanger and possesses antiviral and antibacterial properties. This device is typically placed proximally, between the Y-piece of the ventilator circuit and the endotracheal tube. This configuration appears to add approximately 50 mL of instrumental dead space, thereby increasing the physiological dead space in mechanically ventilated patients.
Objectives: To describe the changes in pulmonary mechanics, ventilation, oxygenation, and dead space (VD) during the first hour of inhaled sedation using the SedaConda ACD-S® device in a proximal configuration, in patients requiring deep sedation admitted to our Intensive Care Unit between November 2023 and November 2024.
Methods: This was a prospective, observational, descriptive study including patients over 18 years of age admitted to the Intensive Care Unit at Hospital Universitari Dr. Josep Trueta, who required deep analgosedation and were considered candidates for inhaled sedation using the Sedaconda ACD-S® system.
After setting protective ventilation parameters and determining optimal PEEP, epidemiological, clinical, and blood gas variables were recorded prior to the initiation of inhaled sedation and again one hour after its onset. All data were entered into a dedicated database for subsequent analysis.
Results: A total of 42 patients were included, 80.95% of whom were male. Obesity was present in 42% of the cohort, with a mean BMI of 28.65 (± 4.17). The median age was 64 years (± 15.4), with an initial SOFA score of 8.9 (± 3.60) and an APACHE II score of 27.83 (± 8.12).

Results

	PREISO	POSTISO	*P*
VT/Kg	6,55 (± 0,5)	6,82 (± 0,74)	< 0,05
Pplateu	21,76 (± 3,48)	21,62 (± 3,60)	0,9
Driving Pressure (DP)	12,52 (± 6,15)	12,55 (± 6,11)	0,5
Compliance (C)	44,76 (± 22,29)	49,58 (± 28,10)	0,09
Resistances (R)	14,93 (± 4,4)	18,31 (9,12)	< 0,05
Dead Space (VD)	117,07 (± 39,8)	157,24 (± 37,51)	< 0,05
pH	7,37 (± 0,06)	7,35 (± 0,06)	< 0,05
pCO2	42,86 (± 6,8)	45,55 (± 6,59)	< 0,01
paO2/fiO2	219,09 (105,51)	246,05 (± 100,04)	0,1

Conclusions: The use of inhaled sedation in the proximal section of the respiratory circuit with the SedaConda ACD-S® device appears to be safe in terms of pulmonary mechanics, allowing for the maintenance of protective ventilation parameters (Vt 6.82 ± 0.74 mL/kg, plateau pressure 21.62 ± 3.60 cmH_2O, and driving pressure 12.55 ± 6.11 cmH_2O). Dead space (VD) increased by an average of 40.17 ± 34 mL, without significant changes in $PaCO_2$ or pH. Additionally, its use was associated with improvements in oxygenation and pulmonary compliance, although these changes did not reach statistical significance.

Topic: Acute respiratory failure and mechanical ventilation

001219

Monocyte distribution width (MDW) as an infection biomarker in the intensive care unit: a study of validity and discriminative capacity

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Intensive Care Medicine Experimental 2025, **13(1)**:*001219*

Introduction: Sepsis remains a leading cause of morbidity and mortality in ICUs. Early diagnosis is crucial for prompt treatment, especially with antibiotics. While PCT is a widely accepted infection biomarker, emerging parameters like MDW—derived from standard complete blood count—are gaining attention. MDW represents the standard deviation of monocyte size, reflecting heterogeneity of monocyte function and morphology in immune response to infection.
Objectives: To assess the validity of the hematological parameter monocyte distribution width (MDW) as a diagnostic test for infection in the ICU, determine the optimal MDW cutoff value, evaluate its discriminative capacity, and compare it with procalcitonin (PCT).
Methods: This was a prospective, observational, single-center study including all ICU admissions from March 1 to May 31, 2024. Collected data encompassed demographics, admission cause, clinical and laboratory parameters, and prognostic scores. MDW was measured from whole blood in K3-EDTA within four hours of collection.
Patients were stratified into three groups: noninfectious medical conditions (NIMC), noninfectious surgical conditions (NISC), and infectious conditions (IC). Classification relied on clinical, laboratory, and imaging findings consistent with standard ICU practice.
The diagnostic performance of MDW and PCT was evaluated by calculating sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) at various thresholds. The clinical diagnosis of infection at ICU discharge served as the gold standard. Receiver operating characteristic (ROC) curves were generated and area under the curve (AUC) was calculated to estimate discriminative ability.
Results: An MDW threshold of ≥ 23 demonstrated the best balance of sensitivity and specificity (Youden index), with sensitivity of 82.1%, specificity of 93%, NPV of 97%, and PPV of 63.9%. In comparison, the optimal PCT cutoff was ≥ 0.17 ng/mL, with sensitivity of 79.3%, specificity of 84%, NPV of 96.2%, and PPV of 44.2%. (See Tables 1 and 2 of results).
The AUC for MDW was 0.935 (SD 0.024; 95% CI 0.889–0.982; $P < 0.0001$), while for PCT it was 0.898 (SD 0.032; 95% CI 0.836–0.961; $P < 0.0001$).
Conclusions: MDW showed high diagnostic accuracy for infection in ICU patients, surpassing PCT in sensitivity, specificity, NPV, and PPV. An MDW cutoff of ≥ 23 was superior to the manufacturer-recommended ≥ 21.5 (this cutoff has been validated for the Emergency department patients), offering better specificity (93%) and PPV (63.9%). With an AUC of 0.935, MDW exhibited strong discriminative power, suggesting it is a robust biomarker for early infection diagnosis in critically ill patients.

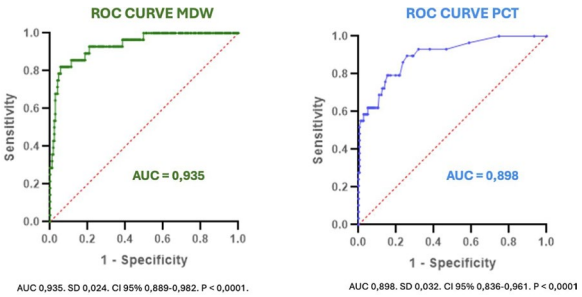
Table 1 (abstract 001219) Descriptive statistics by patient group

	TOTAL (n=211)	NIMC Group (n=80)	NISC Group (n=102)	IC Group (n=29)
Age, mean (SD), years	64,17 (14,73)	65,75 (16,05)	64,05 (12,55)	60,28 (17,59)
Female, n (%)	91 (43,13%)	32 (40%)	41 (40,20%)	18 (62,07%)
MDW, mean (SD)	19,96 (3,94)	19,38 (2,88)	18,57 (2,47)	26,49 (4,46)
PCT, mean (SD) ng/ml	3,14 (18,93)	0,22 (0,09)	0,11 (0,25)	21,80 (47,61)
CRP, media (SD) mg/L	35,36 (71,05)	26,58 (5,53)	14,38 (45,83)	135,19 (105,4)
SAPS-II, mean (SD)	27,25 (11,91)	27,08 (8,37)	26,44 (13,46)	30,52 (13,99)
SOFA, mean (SD)	1,73 (2,37)	1,23 (1,74)	1,94 (2,65)	2,35 (2,60)

Legend: NIMC: Non-Infectious Medical Conditions; **NISC:** Non-Infectious Surgical Conditions; **IC:** Infectious Conditions; **MDW:** Monocyte Distribution Width; **PCT:** Procalcitonin; **CRP:** C-Reactive Protein; **SAPS-II:** Simplified Acute Physiology Score II; **SOFA:** Sequential Organ Failure Assessment; **SD:** Standard Deviation

Table 2 (abstract 001219) Results for key cutoff points of MDW and PCT

VALORES	SENSITIVITY	SPECIFICITY	NPV	PPV	YOUDEN INDEX
MDW≥ 21,5	85,7%	87%	97,5%	51%	0,72
MDW≥ 22,5	82,1%	91,5%	97%	60,5%	0,74
MDW≥ 23	82,1%	93%	97%	63,9%	0,75
MDW≥ 23,5	78,6%	94,4%	94,4%	68,8%	0,73
PCT≥0,12	79,3%	78%	96%	36,5%	0,57
PCT≥0,16	79,3%	83%	96,2%	42,6%	0,62
PCT≥0,17	79,3%	84%	96,2%	44,2%	0,63
PCT≥0,18	75,9%	84,6%	95,7%	44%	0,61



MDW and PCT ROC Curves.

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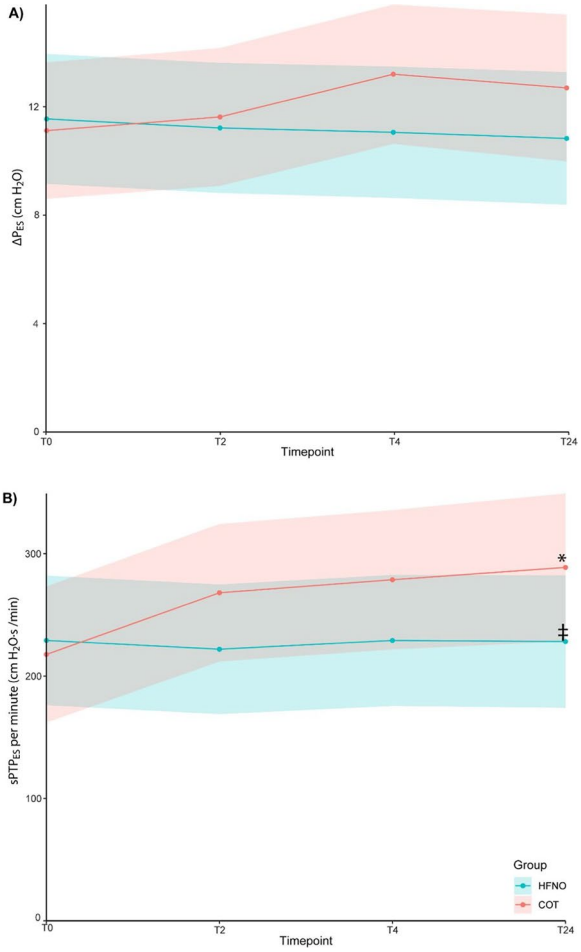
Topic Sepsis

001220

Physiological effects of high-flow nasal oxygen: a randomized trial in post-extubation patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001220

Introduction: High-flow nasal oxygen (HFNO) is used post-extubation to prevent reintubation. The physiological benefits of HFNO during the first 24 h after extubation as compared to conventional oxygen therapy (COT) are incompletely understood.
Objectives: The aim of this study was to compare the effect of HFNO to COT on respiratory effort and ventilation distribution in the first 24 h post-extubation.
Methods: Adult patients ($n = 42$) invasively ventilated for > 48 h were randomized between HFNO 60L/min or COT for 24 h post-extubation. Esophageal pressure (PES) measurements and electrical impedance tomography (EIT) were performed before and 2, 4, and 24 h post-extubation. Primary endpoint was change in ΔPES at 24 h after extubation as compared to baseline. Secondary endpoints were simplified PES pressure–time product (sPTPES), and EIT-derived parameters of ventilation within 24 h post-extubation.
Results: The change in ΔPES from baseline to 24 h after extubation in the COT group was 1.5 [0.0; 5.1] and −1.3 [−2.8; 2.2] cm H_2O in the HFNO group ($P = 0.11$, Fig. 1A). The change in sPTPES/min from baseline to 24 h in the COT group was 66 [−7; 111] and 0 [−47; 43] cm H2O ·s/min in the HFNO group ($P = 0.04$, Fig. 1B). Higher baseline ΔPES and sPTPES were correlated with decreasing levels of ΔPES and sPTPES post-extubation until 24 h (both ΔPES and sPTPES/min $r = -0.6$, $P < 0.01$) in HFNO, but not in COT group (both $P > 0.05$). No significant differences in EIT-derived ventilation parameters were observed except a lower ventral-to-dorsal tidal ventilation ratio in HFNO at 2 h ($P = 0.045$).
Conclusions: HFNO has a limited but sustained stabilizing effect on respiratory effort as indicated by a lower sPTPES.



(abstract 001220) Effect plots of the linear mixed models with 95% confidence intervals, intention-to-treat analysis. **A**: ΔPES. *P* value for difference between groups at T2: 0.54, T4: 0.06 and T24: 0.11. **B**: sPTPES/min. *P* value for differences between the groups at T2: 0.08, T4: 0.07 and T24: 0.04. Statistical significance between groups indicated by ‡, statistical significance from baseline within the group indicated by *

Reference
1. Fisher and Paykel Healthcare (unrestricted research grant)

Topic: Acute respiratory failure and mechanical ventilation

001221

Opioid and benzodiazepine requirements in critically ill post-surgical children with Down syndrome: a systematic review and meta-analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001221

Introduction: Down syndrome (DS), or Trisomy 21, is defined by the existence of an additional chromosome 21. Various physiological considerations in DS patients might lead to challenges in adequate pain management and sedation after surgery. The aim of this systematic review and meta-analysis is to evaluate the variations of the requirement needed for pain management and sedation in patients with DS who have undergone surgery compared to patients without DS.
Methods: A systematic review and meta-analysis of studies were conducted, focusing on critically ill patients with DS who were admitted to Intensive care units (ICUs) post-surgery and received opioids and/or benzodiazepines. Searches were conducted in four databases from their inception to November 18, 2023 (Pubmed, Scopus, Cochrane Library, and Web of Science). The primary outcome measured was the dosage of Oral Morphine Equivalent (OME) administered in the days following surgery. Fixed-effect models were used, an approach advisable when only a limited number of studies are available.
Results: Out of the 992 studies initially screened, the systematic review included ten studies, encompassing 730 patients, while the meta-analysis consisted of seven studies, encompassing 533 patients. Of the seven studies included in the analysis, 298 patients were identified to have DS, and 235 patients served as controls. Patients with DS showed a slight increase in OME needs on the first day, but this increase was not statistically significant (mean difference [MD] = 0.09; 95% Confidence Interval [CI] [−0.02, 0.20]; $P = 0.11$). There was also no significant difference in the requirement for Midazolam on the first day among DS patients (MD = 0.01; CI [−0.16, 0.19]; $P = 0.88$). In addition, the duration of mechanical ventilation was not statistically significant in patients with DS when compared with the control group (MD = −1.46 h; 95% CI [−9.74, 6.82]; $P = 0.73$).
Conclusions: Patients with Down syndrome did not require more sedation or analgesia in the first three days after surgery than patients without Down syndrome. In addition, the two groups showed no significant difference in the duration of mechanical ventilation.

Topic: Sedation, analgesia and delirium

001222

Monocyte distribution width (MDW) as an infection biomarker in the intensive care unit: II. A study on clinical utility

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Intensive Care Medicine Experimental 2025,* 13(1)*:001222

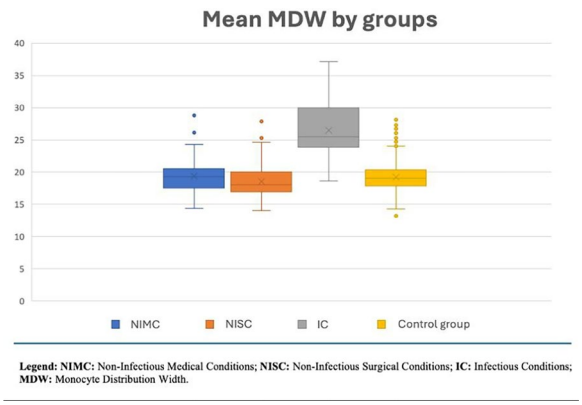
Introduction: Sepsis remains a major cause of morbidity and mortality among hospitalized patients, especially in intensive care units (ICUs). Timely detection is critical, as early initiation of appropriate treatment—primarily antibiotic therapy—has been proven to reduce mortality. However, early diagnosis remains challenging, prompting ongoing research into reliable diagnostic tools.
Procalcitonin (PCT) has long been considered the biomarker with the highest diagnostic accuracy for infection. Recently, new biomarkers have been studied, including monocyte distribution width (MDW), a parameter derived from the complete blood count. MDW reflects the standard deviation of monocyte size and indicates cellular heterogeneity in response to infectious stimuli.
Objectives: To analyze the clinical utility of monocyte distribution width (MDW) as a diagnostic test for infection in the intensive care unit (ICU).
Methods: This was a prospective, observational, single-center study. All patients admitted to the ICU between March 1 and May 31, 2024, were consecutively included. Data collected included demographics,

reason for admission, clinical parameters, laboratory tests, and prognostic scores. MDW was measured from whole blood samples in K3-EDTA, analyzed four hours post-collection.

Sensivity, specificity, positive and negative predictive values and standard descriptive statistics were calculated. MDW means from the overall sample and the various subgroups were compared using the independent samples *t* test, assuming equal variances after performing the *F* test for equality of variances.MDW utility was evaluated by calculating positive and negative likelihood ratios (LR + and LR–), based on the current consensus that a LR + > 10 and a LR– < 0.1 provide strong evidence for confirming or excluding infection. A Fagan nomogram was applied to determine how MDW modifies pretest probability.

Results: No significant differences were found between the MDW means of the NIMC (noninfectious medical conditions) and NISC (noninfectious surgical conditions) groups compared to the total sample or the control group.The IC group (patients with confirmed infection) showed a significantly higher MDW mean ($p < 0.001$) than the total sample and all other subgroups. No significant differences were found between infected patients with and without sepsis.An MDW ≥ 23 was the first value to yield a positive LR above 10 (11.2), but its negative LR was 0.19, not optimal. The first value with a negative LR < 0.1 was MDW ≥ 20.5.According to the Fagan nomogram, an MDW ≥ 23 (LR + 11.2) increases the pretest probability of infection from 5–10 to 49%.

Conclusions: MDW is a useful test for diagnosing infection in ICU patients. Values < 20.5 may help to rule out infection, showing a high negative predictive value (98.6%), while values ≥ 23 support infection detection with a moderate positive predictive value (63.9%).An uncertainty zone remains between 20.5 and 22.5, where additional testing is recommended.

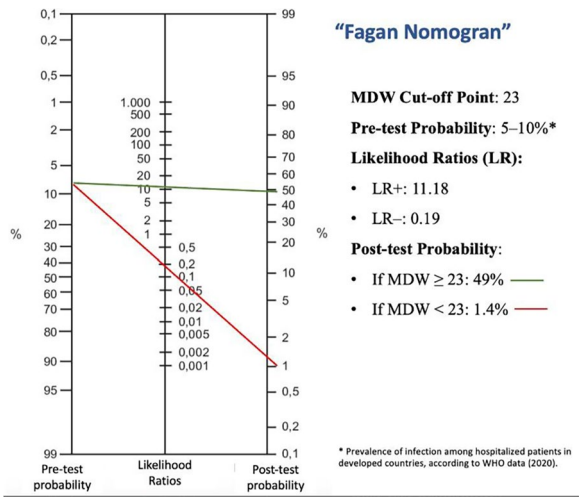


Mean MDW by groups.

MDW	LR+	LR-	PPV	NPV
≥ 20,5	4,4	0,09	41,2%	98,6%
≥ 21	4,9	0,17	43,6%	97,3%
≥ 21,5	6,6	0,16	51%	97,5%
≥ 22	7,2	0,16	53,3%	97,5%
≥ 22,5	9,7	0,20	60,5%	97%
≥ 23	11,2	0,19	63,9%	97%

Legend: LR+: positive likelihood ratio; LR-: negative likelihood ratio; PPV: positive predictive value; NPV: negative predictive value

Results for key cutoff points of MDW.



Fagan Nomogran.

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Topic: Sepsis

001223

Mortality-related factors in critically ill patients with *Legionella pneumophila* pneumonia: a retrospective observational study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001223

Introduction: Pneumonia caused by *Legionella pneumophila* reaches a mortality rate up to 40% in the critically ill population. Prognostic factors related to mortality need to be evaluated in order to improve outcome.
Objectives: The aim of our work was to investigate the factors influencing mortality in critically ill patients with *Legionella pneumophila* pneumonia.
Methods: A retrospective observational study was conducted at the intensive care unit (ICU) of the Department of Anesthesiology and Intensive Therapy, Semmelweis University, Hungary. All patients treated with *Legionella pneumophila* pneumonia between 2016 and 2023 were included. Patients were grouped based on ICU survival (ICU survivors [S +] and ICU non survivors [S-]). Data analysis was performed using clinical biostatistical methods. Variables associated with mortality were examined using multivariate Cox regression analysis and Kaplan–Meier analysis.
Results: A total of 50 patients were admitted to the ICU with *Legionella pneumophila* pneumonia during the 7-year period. The median age of the represented population was 64 (interquartile range [IQR] 50–73) years, and 62% were male. Based on the origin of infection, 29 patients (58%) had community-acquired, while 21 patients (42%) had nosocomial infections. The overall mortality was 42% ($n = 21$). Immunosuppression, higher APACHE II score, and higher SOFA score were significantly more common in the S- group. Multivariate analysis identified higher SOFA score (hazard ratio 1.22, 95% confidence interval 1.06–1.41, $p = 0.01$) and immunosuppression (hazard ratio 3.03, 95% confidence interval 1.25–7.14, $p = 0.01$) as risk factors for mortality. Furthermore, higher mortality rates were observed in patients with nosocomial infections and those who received delayed empirical antibiotic therapy, although these differences were not statistically significant given the sample size. The importance of these factors is underscored by the fact that in the group with the best survival, 75.0% received appropriate empirical antibiotic therapy, while only 37.5% did so in the group with the worst survival. Similarly, the rates of nosocomial infections were 25.0% and 50.0% in these groups, respectively.
Conclusions: Our findings suggest that mortality in severely ill, immunosuppressed patients with *Legionella pneumophila* pneumonia could be improved with the timely initiation of appropriate empirical antibiotic therapy. Based on our observations, empirical antibiotic therapy covering *Legionella pneumophila* is typically omitted in cases of nosocomial infection, highlighting a potential intervention identified in this study.

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Topic: Infections and prevention

001224

Partitioning of mechanical power by equation of motion: association with outcome in lung transplant

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Introduction: Mechanical power (MP) is the energy delivered to the respiratory system over time during mechanical ventilation, and integrates the variables related to the development of ventilator-induced lung injury; it is usually calculated using a formula obtained from the geometricreference method (MP F) (1); however, it does not differentiate the components involved in respiratory impedance and requires constant flow. Using the equation of motion (EM), we could calculate the total ventilator work of breathing and its resistive and elastic components in any ventilator mode.
Objectives: To calculate the MP as the inspiratory work of the ventilator partitioned using the equation of motion (MP EM), comparing it with MP F; and its relationship with hospital mortality, ventilator days and ICU stay in postoperative lung transplant patients (LT) mechanically ventilated (MV) for at least 48 h.
Methods: Prospective observational study, from December 2023 to January 2025, included in an original clinical study approved by the local ethics committee (Musc-Txp23). We studied a group of consecutive postoperative LT with MV for more than 48 h without ECMO. During controlled MV with constant flow. Flow signals (V´), airway pressure (Paw), and esophageal pressure (Pes) were recorded. Sampling 1126 Htz. Measurements: 1- Elastance and total respiratory system resistance (Ers, Rrs) were calculated using multiple linear regression. 2- MP E. Using EM, total Paw = Ers * Volume + Rrs * V´ + PEEPt. Integrating Paw * V´ over the inspiratory time for each component we obtained the partitioned work of breathing, expressed in J/min. 3- MP F was calculated according to (1), MP F (J/min) = 0,098 × V T × RR × (Ppeak—DP/2). RR:respiratory rate. Vt: tidal volume, liters. DP: driving pressure. The data are expressed as means (SD) or medians (IQR 25–75%). Comparisons with nonparametric tests. Concordance analysis and linear regression relationships. Relative risk (RR) of mortality, 95% CI.
Results: Patients: N 22. Male 12 (54.50%). Age 57.14 ± 9.75 years. Double LT 19 (86.36%). PaO2 /FiO2 335 (296.77–326.31); PaCO2 41.50 (37.25–51); pH 7.42 (7.38–7.48). ICU stay 56 (19.50–95), days of MV at inclusion 8.5 (7–15.5), Total days of MV 54 (15.50–82). Deaths 7 (31.82%). Respiratory parameters: Ers 24.68 ± 7.06 cmH2O/L; Rrs 11.81 ± 4.31 cmH2O/L/s. P Plateau 21.14 ± 3.53 cmH2O; PEEP 5 (5–7.25) cmH2O; DP 14.07 ± 3.08 cmH2O. Vt 5.86 (4.24–6.74) ml/Kg. RR 19.51 (18–22)/min.
MP EM, J/min: Total 19.36 ± 4.54 (Elastic: dynamic 6.61 ± 3.03, static 6.67 ± 2.67; Resistive 6.22 ± 2.03). The MP by MP EM vs MP F were highly correlated, R^2 0.95; mean differences 0.24 ± 1.3, 95% CI −0.34 to 0.84; coefficient of variation 13.69%.

MP EM < 20 > J/min: Risk of death (RR) 3,33 (95% CI 1.29–8.59); p = 0.001. Stay ICU 20.50 (10.00 −79.00) vs 68.50 (49.00–104.75); p = 0,023, MV 20.00 (8.50–55.50) vs 65.00 (45.50–98.75) days; p = 0.006.
Conclusions: The agreement between MP EM and MP F was excellent. MP EM higher than 20 J/min is associated with increased risk of death, ventilator days, and ICU stay. The elastic partition represents the most implicated component.

Table 1 (abstract 001224) ...

	Survival	Non Survival	P
Pplateau (cmH_2O)	20.65 (18.15-25.00)	23.00 (20.00-24.00)	0.358
ΔP (cmH_2O)	14.00 (11.50-16.64)	15.56 (14.95-16.00)	0.290
MP_Total Elastic (J/min)	11.69 (10.57-12.75)	15.25 (14.21-9.48)	0.003
MP_Static (J/min)	5.65 (4.23-6.91)	7.84 (7.00-8.28)	0.008
MP_Resistive (J/min)	4.96 (4.50-5.93)	7.98 (5.68-9.80)	0.057
MP_{EM}. Total (J/min)	16.62 (16.07-19.40)	21.47 (20.91-25.60)	<0.001

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Topic: Acute respiratory failure and mechanical ventilation

001225

Clinical characteristics and outcomes in patients aged 80 years or older in intensive care units of a large multispecialty hospital in the capital city of Poland

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Introduction: Life expectancy has risen in the recent decades, causing a rapidly aging population. Consequently, intensive care units (ICUs) are increasingly admitting elderly patients with multiple health issues, making it challenging to determine their prognosis and the benefit of intensive care.
Objectives: We aimed to clinically characterise patients aged ≥ 80 years admitted to the ICUs of an ~ 800-bed multispecialty hospital in Warsaw, Poland, taking into account comorbidities, prognostic scores, treatment and outcomes, with a focus on mortality and its determinants.
Methods: We retrospectively analysed patients aged ≥ 80 years admitted to the Department of Anaesthesiology and Intensive Care (3 ICUs with a total of 30 beds) of the National Medical Institute of the Ministry of the Interior and Administration in Warsaw between 1 January 2018 and 31 December 2022, comparing survivors and nonsurvivors. The data were collected on demographics, admission diagnosis, previous place of care, comorbidities, prognostic scores (APACHE, SAPS and SOFA), organ support during ICU stay and its duration, decisions to limit life sustaining therapy and mortality. The Clinical Frailty Scale (CSF) score was calculated retrospectively from the available data and assessed as a predictor of death using multiple logistic regression models adjusting for age, sex and either APACHE or SAPS or SOFA.
Results: We included 476 patients (median age 84 years, range 80–103 years, female 54%, COVID-19 17%, median ICU stay 8 days; 11.8% of the ICU population of the analysed period) with a high incidence of comorbidities (e.g. coronary artery disease, diabetes, renal failure, cancer and chronic obstructive pulmonary disease in 38%, 33%, 26%, 19% and 10% of patients, respectively). ICU mortality was very high (76% vs 37% in the younger patients over the same period, p < 0.001) but independent of sex and age. Advanced frailty was common, as indicated by CFS score (median 7, n = 189), which was identified as a significant risk factor for death independent of age, sex and APACHE score (odds ratio for the 1-point increase in CFS 1.08, 95% CI 1.01–1.15, n = 103), but not SAPS and SOFA scores; APACHE, SAPS and SOFA were predictors of death independent of age, sex and CFS. Organ support techniques were frequently used (invasive mechanical ventilation in 91%, pharmacological cardiovascular support in 83%, and renal replacement therapy in 14% of patients), with significant differences between nonsurvivors and survivors (95% vs 78%, 86% vs 74%, and 16 vs 7%, respectively; all $p \leq 0.015$) and high mortality rates (80%, 79%, and 88%, respectively). A protocol to limit futile therapy was implemented in 66 patients (14%).
Conclusions: Our findings support the usefulness of prognostic scales used upon ICU admission, while also pointing out the importance of individualized assessment for the anticipated benefit of ICU treatment in elderly patients, considering specific comorbidities, prior treatment effects, and frailty.

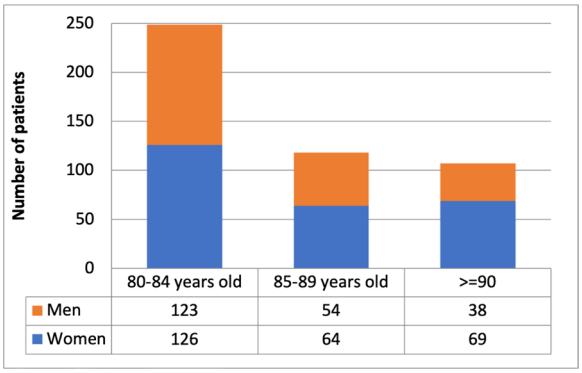


Fig. 1 (abstract 001225) Demographic structure of the study population

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Topic: Health Services Research and Outcome

001226

Descriptive analysis of patients undergoing cardiac surgery in the coronary icu of a third level hospital

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Introduction: Cardiac surgeries constitute complex procedures involving diverse clinical and surgical profiles. This study aims to describe the demographic, clinical, surgical and postoperative characteristics of patients undergoing cardiac surgery between 2017 and 2023 in a tertiary hospital.
Methods: A prospective analysis of patients after undergoing cardiac surgery between 2017 and 2023 was performed. Demographic (age, sex), clinical (comorbidities, preoperative diagnoses), surgical (duration of surgery, extracorporeal circulation and aortic clamping times) and postoperative (complications, mortality, readmissions) variables were assessed. Quantitative variables were expressed as means and

standard deviation (± SD), or median with interquartile range (IQR) and qualitative variables as frequencies.
Results: 2,459 patients were analysed. The mean age of the patients was 64 ± 12 years, 72.3% being male. The most frequent comorbidities included HT (68.5%), diabetes mellitus (36.4%) and AF (19.2%). The predominant preoperative diagnosis was valve involvement (63.7%) followed by ischemic heart disease (41.7%). Of all procedures, the most frequent was valve surgery (43.7%) with biological aortic valve replacement (16.9%), followed by coronary surgery (36.9%) and combined surgery (11.3%). Urgent cases accounted for 38%, emergent cases for 13%, with the majority being planned surgery (49%). From a surgical point of view, the median duration of surgery was 180 min (IQR: 150–210), with mean extracorporeal circulation times of 91 ± 28 min and aortic clamping of 63 ± 19 min. Postoperatively, the most common complications included arrhythmias (15%), thrombopenia (10%), need for polytransfusion (16%) and reintubation (4%). In-hospital mortality was 4.3%, while hospital readmissions occurred in 3.5% of cases.
Conclusions: Our sample patient is a 64 ± 12 year-old male, hypertensive (68.5%) who underwent mostly valve surgery (43.7%) followed by coronary surgery (36.9%), with biological aortic valve replacement being the most frequent (16.9%). Our most frequent complications are arrhythmias and polytransfusion, with a readmission rate of 3.5% of cases and a mortality rate of 4.3%. These data are comparable to other series, highlighting adequate perioperative management and results consistent with national standards.

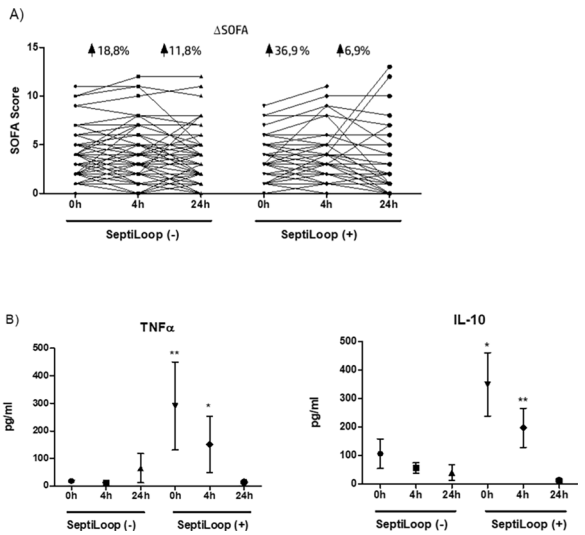
Topic: Cardiovascular issues in ICU

001227

Dynamics of immune dysregulation assessed by SeptiLoop® in Emergency Department patients with elevated risk of sepsis

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Introduction: The immune response to infection is highly dynamic and complex. In sepsis, this response frequently becomes dysregulated, disrupting the balance between pro-inflammatory and anti-inflammatory mechanisms. If not promptly controlled, this dysregulation may result in excessive inflammation, immunosuppression, and a failure to restore immune homeostasis.
SeptiLoop® is a novel in vitro diagnostic test that uses lipopolysaccharide (LPS) to stimulate immune cells in heparinized whole blood. It quantifies Tumor Necrosis Factor-alpha (TNF-α) release using a lateral flow assay, enabling rapid assessment of immune dysregulation and the patient's immunological state.
Objectives: To assess immune suppression using SeptiLoop® in a cohort of Emergency Department (ED) patients with suspected bacterial bloodstream infection and an elevated risk of sepsis (NEWS score ≥ 3). Specifically, we aimed to: evaluate the persistence of immune dysregulation over time (0 h, 4 h, and 24 h); explore associations between immune status, clinical outcomes; and, characterize the immune profile over time.
Methods: We conducted a prospective observational cohort study of emergency department patients with suspected infection and high risk of sepsis (NEWS ≥ 3). All patients received standard care in accordance with the Surviving Sepsis Campaign guidelines. Whole blood samples were collected at 0 h, 4 h, and 24 h following ED admission. SeptiLoop® negative results were considered indicative of immune dysregulation when TNF-α release after LPS stimulation was < 200 pg/mL. Statistical analyses were performed using appropriate tests (*$p < 0.05$; **$p < 0.01$).
Results: A total of 193 patients were included. Of these, 128 (66.3%) were classified as immunodysregulated at baseline (0 h) based on a negative SeptiLoop® result. Among these patients, 91.6% remained immunodysregulated at 4 h, and 85.4% at 24 h, indicating persistent immune suppression in most cases. In addition, 23.3% of initially non-immunodysregulated patients transitioned to immunodysregulation at 4 h, and 34.3% did so at 24 h. Patients classified as nonimmunodysregulated at baseline showed a significantly higher rate of SOFA score worsening between 0 and 4 h (36.9% vs. 18.8%, $p < 0.01$). Nonimmunodysregulated patients showed higher TNF-α and IL-10 plasma levels at 0 h and 4 h ($p < 0.05$), while cytokine levels declined in both groups by 24 h. Note that ICU admissions were more frequent in the nonimmunodysregulated group (23.1% vs. 11.3%, $p < 0.05$). Kaplan–Meier survival analysis revealed a nonsignificant differences between groups (Log-rank $p = 0.34$). No significant differences were observed between groups in age, sex, BMI, height, weight, leukocyte count, lymphocyte/neutrophil levels, CRP, lactate, comorbidities, or chronic medications.
Conclusions: SeptiLoop® provides a rapid and functional tool to assess immune status in patients with suspected sepsis. The test detects immune cell dysfunction and may serve as a real-time indicator of host response. Our findings support the value of immune profiling to identify patients at risk for adverse outcomes and to inform personalized therapeutic strategies. Immune stratification should be further explored in future sepsis management protocols.



A) Individual SOFA score trajectories at 0 h, 4 h, and 24 h in patients stratified by SeptiLoop® result at 0 h. Patients with a negative SeptiLoop® result (left) were classified as immunodysregulated. Arrows indicate the percentage of patients showing ΔSOFA score worsening between 0 h–4 h and 4 h–24 h in each group. B) Mean values with standard error of the mean (SEM) for plasma cytokine levels (TNF-α, IL-10) at 0 h, 4 h, and 24 h, stratified by SeptiLoop® result at baseline (0 h). Statistical comparisons between immunodysregulated and nonimmunodysregulated groups were performed at each time point using unpaired *t* test (*$p < 0.05$; **$p < 0.01$).

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Topic: Sepsis

001228

Euglycemic ketoacidosis after cardiac surgery: Is SGLT2 inhibition the trigger?

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Introduction: Postoperative ketoacidosis is rarely considered in cardiac surgery. However, the growing use of sodium-glucose cotransporter-2 inhibitors (SGLT2i) raises concern due to reports of euglycemic diabetic ketoacidosis (euDKA) in noncardiac surgery.
Objectives: To assess the incidence of postoperative ketoacidosis in elective cardiac surgery and its association with SGLT2i use, along with clinical and analytical implications.
Methods: A prospective observational study was conducted in a cardiac ICU. Adult patients undergoing elective cardiac surgery between June 2024 and March 2025 were included. Arterial blood gases and ketone levels were obtained at ICU admission, 20:00 h, and 06:00 h the next day. Ketoacidosis was defined as pH < 7.30 and ketonemia ≥ 0.6 mmol/L, in the absence of preoperative ketoacidosis. Clinical, surgical, and laboratory data were analyzed using chi-square, Fisher's exact test, Mann–Whitney *U*, and repeated measures analysis.
Results: 103 patients were included; 53% were males, 67% had hypertension, 29% diabetes, and 59% dyslipidemia. Median age was 66 years (IQR 57–73), BMI 26.4 kg/m^2 (IQR 24.38–30.16). The most frequent surgical category (37.9%), included combined procedures (e.g., aortic ± valve, coronary ± valve), followed by CABG (16.5%), aortic valve (16.5%), and mitral valve surgery (12.6%).
Postoperative ketoacidosis occurred in 24 patients (23.3%). Among patients on SGLT2i (n = 28), 16 (57.1%) developed ketoacidosis vs. 8 of 75 (10.6%) in the non-SGLT2i group (p < 0.001) (Table 1). Ketoacidosis was also associated with diabetes (p = 0.001), but not with sex, hypertension, or dyslipidemia. No differences were found in age, BMI, EUROSCORE II, or cardiopulmonary bypass time. Repeated measures analysis showed lower mean arterial pH in the ketoacidosis group (7.31 vs. 7.35, p < 0.001), more negative base excess (–4.2 vs. –2.6, p = 0.001), and lower bicarbonate (21.57 vs. 22.86 mmol/L, p = 0.001). Lactate values did not differ significantly (1.4 vs. 1.8 mmol/L, p = 0.093) (Table 2). No significant differences were observed in ICU length of stay (p = 0.3), duration of mechanical ventilation (p = 0.5), or in-hospital mortality (p = 0.46).
Conclusions: Ketoacidosis, often euglycemic, was observed in nearly one-quarter of patients undergoing cardiac surgery and was strongly associated with SGLT2i use. These findings support the need for increased perioperative awareness and further research in this population.

Table 1 (abstract 001228) Association between SGLT2 inhibitor use and postoperative ketoacidosis

	Ketoacidosis (+)	Ketoacidosis (–)	Total	% with Ketoacidosis	P value
SGLT2i: Yes	16	12	28	57.1%	<0.001
SGLT2i: No	8	67	75	10.6%	
Total	24	79	103	23.3%	

Table 2 (abstract 001228) Comparison of analytical parameters between patients with and without postoperative ketoacidosis

Parameter	No Ketoacidosis (n = 79)	Ketoacidosis (n = 24)	p-value
Mean arterial pH	7.35	7.31	< 0.001
Base excess (mmol/L)	−2.6	−4.2	0.001
Bicarbonate (mmol/L)	22.86	21.57	0.001
Lactate (mmol/L)	1.8	1.4	0.093

Topic: Cardiovascular issues in ICU

001229

A pilot, randomized, double-blinded, controlled study of hemodynamic and acid–base effects of 0.5 m sodium lactate and 3% saline solutions in septic shock patients

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Introduction: Intravenous fluid resuscitation is a common treatment for hemodynamic instability in patients with septic shock. Excessive accumulation of fluids and chlorides are independent predictors of increased morbidity and mortality and are associated with organ dysfunction. [4, 8] In light of the recent paradigm shifts in lactate metabolism [2, 3], the concept of low-volume therapy using hypertonic sodium lactate solution appears to be an attractive alternative. [1, 5, 6, 7, 9].
Objectives: In a blind fashion, we compare the hemodynamic and acid–base effects of intravenous bolus administration of 0.5 M sodium lactate solution (HSL) versus 3% sodium chloride (SAL) solution in adult patients with septic shock.
Methods: In a proof-of-concept, prospective, randomized, controlled study we compare a change in cardiac stroke work (SW = SV x MAP) assessed by means of transthoracic echocardiography (SV—stroke volume) and arterial pressure transducer system measured at time of start of infusion, at 30 and at 60 min from the start of the respective fluid bolus (3 ml/kg over 30 min; HSL or SAL). A number of secondary outcomes are assessed (inflammatory markers, vasopressor requirement, renal function, shock resolution).
Results: This pilot study enrolled 7 thus far and will include up to 40 patients. This small-scale preliminary study will be conducted to check the feasibility and improve the research design for a planned larger study. The primary endpoints will be analysed by a mixed model of repeated measures with baseline value SW as covariate and treatment, and time-point as fixed factors and patient as random effect with a two-sided α = 0.05. Treatment groups will be compared overall and additionally per time-point. The primary efficacy analysis will be

performed per "intention to treat" on the full analysis set with missing data and per-protocol set will be used as sensitivity analysis.
We present preliminary blinded data from the first 7 enrolled patients, analyzed as a mixed cohort from both treatment groups. Hemodynamic variables (stroke volume, mean arterial pressure, cardiac stroke work) were assessed using paired *t* tests and reported as mean ± SD (Fig. 1). Acid–base and electrolyte parameters (pH, lactate, sodium, chloride, potassium) were analyzed with Wilcoxon tests and presented as median [IQR], min–max (Fig. 2). These early findings suggest a favorable safety profile and will be re-evaluated after unblinding and upon completion of the full protocol-defined analysis following target sample enrollment.
Conclusions: This study will verify the effect and safety of two hypertonic crystalloid solutions in providing intravascular fluid replacement with the potential to eliminate harmful fluid overload and the consequences of chloride–liberal infusion therapy.
The results of the study could impact the choice of resuscitation fluid in this indication in the future and should contribute to solving the question whether chloride or lactate is the preferred anion for sodium based hypertonic solutions in the resuscitation of patients with septic shock.

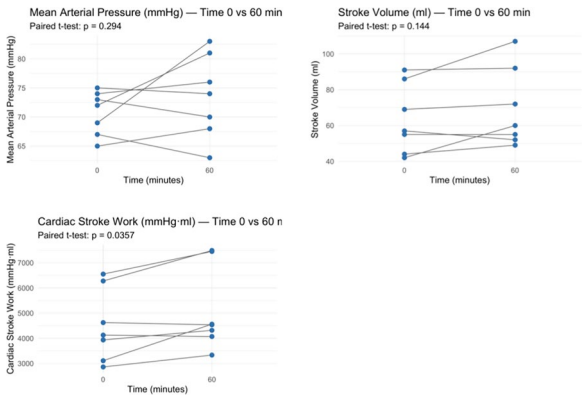


Fig 1 (abstract 001229) Changes in mean arterial pressure, stroke volume and cardiac stroke work in 7 patients treated with HSL or SAL at preinfusion and 60 min after infusion

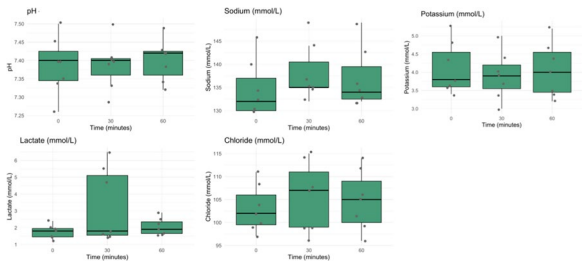


Fig 2 (abstract 001229) Changes in pH, plasma lactate, sodium, chloride and potassium in 7 patients treated with HSL or SAL at preinfusion, 30 min after infusion and 60 min after infusion reported with the median, IQR and maximum and minimum value

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Topic: Sepsis

001230

To wrongly assume: a retrospective study of ICU readmission

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Intensive Care Medicine Experimental 2025,* 13(1)*:001230

Introduction: A low rate of early readmission after 48 h of discharge is widely recognized as an important quality indicator of care in the ICU. ICU readmissions are often linked to poorer clinical outcomes[1]. In practice, clinicians often rely on assumptions and generalizations, such as discharge timing and the complexity of nursing care required, to guide decisions about when patients are ready to be transferred from the ICU to a hospital ward.

Objectives: This study aims to characterize patients who are readmitted to the ICU, assess the clinical assumptions influencing discharge decisions, and develop targeted interventions to improve the quality of care.
Methods: a retrospective study that characterized patients readmitted to the ICU 48 h after discharge. Demographic data, physiological, and nursing parameters were collected and analyzed from electronic medical records.
Results: A total of 109 patients were readmitted to the ICU within 48 h and hospitalized for at least 24 h. The majority of the readmitted patients had a short ICU stay ≤ 3 days. A high Apache II score (22), Sofa score (7) ($r = 0.767$, $p = 0.001$), and a BMI ≥ 40, which was correlated with Apache II score ($r = -0.345$, $p = 0.004$). Most were without a tracheostomy (90%) and a pressure sore (87%). However, 65% were discharged during the week. Statistically, no significant differences in the characteristics of the patients were observed between the time the patients were discharged on the days of the week; only a higher readmission Sofa Score was observed during a weekday ($U = 454$, $p = 0.041$). In addition, readmitted patients to the ICU with tracheostomy and CVC decreased over the years.
Conclusions: Patients with significant comorbidities are at a higher risk of ICU readmission. Assumptions regarding discharge timing and nursing care complexity were not found to be reliable predictors of readmission. To improve patient outcomes and reduce readmission rates, hospital wards must implement targeted educational programs focused on managing complex conditions training. In addition, early identification of clinical deterioration postdischarge is a critical component in ensuring patient safety and continuity of care.

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Topic: Nursing care and physiotherapy

001232

Independent risk factors for developing acute respiratory failure in postoperative cardiac patients

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Introduction: To determine independent risk factors for acute respiratory failure (ARF) in a cohort of postoperative cardiac surgery patients in a coronary ICU.
Methods: A prospective observational study of a cohort of patients undergoing cardiac surgery between 2017 and 2023 was conducted in a 10-bed cardiovascular ICU in a tertiary hospital. We collected demographic and clinical variables, comorbidities, prognostic scales, type of surgery performed, need for vasoactive amines or other cardiac assist devices, need for mechanical ventilation or continuous extrarenal depuration technique and other risk factors for the development of AKI, such as postoperative complications, length of hospital stay and mortality. Univariate and multivariate analyses were performed using logistic regression to identify significant associations between these variables and the development of AKI. Results were expressed as odds ratios (OR) with 95% confidence intervals.
Results: After analysing 2,458 cases, 15.1% of patients ($n = 370$) had postoperative AKI. Of all variables studied, only a high APACHE-II value (OR: 1.10; CI95%: 1.08–1.13; $p < 0.001$), history of smoking (OR: 1.56; CI 95% 1.16–2.10; $p = 0.004$) and combined surgery (OR: 1.73; CI 95% 1.26–2.36; $p < 0.001$) were considered independent factors for the development of AKI. Other associated factors included obesity (16.2%; $p < 0.001$), presurgical chronic renal failure (17%; $p = 0.015$) and postsurgical complications. 015) and specific postsurgical complications such as pneumothorax (7.6%; $p < 0.001$), haemothorax (4.9%; $p <$ 0,001), need for multiple transfusions (19,5%; $p > 0.001$), delirium (12.7%; $p > 0.001$), acute renal failure (43.5%; $p > 0.001$) and infectious complications (the most relevant being bacteraemia (8.4%; $p > 0.001$), pneumonia (8.1%; $p > 0.001$), surgical wound infection (4.3%; > 0.001), urinary tract infection (2.7%; $p > 0.001$) and postoperative mediastinitis 2.4%; $p > 0.001$).
Likewise, aortic dissection surgery was more frequently associated with AKI (6.2%; $p < 0.001$), with a multifactorial origin.
Conclusions: According to the obtained results, the main independent risk factors associated with post-extubation AKI include higher APACHE II score, smoking and combined surgeries. Identifying and monitoring patients with these risk factors will allow for more appropriate and personalised management, which could reduce the incidence of AKI and improve outcomes.

Topic: Cardiovascular issues in ICU

001233

Exploring innovative applications of EEG in the ICU environment

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Intensive Care Medicine Experimental 2025,* 13(1):*001233

Introduction: For a century, electroencephalography (EEG) has delivered remarkable results in the investigation and diagnosis of diseases, as well as in the evaluation of cognitive and neuronal activities of the human brain [1]. Its application in the ICU has been particularly impactful, showing significant value in the monitoring and evaluation of various patient conditions [2]. In recent decades, fractal analysis has emerged as a powerful tool to study brain electrical activity [3]. In particular, EEG has revealed the multifractal nature of brain electrical activities and uncovered correlations between these multifractal states and their properties, offering deeper insight into the complexities of brain function [4].
Objectives: This research aims to explore the multifractal properties of EEG signals in ICU patients, focusing on two groups of patients with known Glasgow coma scale and the effects of sedative drugs on the multifractal formalism of the EEG data [5].
Methods: In this research work, we used a wireless Emotiv EPOC 14 headset to record EEG signals from 36 ICU patients at the National Institute of Neurology, Mongi Ben Hmida, Tunis, Tunisia [6]. Six of the patients were sedated during the recording, and 30 others with a known Glasgow Coma Scale (GCS). We considered sedated patients as the first group (S), we selected 6 other patients with GCS = 3 as the second group (D), and group L is the group of patients with GCS = 7. To analyze the data, we utilized multifractal analysis based on wavelet leader techniques to explore the properties of EEG signals in ICU patients.
Results: The singularity spectrum of three patient groups presents distinctive graphical patterns, varying in both shape and location, with significant features identified in the sedated patient group, as illustrated in Fig. 2 of [7]. Figure 1 illustrates the average peak values of the singularity spectra across these groups: the sedated group has the lowest average score of 0.11, while the group with a Glasgow Coma Scale (GCS) score of 3 shows an average of 0.2, and the group with a GCS score of 7 exceeds an average of 0.3. Applying the same methodology, combined with the dominant wave band analysis, revealed a significant correlation between the proposed EEG-MFA-based coma scale and the GCS scores. These findings are detailed in Fig. 2.

Conclusions: The singularity spectrum yielded fascinating results, especially in classifying the vigilance states of comatose patients. An EEG-based coma score could overcome many limitations of the classical coma scales. Upon further investigation, we discovered that carefully selecting specific EEG channels, in conjunction with brain rhythm analysis, could serve as the foundation for developing a novel EEG-based coma scale. The use of EEG could emerge in the ICU. Although our work has shown promising results, it is constrained by the limited number of patients involved. Future studies should be conducted across multiple ICU departments to ensure broader applicability. Furthermore, utilizing advanced EEG headsets with a higher number of electrodes could improve the accuracy and depth of the findings.

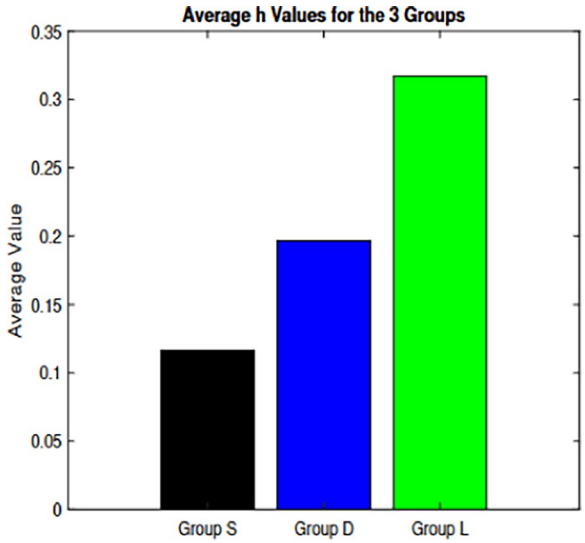


Fig. 1 (abstract 001233) The average value of the holder exponent (h) for the three different groups

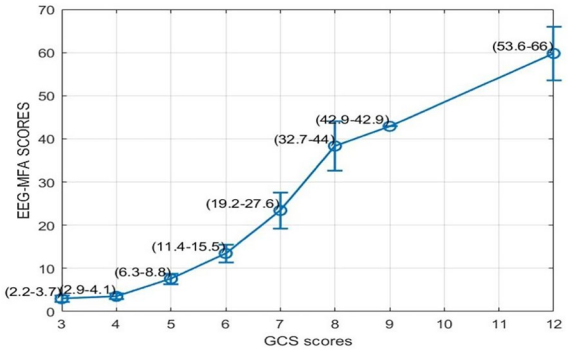


Fig. 2 (abstract 001233) EEG-MFA-based score for ICU patients with known GCS

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8. To Dr. Kamel Baccar, with whom we embarked on this research journey, and who has recently departed to a better world.

Topic: Neurointensive care

001234

Predictive factors of favorable outcome for endovascular thrombectomy in acute stroke in very old patients (over 80 years)

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Intensive Care Medicine Experimental 2025,* 13(1)*:001234

Introduction: Randomized clinical trials have demonstrated the superiority of mechanical thrombectomy plus best medical treatment over best medical treatment in patients with large vessel occlusion ischemic stroke. However, very old patients (≥ 80 years of age) were under-represented in randomized trials of endovascular thrombectomy. Though there are uncertaintiesabout the clinical benefit of the intervention in this growing population.
Objectives: This study aims to identify predictors at hospital admission for favorable outcome after endovascular thrombectomy in very old patients.
Methods: Cohort retrospective study analyzing the group of very old patients (aged 80 years or older) with acute ischemic stroke who underwent endovascular thrombectomy of the anterior circulation admitted to the neurocritical care unit of a tertiary hospital, between January 2017 and December 2024. We collected demographic data, degree of disability/dependence pre-stroke (modified Rankin Scale—mRS), admission stroke severity (National Institutes of HealthStroke Score—NIHSS), comorbidities, severity scores (APACHE II), intravenous thrombolysis (rT-PA), mortality and functional outcome (mRS) at hospital discharge and at 3 months after the procedure. We defined favorable as 3-month mRS equal or less than 3. Statistical analysis was performed with SPSS, version 23. We performed Chi-square and Fisher's exact tests; Mann–Whitney and Kruskal–Wallis tests. Significance was set at < 0.05.
Results: During the referral period, 147 patients who were admitted to the neurocritical care unit with acute ischemic stroke underwent a thrombectomy, and 19 (13%) of them were very old patients. Median age was 87 years (IQR 82.0–89.0). The median admission mRS was 0 (IQR:0.0–1.0) and the median NIHSS was 15.0 (IQR 5.0–20.0). The utilization of rT-PA was 47% (9/19). 28-day mortality was 13% (3/19), and was associated with APACHE II (p 0.022), but not with admission NIHSS (p 0.62) or rT-PA utilization. We did not find significant association-between 3 month-mRS and APACHE II (p 0.081), admission NIHSS (p 0.12), or rT-PA (p 0.52).A favorable outcome at 3 months was seen in 47% (9/19 patients), with a decrease in mRS of −3 (IQR −1, −4) in the overall population, and no association with age was seen.
Conclusions: In this cohort, APACHE II was associated with 28-days mortality, but neither NIHSS nor thrombolysis was associated with short term mortality or 3-month functional outcome after

endovascular thrombectomy. Against the literature stroke severity did not predict poststroke outcomes. Age did not influence the outcome. Mortality is lower than historical or thrombolysis controls, therefore thrombectomy should be considered despite age.

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Topic: Neurointensive care

001235

Survival clock: unveiling mortality predictors in out-of-hospital cardiac arrest

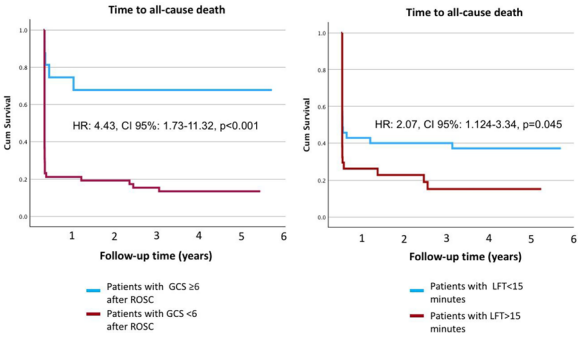
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Intensive Care Medicine Experimental 2025,* 13(1)*:001235

Introduction: Out-of-hospital cardiac arrest (OHCA) affects around 3.8 million people annually worldwide. Early initiation of cardiopulmonary resuscitation and prompt access to defibrillators are crucial, but despite improved care systems, mortality remains high. Prognostic indicators like no-flow time (NFT), low-flow time (LFT), and Glasgow Coma Score (GCS) after return to spontaneous circulation (ROSC) are often associated with outcomes, but specific cut-off values are lacking in evidence.
Objectives: To establish a correlation between NFT, LFT and GCS after ROSC and all-cause mortality.
Methods: Retrospective, observational, single-center study on patients admitted to an intensive care unit (ICU) unit of a tertiary hospital following OHCA between 2017 and 2019. Data were collected from clinical registries, receiving operating characteristic analysis was used to assess the impact of LFT, NFT and GCS after ROSC in predicting all-cause mortality (ACM). Kaplan–Meier survival analysis was performed.
Results: Among the 79 participants considered, 32.9% were female, with a mean age of 59.3 ± 15.1. The majority of OHCA were witnessed (84.8%), and basic life support was administered in 72.2% of cases. However, only 25.3% of these interventions involved the use of an automated external defibrillator.
A total of 59 patients (74.7%) died during follow-up (FUP). Mean FUP time in surviving patients was 3.9 years. Mean NFT was 4.1 ± 3.1 min and LFT was 22.7 ± 12.3 min. There was not a correlation between NFT and ACM. However there was a strong correlation between increasing LFT and ACM. Specifically, the use of a 15-min cutoff demonstrated the highest sensitivity and specificity in predicting mortality. Patients that face a LFT greater than 15 min had 2.1 times the risk of death when compared to patients with LFT of less than 15 min (HR: 2.07, CI 95% 1.124–3.34, $p = 0.045$).
Median GCS after ROSC was 3. It was found that GCS of 6 was the best cutoff value in terms of sensitivity and specificity to discriminate mortality risk. Patients with a GCS inferior to 6 had a statistically significant greater risk of mortality than patients with a GCS of at least 6 (HR: 4.43, CI 95% 1.73–11.32, $p < 0.001$).
Conclusions: Our study underscores the importance of time and neurological status in OHCA cases. NFT cannot be used to predict ACM as it is difficult to ascertain. In contrast, a LFT beyond 15 min and a GCS below 6 serve as key indicators associated with increased mortality risk.



GCS and LFT—All Cause Mortality.

References

1. None
2. None

Topic: Cardiac arrest

001236

Machine learning models vs. the ROX index for predicting high-flow nasal oxygen failure in COVID-19: a comparative study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001236

Introduction: Early identification of high-flow nasal oxygen (HFNO) failure in COVID-19 related acute hypoxemic respiratory failure is critical to prevent delayed intubation and improve outcomes. Traditional tools like the ROX index have limited early-stage accuracy.Artificial intelligence (AI) offers a promising approach to enhance predictive performance and support clinical decision-making in real time.
Objectives: To compare the predictive performance of multiple machine learning (ML) models with the ROX index in forecasting HFNO failure in critically ill COVID-19 patients.
Methods: This retrospective study included 386 adult COVID-19 patients treated with HFNO. HFNO failure was defined as the need for invasive mechanical ventilation or death under HFNO therapy. Patients were randomly divided into training (80%) and testing (20%) sets. Four ML algorithms, Logistic Regression (LR), Random Forest (RF), Extreme Gradient Boosting (XGBoost), and K-Nearest Neighbors (KNN) were trained using demographic, clinical, and biological features. Hyperparameterswere optimized using GridSearchCV. Performance was assessed using accuracy, recall, precision, specificity, area under the curve (AUC), and F1 score. The ROX index at Day 2 and Day 3 served as clinical benchmarks.
Results: XGBoost outperformed all other models with an AUC of 0.842, accuracy of 74.3%, recall of 62.5%, precision of 74.1%, specificity of 83.3%, and F1 score of 0.678. This model demonstrated excellent discrimination in identifying patients at high risk of HFNO failure. Random Forest achieved similar accuracy (74.3%) but had a lower AUC (0.743), recall (60.0%), and F1 score (0.612), reflecting slightly inferior but still robust performance. KNN yielded moderate results (accuracy 64.9%, AUC 0.640, F1 score 0.536), while Logistic Regression was the least effective (accuracy 59.5%, AUC 0.656, F1 score 0.464), highlighting the added value of non-linear, ensemble-based approaches in handling complex clinical datasets.

The ROX index, used as a reference standard, showed an AUC of 0.798 at Day 2 and 0.865 at Day 3. Although the Day 3 ROX score exhibited the highest AUC overall, XGBoost was superior at earlier timepoints, where clinical decision-making is most critical. Notably, the precision of XGBoost exceeded that of the ROX index at Day 2 (74.1% vs. 67.5%), suggesting improved ability to avoid false-positive predictions in early management.
Comparative ROC curve analysis emphasized the strong discriminatory capacity of XGBoost and RF over conventional logistic regression and the ROX index at early phases (Fig. 1). These findings support the integration of ML models, particularly XGBoost, to complement traditional tools and assist clinicians in early risk stratification and therapeutic planning.
Conclusions: Machine learning models, especially XGBoost, offer superior early prediction of HFNO failure as compared to traditional approaches, including the ROX index. Its incorporation into critical care workflows could enhance real-time clinical decision-making, optimize timing of intubation, and personalize management strategies in patients with severe COVID-19.

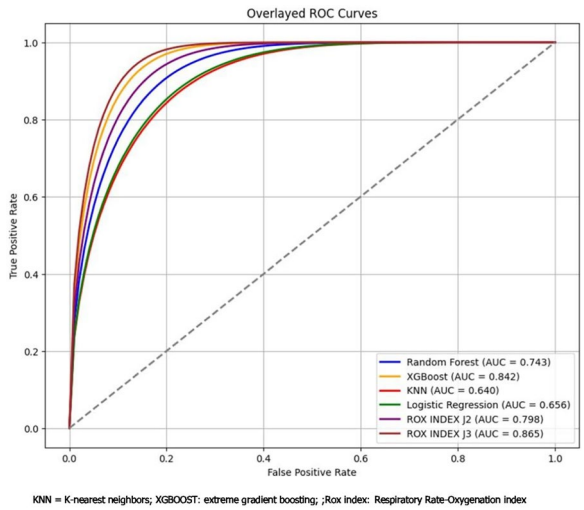


Fig. 1 (abstract 001236) ROC Curves of the Models Used

Topic: Information systems and Data Science

001237

Cerebral vasospasm after neurosurgery: beyond subarachnoid hemorrhage

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Introduction: Cerebral arterial vasospasm is commonly encountered after aneurysmal subarachnoid hemorrhage, and it is associated with delayed cerebral ischemia. However, it is not the only cause of cerebral vasospasm, under certain circumstances it can be developed in post-neurosurgical patients. Neurological deficit secondary to cerebral vasospasm following tumor resection can be a catastrophic event. Pathophysiological mechanisms underlying postoperative vasospasm are complex and multifactorial.
Objectives: The main objective of this study is to describe the characteristics of patients with vasospasm after tumor resection in a referral center and seach for probable predictors.
Methods: Cohort retrospective study analyzing consecutive patients who presented post-surgical vasospasm between January 2017 and May 2024 at an neurocritical care unit of a tertiary hospital. We collected demographic data, tumor features, surgical characteristics, vasospasm diagnosis and management. ANOVA and Chi-square tests were used accordingly. Statistical analysis wasperformed with SPSS, version 23. Significance was set at < 0.05.
Results: Twenty-two patients were enrolled, median age was 41 years, and 41% were female. The incidence is extremely low, 0.24% (2.4 events/1000 tumor brain surgeries). The most frequent location of lesions was in thesellar/suprasellar space (73%), and pituitary tumors were the most common pathology. The average time to develop vasospasm was 3 days and mostly was diagnosed using transcranial Doppler (86%). Almost all patients had anterior circulation compromised (91%). All patients needed pharmacological and supportive treatment, and more than half needed nimodipine. Incomplete recovery after vasospasm was reported in 13 patients (59%), and 3 patients (14%) died. No association was seen between outcome and the probable causative factors.
Conclusions: Cerebral vasospasm due to tumor resection is a rare but challenging complication with remarkably high morbidity and mortality in reported cases. A high index of suspicion is required for early diagnosis and prompt management. It should be considered in post-surgical patients with neurological impairment without evident cause.

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Topic: Neurointensive care

001238

Mismatch between attending's and residents' perceptions on diagnoses and care goals after intensive care unit rounds

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Introduction: Intensive care unit (ICU) rounds are frequently performed in academic hospitals to discuss information on diagnoses and care goals of admitted patients. However, experienced attending physicians might have different perceptions about this information compared with junior residents.
Objectives: To measure how much and which type of information were different between attendings and postgraduate year-1 residents after an ICU round, to evaluate the attending physician's and trainees' impressions of the residents' preparedness for patient care, and whether this perception mismatch might be associated with the quality of information misalignment.
Methods: A cross-sectional study was performed at an academic ICU at a large university-affiliated hospital in Sao Paulo, Brazil during twelve months. A standardized questionnaire was applied to residents and attending physicians immediately after an ICU round. No formal tool (e.g., checklists, standardized presentations, handoffs) was employed during the study period. Residents' preparedness for patient care was evaluated with a 10-point Likert scale separately by the attending physician and the trainee.
Results: Six hundred eighty-six case comparisons during 57 rounds were evaluated. Residents correctly identified 783 of 1,191 diagnoses reported by the attending physician (65.7%, 95% confidence interval [95% CI] 61–68). Residents also identified 868 of 1,329 goals and objectives mentioned by the attending physician (65%, 95% CI 62–68). Discordance in perceived perceptions of residents' preparedness did not influence the misinformation rate.
Conclusions: Information about diagnoses and care goals are similar between attendings and junior residents in only two of every three

opportunities after an ICU round. Mismatched information occurs in all aspects of care, including diagnoses, goals, procedures and code status, and is not influenced by divergent perceptions of the resident' readiness after the round. Our results might have implications for patient safety and quality of care in academic ICUs.

Topic: Health services research and outcome

001239

Comparison of two citrate concentrations for regional anticoagulation of continuous renal replacement therapy: an observational study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001239

Introduction: Regional citrate anticoagulation (RCA) is the preferred approach for continuous renal replacement therapy (CRRT), and different protocols with distinct citrate concentrations are available. However, if a higher citrate concentration is associated with longer filter lifespan as compared to a lower citrate concentration is poorly understood.
Objectives: Our objective was to study the effect of RCA with a higher citrate concentration (citrate 4%) compared with a lower citrate concentration (citrate 0.5%) on filter life span during CRRT.
Methods: A retrospective study was performed at a private tertiary medical-surgical intensive care unit (ICU) in Sao Paulo, Brazil. All adult (> 18 years old) patients who required CRRT with RCA were included. Patients with severe hepatic disease, with COVID-19 or requiring extracorporeal membrane oxygenation were excluded. A mixed Cox regression was used to analyze the association of two citrate concentrations (citrate 4% group and citrate 0.5% group) and take into account the influence of confounders that could also affect the outcome (filter life span) and the clustering effect (the same patients could receive more than one CRRT session). Observations were censored when CRRT was interrupted for any reason other than failure due to clotting at 72 h.
Results: From 2023 to 2024, one hundred twenty-nine patients (mean age was 73.8 years; 66.7% were men; median SAPS3 was 59; 81% received vasoactive drugs) received 596 CRRT sessions in our ICU (median 4 session per patient (IQR 4–10). All sessions were continuous venovenous hemodiafiltration. In the citrate 4% group ($n = 66$ patients with 253 sessions) vs citrate 0.5% group ($n = 63$ patients with 343 sessions), median filter life span was 69 h (IQR 46–72 h) vs 70 h (IQR 60–72) (unadjusted absolute difference, 4 h [95% CI 0.8–7.3 h]; $p = 0.08$ with Mann–Whitney test). Mixed Cox regression did not show an association between these two RCA groups with longer filter lifespan ($p = 0.43$), after adjustment for confounders (SAPS3, venous access type, year of ICU admission, post-filter hematocrit, use of vasoactive drugs during dialysis, and membrane type).
Conclusions: Among critically ill patients receiving continuous kidney replacement therapy, anticoagulation with a RCA protocol with citrate 4% compared with citrate 0.5% was not significantly associated with longer filter life span.

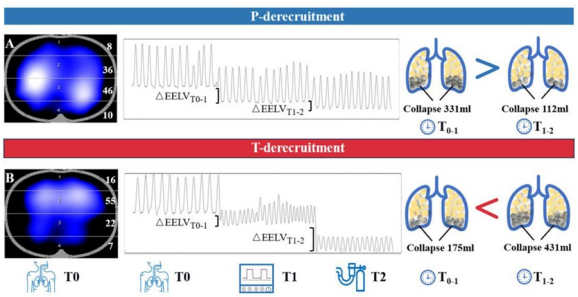
Topic: Acute kidney injury and hemofiltration

001240

EELV-associated phenotypes reveal the effect of different SBT methods on patients at high risk of extubation failure

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Intensive Care Medicine Experimental 2025,* 13(1)*:001240

Introduction: Spontaneous breathing trial (SBT) is typically conducted with pressure-support ventilation (PSV) or T-piece. Identifying potential extubation failure and selecting the optimal SBT method are still challenging. This study aimed to assess the effect of end-expiratory lung volume (EELV) on weaning outcome during different SBT methods.
Methods: Patients were conducted with pressure support of 8 cmH2O and positive end-expiratory pressure of 0 cmH2O for 30 min, and then replaced with a T-piece for 30 min if they passed the PSV-SBT, and were divided into T-piece SBT success and failure group. We acquired three 2-min EIT records at baseline (T0), after 30 min of PSV-SBT (T1) and after 30 min of T-piece SBT (T2). △EELVT0-1—△EELVT1-2 > 50 ml was defined as the P-derecruitment phenotype, △EELVT0-1—△EELVT1-2 < -50 ml was classified as the T-derecruitment phenotype.
Results: A total of 67 patients after cardiac surgery were included in the study of which 60 patients passed the PSV-SBT and 7 patients did not (10.4%). Of these 60 patients, 17 failed the T-piece SBT (28.3%) and 43 patients succeeded the weaning finally. Compared with T-piece SBT success ($n = 43$), the failure group ($n = 17$) showed a higher incidence of pendelluft (52.9% vs. 23.7%, $p = 0.033$) and a greater changes in tidal impedance variation (ΔTIV%: 38.8% vs. 27.8%, $p = 0.011$). No significant changes in EIT variables were observed between the PSV-SBT success and failure groups ($p > 0.05$). Meanwhile, the T-piece SBT failure group showed a greater reduction of ΔEELVT1-2 than ΔEELVT0-1 (400 [293, 436]ml vs. 199 [166, 269]ml, $p < 0.001$), while this reduction was lower in the success group (186 [129, 311]ml vs. 322 [247, 459]ml, $p < 0.001$). T-derecruitment phenotype represented the majority of the T-piece SBT failure group (64.7%) and had worse dorsal ventilation at baseline (40[39,46]% vs. 44[41,50]%, $p = 0.047$) than the P-derecruitment phenotype, which accounted for the majority of the success group (72.1%).
Conclusions: P-derecruitment and T-derecruitment phenotypes were related to the weaning outcome. Moreover, T-derecruitment phenotype was characterized by poor dorsal ventilation at baseline. The significant reduction of EELV during the T-piece SBT revealed the effect of lung collapse.



P-derecruitment phenotype was △EELVT0-1—△EELVT1-2 > 50 ml, T-derecruitment phenotype was △EELVT0-1—△EELVT1-2 < -50 ml; A represents a patient with better dorsal ventilation (56%) at baseline (T0) succeed the T-piece SBT and his lung collapse occurred mainly at T0-1; B represents a patient with worse dorsal ventilation (29%) at baseline (T0) failed the T-piece SBT and his lung collapse occurred mainly at T1-2. EELI, end-expiratory lung impedance.
Topic: Acute respiratory failure and mechanical ventilation

001241

The characteristics and clinical outcome of elderly critically ill surgical abdomen patients in single center study

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Introduction: Acute abdominal pain accounts for 4–9.1% of all emergency department visits. Clinical investigation of patients with acute abdominal pain is critical to guide further evaluation with laboratory tests and imaging studies. Acute abdomen patients are at high risk for complications and death, and patients with actual or impending organ failure or life-threatening disability due to severe comorbidities are typically admitted to an intermediate or intensive care unit (ICU) for real-time monitoring of organ function, management of associated sepsis, or optimization of perioperative hemodynamics for emergency or elective surgery.
In the aging society, surgery for acute abdomen in the elderly population is increasing, and studies have been conducted on the elderly and their impact in each disease group, but not much has been reported on the impact in the intensive care unit. In particular, there is only limited review of the emergency abdominal surgery population. Therefore, this study aims to identify the clinical characteristics and outcomes of advanced age in critically ill patients undergoing surgery for sexual abdominal disease.
Methods: 372 patient charts were retrospectively reviewed from 2018 to 2023 underwent abdominal surgery and critical care in National Health Insurance Ilsan Hospital (NHISIH) whom were diagnosed with surgical abdomen in Emergency Room. 89 patients were excluded due no ICU admission or no abdominal surgery. The patient was divided into three groups, young elderly patient group (YEPG), patients over eighty (POE) and nonelderly patient group. Also risk factor of mortality of critically ill surgical abdomen patients was analyzed.
Results: The average age of nonelderly, elderly and patients over eighty(POE) were 49.4 ± 9.6, 71.5 ± 6.0 and 85.1 ± 3.9 ($p < 0.001$) respectively. The proportion of hypertension increased between age groups with 25.4%, 56.3% and 71.4% and the frailty rate also increased with age of 7.5% 7.1% and 25.7% ($p < 0.001$) respectively. Severe complication rate of these groups was 10.4%, 19.5% and 25.7% ($p = 0.02$) respectively. The mortality of the three groups were 4.5%, 5.4% and 14.3% ($p = 0.02$) respectively. The risk factors of mortality of critically ill surgical abdomen patients was analyzed and POE were 6.68 more like to die compared to non elderly group (6.68, 1.18–37.66, $p = 0.03$). Other risk factors with significance was SOFA score (OR 1.32, 1.15–1.52, $p < 0.001$), and use of antifungal agent (OR 12.68, 3.15–51.08, $p < < 0.001$).
Conclusions: Pateints over eighty group was more likely to have poorer outcomes in critically ill surgical abdomen patients in ICU.

Table 1 (abstract 001241) Characteristics and outcome of nonelderly, younger–elderly, and older–elderly of critically ill surgical abdomen patients

	Non-elderly (*n =67*)	Elderly *(n =112)*	Octogenarian *(n=105)*	P- value
Age	49.4±9.6	71.5±6.0	85.1±3.9	<0.001**
Sex M (%)	49 (73.1)	69 (61.5)	27(25.7)	<0.001*
HTN	17(25.4)	63 (56.3)	75(71.4)	<0.001*
DM	9(13.4)	30(32.1%)	31(29.5)	0.44*
CKD	4(6.0)	10(11.4)	15(14.3)	0.074*
Liver disease	4(6.0)	7(6.3)	10(9.5)	0.38*
CVD	5(7.5)	13(11.6)	8(7.6)	1.00*
Frailty	5(7.5)	8(7.1)	27(25.7)	<0.001*
APCT perforation	29(43.3)	56(50.0)	53(50.0)	0.39*
Shock at ER	7(10.4)	7(6.3)	12(11.4)	0.69*
ASA				<0.001*
1	7(10.4)	1(0.9)	0(0.0)	
2	18(26.9)	18(16.1)	10(9.5)	
3	31(46.3)	81(72.3)	74(70.5)	
4	9(13.4)	12(10.7)	20(19.0)	
5	2(3.0)	0(0.0)	1(1.0)	
Surgery				
Cancer	5(7.5)	11(9.8)	16(15.2)	0.11*
Appendicitis	14(20.9)	23(20.5)	16(15.2)	0.32*
Cholecystitis	5(7.5)	8(7.1)	10(9.5)	0.67*
Trauma	10(14.9)	5(4.5)	4(3.8)	0.009*
OP time (min)	126.7±83.6	127.2±79.0	110.5±58.3	0.19**
Severe complication	7(10.4)	22(19.6)	27(25.7)	0.02*
ICU				
APACHE II	18.9±9.5	20.2±9.0	23.6±8.4	0.002**
SOFA	7.0±4.8	7.11±4.4	7.9±4.0	0.29**
mNutric score High	23(34.3)	69(61.6)	90(85.7)	<0.001*
Ventilator	23(34.3)	42(37.5)	58(53.3)	0.01*
Inotrope	43(64.2)	69(61.6)	80(76.2)	0.07*
CRRT	2(3.0)	6(5.4)	11(10.5)	0.06*
Dialysis	4(6.0)	13(11.6)	14(13.3)	0.17*
Antifungal	2(3.0)	8(7.1)	6(5.7)	0.62*
ICU readmission	3(4.5)	7(6.3)	6(5.7)	0.87*
Hospital Stay (D)	12(2-184)	16(3-109)	15(1-152)	0.78**
ICU stay	1(0-80)	2(0-67)	2(0-86)	0.59
Death	3(4.5)	6(5.4)	15(14.3)	0.02*
In ICU	3(4.5)	5(4.5)	13(12.4)	0.04*

* Linear to linear, ** ANOVA HTN =Hypertension, DM = Diabetes Mellitus, CKD = Chronic Kidney Disease, CVD = Cardiovascular disease, ICU =Intensive Care Unit

Table 2 (abstract 001241) Characteristics and outcome of survivor and nonsurvivor of critically ill surgical abdomen patients

	Survivor (n=260)	Non-survivor (n=24)	P- value
	70.1±15.0	77.7±13.4	0.03**
Age			0.025*
<65	64(24.6)	1(12.5)	
65-79	106(40.8)	6(25.0)	
>=80	90(34.6)	15(62.5)	
Sex M (%)	136 (52.3)	9(37.5)	0.17*
HTN	138(53.1)	17(70.8)	0.1*
DM	66(25.4)	10(41.7)	0.09*
CKD	23(8.8)	6(25.0)	0.01*
Liver disease	19(7.3)	2(8.3)	0.85*
CVD	24(9.2)	2(8.3)	0.89*
Fraility	34(13.1)	6(25.0)	0.11
APCT perforation	124(47.7)	14(58.3)	0.32
Shock at ER	21(8.1)	5(20.8)	0.04*
ASA			<0.001
1	8(3.1)	0(0.0)	
2	46(17.7)	0(0.0))	
3	173(66.5)	13(54.2)	
4	32(12.3)	9(37.5)	
5	1(0.4)	2(8.3)	
ASA>=4	33(12.7)	11(45.8)	<0.001**
Surgery			
Cancer	28(10.8)	4(16.7)	0.38*
Appendicitis	51(19.6)	2(8.3)	0.18*
Cholecystitis	23(8.8)	0(0.0)	0.13*
Trauma	18(6.9)	1(4.2)	0.61*
OP time (min)	119.0±71.4	141.8±91.3	0.15
Clavien Dindo >=3	33(12.7)	23(95.8)	<0.001*
ICU			
APACHE II	20.5±9.86	28.8±7.6	<0.001
SOFA	6.9±3.9	13.2±4.6	<0.001
mNutric score High	159(61.2)	23(95.8)	0.001*
Ventilator	97(37.3)	24(100.0)	<0.001*
Inotrope	168(64.6)	24(100.0)	<0.001*
CRRT	8(3.1)	11(45.8)	<0.001*
Dialysis	18(6.9)	13(54.2)	<0.001
Antifungal	7(2.7)	9(37.5)	<0.001
ICU readmmission	12(4.6)	4(16.7)	0.01
Hospital Stay (D)	15(2-184)	12(1-102)	0.67
ICU stay	1.5(0-80)	11.5(1-86)	0.005

* Chi, ** t-test

Table 3 (abstract 001241) The risk factors of mortality of critically ill surgical abdomen patients

	OR	95% confidence interval	*P*-value
Non-elderly	Ref		
Elderly	1.43	0.20 – 9.95	0.72
Octagenrian	6.68	1.18-37.66	0.03
Shock at ER	0.95	0.20-4.61	0.95
SOFA	1.32	1.15-1.52	<0.001
Antifungal	12.68	3.15-51.08	<0.001
ICU stay	0.98	0.93-1.02	0.25
ICU readmission	0.94	0.16-5.53	0.94
ASA>=4	2.79	0.86-9.03	0.86

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Topic: Perioperative care

001244

Ultrasound-guided in-plane subclavian puncture versus landmark technique: the MISP randomized trial

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Intensive Care Medicine Experimental 2025,* 13(1):*001244

Introduction: Central venous catheterization (CVC) via the subclavian vein is a standard procedure in medicine. Ultrasound guidance is increasingly recommended to improve success rates and reduce complications. The *Microconvex In-plane Subclavian Puncture* (MISP) technique represents a refined approach which yields advanced imaging capabilities and allows precise needle placement and visualization of surrounding structures (Fig. 1) [1]. In contrast, the *Landmark with Ultrasound Prescan* (LP) method relying on anatomical landmarks is associated with high operator variability and higher complication rates [2,3].

We therefore hypothesized that the ultrasound-guided MISP technique provides a higher success rates and less complications than the Landmark Prescan (LP) technique.

Methods: In this randomized controlled trial, 101 patients scheduled for elective surgery were enrolled and randomly assigned to either the MISP or LP technique. The primary endpoint was an a priori created risk-based complication score. Secondary and exploratory endpoints included success rates, complication rates, and procedural times. We performed two-sided Student's *t* tests, Chi-square tests and the Mann–Whitney *U* test with a significance level of 0.05. Data are presented in mean ± standard deviation.

Results: We randomized 51 patients to the MISP and 50 patients to the LP technique (Fig. 2). Patient characteristics were well balanced between the treatment groups (Table 1).

The overall risk score was significantly lower in the MISP group (6.4 ± 5.9 vs. 11.6 ± 10.8; $p = 0.028$; Table 2). In addition, the MISP technique demonstrated significantly higher as-treated overall success rates (86% vs. 71%, $p = 0.046$) and significantly reduced the risk of arterial punctures (1.9% vs. 12%, $p = 0.047$).

After failure with the LP technique, CVC placement was successfull in all patients with the MISP technique, whereas a single failure with the MISP technique remained unsuccessful after switching to the LP technique (Fig. 2). First-pass success with a single skin puncture and no change in needle direction was also more frequent in the MISP compared to the control group (20 out of 51 versus 4 out of 50, $p < 0.001$). Average procedural time was five minutes longer in the MISP group ($p < 0.001$).

Conclusions: The ultrasound-guided MISP technique for subclavian CVC placement significantly reduces risk for complications and increases success rates compared to the LP technique. This clearly outweighs an increase in procedural time by only 5 min with the MISP technique. Further studies should evaluate the implementation of the MISP technique as a standard approach for subclavian vein catheterization.

Table 1 (abstract 001244) Biometrics of participants

	MISP group (51 patients)	LP group (50 patients)	P value
Age (years)	64.8 ± 12.8	64.3 ± 12.6	0.862
Sex			
female	21 (41%)	21 (42%)	0.934
Height (cm)	171 ± 8	171 ± 9	0.989
BMI (kg/m²)	27 ± 6,1	26 ± 4,5	0.241
ASA (1-4)			0.552
1	1 (2%)	1 (2%)	
2	15 (29%)	18 (36%)	
3	34 (67%)	30 (60%)	
4	1 (2%)	1 (2%)	
Surgery			0.407
Colon	16 (31%)	11 (22%)	
Pancreas	13 (25%)	19 (38%)	
Liver	13 (25%)	6 (12%)	
Vascular	2 (4%)	6 (12%)	
Oesophagus	2 (4%)	1 (2%)	
Gastric	3 (6%)	2 (4%)	
Others	2 (4%)	5 (10%)	

Data are presented as mean ± standard deviation or number of patients (percentage in parentheses). Study group MISP = Microconvex In-plane Subclavian Puncture. Control group LP = Landmark with Prescan. ASA = Classification according to the American Society of Anesthesiologists. Statistical analysis: Student's T-test or Chi-square test.

Table 2 (abstract 001244) Risk score with subscores of patients with successful attempts as randomized

	MISP group (43 patients)	LP group (36 patients)	P-value
Total Score	**6.4 ± 5.9**	**11.6 ± 10.8**	**0.028**
Puncture attempts (2 points for any additional skin puncture, 1 point for any change in needle direction, maximum: 5 points):			0.028
0 points	20 (47%)	4 (11%)	
1 point	4 (9%)	14 (39%)	
2 points	7 (16%)	4 (11%)	
3 points	1 (2%)	4 (11%)	
4 points	2 (5%)	2 (6%)	
5 points	9 (21%)	8 (22%)	
Core time (from skin puncture until blood aspiration through all lines):			-
0 points (< 20 minutes)	43 (100%)	36 (100%)	
1 point (20-30 minutes)	0 (0%)	0 (0%)	
2 points (30-40 minutes)	0 (0%)	0 (0%)	
3 points (40-50 minutes)	0 (0%)	0 (0%)	
4 points (> 50 minutes)	0 (0%)	0 (0%)	
Arterial puncture (7 points)	0 (0%)	3 (8%)	0.076
Haematoma (5 points)	0 (0%)	3 (8%)	0.076
Puncturing of posterior wall of the vein (5 points)	20 (47%)	15 (42%)	0.331
Pneumothorax (10 points)	1 (2%)	1 (3%)	0.989
Haemothorax (10 points)	0 (0%)	0 (0%)	-
Misposition of CVC (7 points)	1 (2%)	0 (0%)	0.320

Data are presented as mean ± SD or n (%), and were compared with Mann-Whitney-U- or Chi² tests. Study group MISP = Microconvex In-plane Subclavian Puncture. Control group LP = Landmark with Prescan. CVC: central venous catheter.

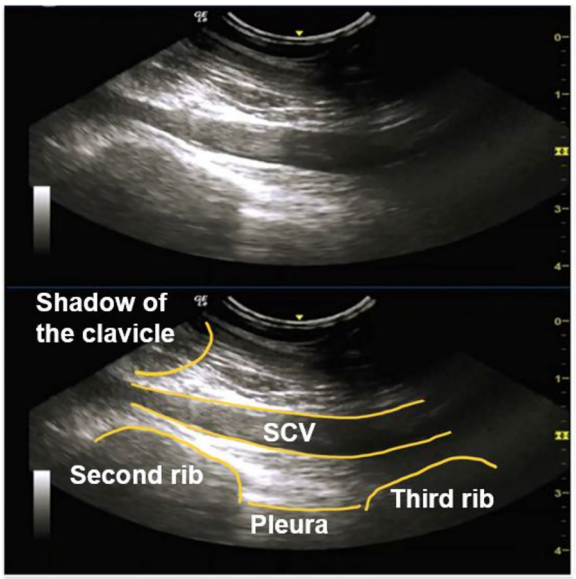


Fig. 1 (abstract 001244) Ideal sonographic image of the subclavian vein in the long axis. SCV = subclavian vein

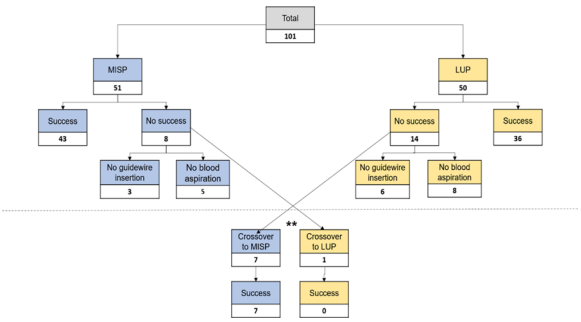


Fig. 2 (abstract 001244) CONSORT Flowchart

Blue boxes: study group MISP = Microconvex In plane Subclavian Puncture; yellow boxes: control group LP = Landmark with Prescan. CVC placement in MISP technique was successful in 43/51 cases; CVC placement in LP technique in 36/50 cases (84% vs. 72%, $p = 0.134$). Below the line the figure shows CVC placements after crossover (crossing arrows)—color-coded according to the method ultimately used. Success rate for crossover-patients differed significantly. **: $p = 0.005$.

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Topic: Perioperative care

001245

Screening and prognostic value of malnutrition in elderly critically Ill patients: association of m-NUTRIC and GLIM scores with 28- and 90-day mortality

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Intensive Care Medicine Experimental 2025,* 13(1)*:001245

Introduction: An ideal screening and diagnostic tool for malnutrition risk in ICU patients is still lacking. Malnutrition is a major contributor to poor clinical outcomes in critically ill patients.
Objectives: In this study, we aimed to screen and diagnose malnutrition in critically ill patients using m-NUTRIC scores and GLIM criteria, and to determine the relationship between malnutrition and mortality in high-risk patients.
Methods: The study was prospective in design and included 250 patients over the age of 60 who were hospitalised in the Medical ICU for more than 72 h. The m-NUTRIC score and the GLIM criteria were assessed within the first 24 h of admission to the ICU.
Results: The median age of the patients was 71 (IQR: 65–77) years and 55% were male. Overall, 64% of patients were malnourished according to the mNUTRIC score, and 68% according to the GLIM criteria. The GLIM criteria were significant ($p < 0.001$) in ROC analyses for predicting 28-day ICU mortality. The m-NUTRIC score and the GLIM criterion were significant in ROC analyses for the prediction of 90-day mortality in the ICU. The m-NUTRIC score was found to predict 28-day mortality in our population with the best sensitivity and specificity at a cut-off of 5.5 points. The m-NUTRIC score was found to predict 90-day mortality in our population with the best sensitivity and specificity at a cut off of 4.5 points.
Conclusions: Malnutrition is common among elderly critically ill patients and is strongly associated with increased mortality. Both the m-NUTRIC score and GLIM criteria are effective tools for early identification of nutritional risk and prediction of 28- and 90-day mortality. Incorporating these tools into routine practice may support timely nutritional interventions and improve patient outcomes.

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Topic: Metabolism, endocrinology, liver failure and nutrition

001246

Complications of tracheostomy in ICU: comparison between percutaneous and surgical techniques

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Intensive Care Medicine Experimental 2025,* 13(1)*:001246

Introduction: Tracheostomy is a commonly performed procedure in critically ill patients requiring prolonged ventilatory support. It can be performed percutaneously or surgically, offering advantages such as improved patient comfort, reduced sedation, and earlier weaning. Despite these benefits, it carries risks of both early (e.g., infection, bleeding, pneumothorax) and late complications (e.g., tracheal stenosis, tracheomalacia, dysphagia, tracheoesophageal fistula).
Objectives: To describe the complications related to the performance of tracheostomies (TQ) and analyze their frequency based on whether they are performed using a PDT in the ICU or ST by surgical team.
Methods: A retrospective observational study that includes all patients admitted to the ICU over a 4-year period (08/20–11/24) who underwent TQ. Clinical and demographic variables were collected, as well as those related to the performance of TQ (percutaneous or ST) and associated complications (bleeding (SE) or stoma infection, intratracheal SE, development of tracheobronchitis (TKB), dysphagia). Quantitative variables are expressed as means ± standard deviation. Qualitative variables are expressed as proportions of the total. Statistical analysis of the data was performed using Chi-square.
Results: 336 patients, 67.56% male, mean age 60 ± 12 years. 79.7% of tracheostomies were performed percutaneously in the ICU, while the remaining 20.3% were performed surgically. Complications related to the percutaneous technique included: 39.9% hemorrhagic (33.5% stoma SE, 66.5% intratracheal SE), 14.2% infectious (97% TKB, 3% stoma infection), and 16.4% dysphagia. In the surgical technique, complications were: 73.5% hemorrhagic (48% stoma SE, 52% intratracheal SE), 30.8% infectious (57% TKB, 43% stoma infection), and 23.5% dysphagia. Statistical analysis showed that the ST technique had a higher rate of hemorrhagic complications ($p = 0.0009$) and infectious complications ($p = 0.0004$) compared with the percutaneous technique, with no significant differences in the risk of dysphagia ($p = 0.172$).
Conclusions: The study shows that TQ performed using the percutaneous technique has a more favorable complication profile. ST presents more hemorrhagic and infectious complications compared to percutaneous ones, with these differences being statistically significant. There were no differences in the risk of dysphagia between the two techniques.

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Topic: Acute respiratory failure and mechanical ventilation

001247

Mitochondrial oxygen tension to guide resuscitation in septic shock: a prospective observational multicenter study

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Introduction: Dissociation between the macro- and microcirculation and the lack of specific markers to indicate tissue hypoxia complicate septic shock resuscitation. A newly developed non-invasive method of measuring mitochondrial oxygen tension (mitoPO2) may be the most downstream bedside marker of tissue oxygen balance and perfusion. As such, mitoPO2 might be a superior signal of inadequate tissue perfusion than conventional markers.
Objectives: To investigate the relation between mitoPO2 and organ dysfunction and mortality of septic shock, as well as the utility of mitoPO2 to trigger fluid resuscitation.
Methods: This was a multicenter observational study in three large mixed ICU's in the Netherlands. 72 septic shock patients were included between 2019 and 2022. The mitochondrial oxygen tension was

sequentially measured every 2 h during the first 24 h of ICU admission. The time course of mitoPO2 was investigated in relation to other hemodynamic variables and parameters of tissue oxygenation, delta SOFA score, and mortality. In total 43 crystalloid fluid boluses of 500 cc were administered in between two sequential mitoPO2 measurements as part of standard of care. The response of mitoPO2 and other parameters of deranged physiology to a crystalloid fluid bolus was evaluated based on baseline values. Using mathematical modelling we identified an a priori threshold of abnormal mitoPO2 of lower than 40 mmHg.

Results: In survivors, mitoPO2 improved from 54(39–64) mmHg to 78(43–88)mmHg (p = 0.022) whereas in nonsurvivors, mitoPO2 decreased from 48(35–56)mmHg at baseline to 39(35–69)mmHg within the first 24 h. A mitoPO2 increase from 65(53–84)mmHg to 85(80–103) mmHg was also observed in patients whose SOFA score improved. In contrast, a high lactate did not decrease in patients with good outcome. In addition, (a-v)pCO2 gap and ScvO2 did not change during the study period and did not differ between mortality and delta-SOFA.

In response to fluid therapy (Fig. 1), mitoPO2 increased only in patients with a baseline mitoPO2 < 40 mmHg from a mean of 24 to 34 mmHg (p = 0.009) but not in patients with mitoPO2 > 40 mmHg. In contrast, patients with an abnormal lactate (> 2 mmol/L), low ScvO2 (< 65%) or high (a-v)pCO2 gap (> 0.8 kPa) did not show an improvement after fluid therapy, nor an increase in mitoPO2.

Conclusions: Septic shock patients with persistently low mitoPO2 during the first day of ICU admission had a higher mortality and more organ dysfunction whereas adequate mitoPO2 was indicative of recovery. Furthermore, low mitoPO2 is improved by fluid therapy, whereas conventionally used markers such as lactate and ScvO2 are not. Overall, mitoPO2 could be a new trigger of septic shock resuscitation.

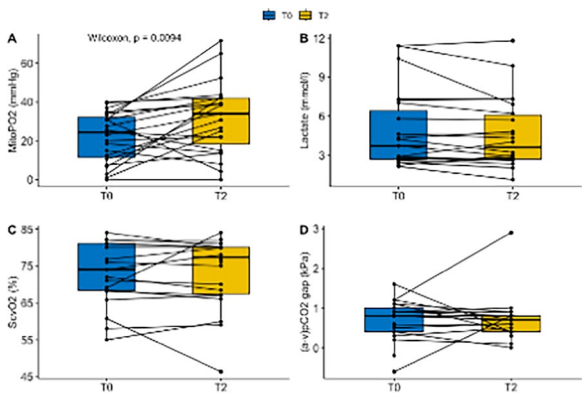


Fig. 1 (abstract 001247) Boxplots of **A** low mitoPO2, **B** High lactate, **C** ScvO2 and **D** (a-v)pCO2 gap before and after 500 cc fluid bolus. Change in individual patients shown with lines. Only p values of statistically significant differences shown. Tested with Wilcoxon signed rank test

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2. JP is supported by the ESICM NEXT grant

Topic: Sepsis

001249

Aortic pulse pressure more accurately reflects stroke volume and its variation better predicts preload responsiveness during passive leg raising

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Introduction: Pulse pressure (PP) primarily depends on stroke volume (SV) and arterial stiffness [1]. For a given vascular compliance within the same patient, variations in PP (ΔPP) reflect changes in SV. While this relationship holds true for aortic pulse pressure (aoPP), it is less accurate for peripheral PP due to pulse wave amplification. Recently, Chemla et al. validated a novel formula to estimate aortic systolic blood pressure (aoSBP) using mean arterial pressure (MAP) and diastolic arterial pressure (DBP): aoSBP = MAP^2/DBP [2]. Based on this new formula, aoPP = aoSBP-DBP.

Objectives: To assess the correlation between aoPP and SV, and to evaluate the ability of aoPP variation (ΔaoPP) to predict preload responsiveness during a passive leg raise (PLR) maneuver.

Methods: This was a retrospective analysis of a multicenter prospective database including patients who underwent PLR to assess fluid responsiveness. Patients were classified as preload responsive if the velocity–time integral of the subaortic flow (VTI) increased by ≥ 15% during PLR. Correlations between ΔaoPP and PLR-induced changes in VTI were analyzed. The global performance of ΔaoPP and peripheral ΔPP in predicting preload responsiveness was compared by calculating their area under the receiver operating characteristic curves (AUC), adjusted to baseline VTI mean. Then, the optimal cutpoints of ΔaoPP were given with the Youden test for 3 ranges of VTI, after 1000 bootstraps iterations.

Results: A total of 100 patients were included, with a median age of 63 years [IQR, 56–72]. Septic shock was the primary diagnosis in 51% of cases, with a median SAPS II score of 52 [IQR, 38–65]. All patients were spontaneously breathing, and 29% were receiving mechanical ventilation. At inclusion, 74% were on norepinephrine with a median dose of 0.2 µg/kg/min [IQR, 0.1–0.5], and 49% were preload responsive. VTI mean was 19.0. A significant correlation was found between ΔaoPP and PLR-induced changes in VTI (R^2 = 0.48; p = 0.009), whereas no such correlation was observed for peripheral ΔPP (R^2 = 0.00096; p = 0.334) (Fig. 1). In the whole population, after adjusted for VTI mean, ΔaoPP demonstrated superior predictive value for preload responsiveness (adjusted AUC = 0.865 for a cutpoint of 8%; sensitivity = 84%, specificity = 80%; p = 0.001), unlike peripheral ΔPP (adjusted AUC = 0.591 for a cutpoint of 7%; sensitivity = 49%, specificity = 76%; p = 0.4) (Fig. 2). For specific ranges of VTI, the optimal cutpoints of ΔaoPP were given as follow; for VTI < 14 cm, AUC = 1 for a cutpoint of 4%, sensitivity = 78%, specificity = 100%; for VTI between and 22 cm, AUC = 0.966 for a cutpoint of 8%, sensitivity = 86%, specificity = 100%; for VTI > 22 cm, AUC = 0.929 for a cutpoint of 14%, sensitivity = 86%, specificity = 90% (Table 1).

Conclusions: In spontaneously breathing critically ill patients, ΔaoPP is more closely correlated with SV estimated by subaortic VTI and more accurately predicts preload responsiveness than peripheral ΔPP.

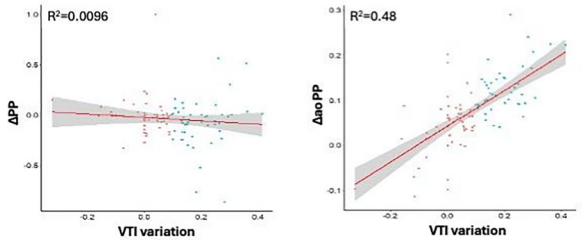


Fig. 1 (abstract 001249) Correlation curves between ΔaoPP and PLR-induced changes in velocity–time integral of the subaortic flow (VTI). *ΔPP* Peripheral pulse pressure variation, *ΔaoPP* Aortic pulse pressure variation

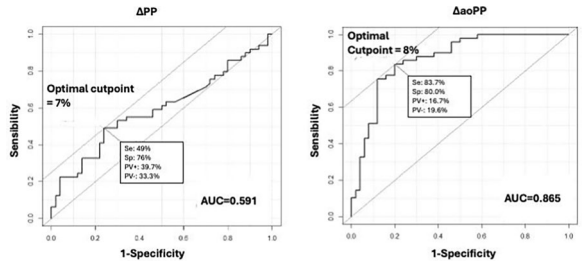


Fig. 2 (abstract 001249) Optimal cutpoint to predict preload responsiveness during a passive leg raise maneuver adjusting on the velocity–time integral of the subaortic flow (VTI) mean of the population. *ΔPP* Peripheral pulse pressure variation, *ΔaoPP* Aortic pulsepressure variation

Table 1 (abstract 001249) The global performance of ΔaoPP in predicting preload responsiveness adjusted to the velocity–time integral of the subaortic flow (VTI)

Range of VTI	Optimal Cutpoint of ΔaoPP	AUC	Sensitivity	Specificity
Global population	8%	0.865	84%	80%
<14cm	4%	1	78%	100%
≥ 14 cm and ≤ 22cm	8%	0.966	86%	100%
> 22 cm	14%	0.929	86%	90%

ΔaoPP Aortic pulse pressure variation

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Topic: Cardiovascular issues in ICU

001250

Analysis of factors associated with ICU readmission in surgical ICU patients

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Introduction: ICU readmission occurs when a patient's condition falls unexpectedly after discharge. It is linked to higher mortality, prolonged hospitalization and increased costs. As up to 42% of ICU readmissions are preventable, identifying modifiable risk factors is essential. This study examines risk factors for ICU readmission within 48 h and 7 days post-discharge.
Methods: A retrospective review was conducted on SICU patients at National Insurance Service Ilsan Hospital from January 2020 to December 2023. Patients who stayed more than 24 h in the SICU were included. Exclusion criteria were patients who expired in the ICU, were transferred to other facilities, were discharged directly from ICU, were under 20 years old, or pregnant. Demographic variables, APACHE II scores, mechanical ventilator use, inotropic use, vital signs before SICU discharge, and laboratory results were collected.
Results: Among 2,199 patients analyzed, 158 were readmitted within 48 h and 212 within 7 days. Both groups had higher APACHE II scores, mechanical ventilation and norepinephrine use at discharge. Critical vital signs, such as low blood pressure and oxygen saturation were significantly more prevalent. In-hospital mortality was significantly higher in ICU readmitted patients: 60 (38%) within 48 h and 83 (39.2%) within 7 days, compared to 266 (13%) and 243 (12.2%) in non-readmitted patients, respectively. Norepinephrine use, RR > 30/min, SpO2 < 90%, WBC > 10,000, platelet < 150,000, and sodium > 145 mEq on the discharge day, along with mechanical ventilator use, were associated with both 48-h and 7-day readmission. SBP < 90 mmHg was identified as a risk factor for 7-day readmission.
Conclusions: This study identifies key contributing factors for ICU readmission in surgical patients. Recognizing these factors can aid decision-making, reduce readmissions and improve patient outcomes. Addressing modifiable risks through targeted interventions may optimize ICU care and resource utilization.

Table 1 (abstract 001250) Risk Factors associated with ICU readmission with 48 h

Variable	OR [95% CI], p-value
Sex	1.297 [0.853–1.972], 0.223
DM	1.173 [0.774–1.778], 0.453
APACHE II > 25	1.487 [0.947–2.334], 0.085
PCT > 1.0	1.213 [0.763–1.928], 0.415
Mechanical ventilation	3.742 [2.223–6.298], <0.001
Norepinephrine use during ICU admission	1.414 [0.686–2.912], 0.348
Norepinephrine use in ICU discharge day	9.936 [6.570–15.025], <0.001
SBP < 90 in ICU discharge day	1.206 [0.697–2.087], 0.502
RR > 30 in ICU discharge day	2.564 [1.563–4.205], <0.001
HR > 120 in ICU discharge day	1.503 [0.946–2.387], 0.084
BT > 38.3 in ICU discharge day	0.920 [0.596–1.418], 0.704
SpO_2 < 90% in ICU discharge day	2.123 [1.348–3.344], 0.001
WBC > 10000 in ICU discharge day	1.934 [1.285–2.910], 0.002
Platelet < 150000 in ICU discharge day	0.997 [0.994–0.999], 0.001
K^+ < 3.5 in ICU discharge day	1.206 [0.786–1.848], 0.391
Na^+ > 145 in ICU discharge day	2.152 [1.029–4.499], 0.042

Table 2 (abstract 001250) Risk factors associated with ICU readmission within 7 days

Variable	OR [95% CI], p-value
Sex	1.341 [0.928–1.938], 0.118
Cardiac disease	1.404 [0.919–2.146], 0.117
APACHE II > 25	1.458 [0.978–2.172], 0.064
PCT > 1.0	1.055 [0.700–1.590], 0.798
Mechanical ventilation	3.479 [2.219–5.454], <0.001
Norepinephrine use during ICU admission	1.176 [0.659–2.098], 0.584
Norepinephrine use in ICU discharge day	6.381 [4.353–9.355], <0.001
SBP < 90 in ICU discharge day	1.983 [1.279–3.074], 0.002
RR > 30 in ICU discharge day	2.711 [1.756–4.186], <0.001
HR > 120 in ICU discharge day	1.353 [0.880–2.082], 0.169
BT > 38.3 in ICU discharge day	1.138 [0.775–1.670], 0.510
SpO_2 < 90% in ICU discharge day	2.406 [1.601–3.617], <0.001
WBC > 10000 in ICU discharge day	1.948 [1.358–2.794], <0.001
Platelet < 150000 in ICU discharge day	0.997 [0.995–0.999], <0.001
K^+ < 3.5 in ICU discharge day	1.210 [0.827–1.769], 0.326
Na^+ > 145 in ICU discharge day	2.248 [1.147–4.404], 0.018

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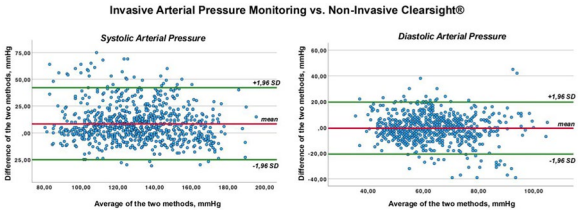
Topic: Perioperative care

001253

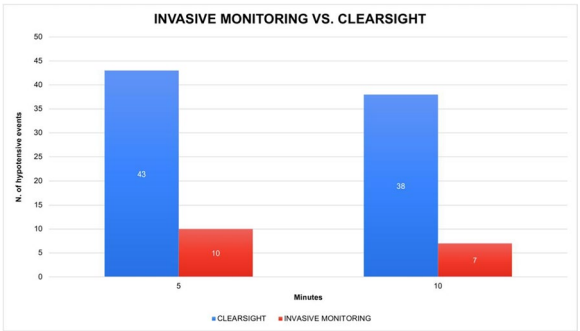
Agreement between noninvasive Clearsight® and invasive arterial pressure and impact on the hypotension prediction index applicability: an observational study in cardiovascular operating room

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Intensive Care Medicine Experimental 2025,* 13(1)*:001253

Introduction: Continuous noninvasive monitoring systems, e.g. ClearSight®, are increasingly used in the anesthesia field in place of the standard invasive arterial catheter allowing early hypotensive events prediction through the algorithm "hypotension prediction index" (HPI) promoting a timely intervention [1].
Feasibility of continuous noninvasive monitoring in patients with moderate-to-high surgical risk remains controversial [2], [3]. We aimed to assess the agreement between invasive arterial monitoring and Clearsight® in patients undergoing cardiac and vascular surgery. HPI performance in predictive arterial hypotension was also evaluated.
Methods: 40 consecutive patients undergoing cardiac or vascular surgery were prospectively enrolled over 12 months: they were simultaneously equipped with an invasive monitoring and Clearsight® with HPI algorithm. Systolic, diastolic and mean arterial pressures (SAP, DAP, MAP) from both systems were recorded every 5 min during surgery and values compared (unpaired Student's *t* test). Limits of agreement between methods were established as the mean difference ± 1.96 SD of the differences, as described by Bland and Altman. Agreement and Lin's concordance correlation coefficient (CCC) was calculated. The HPI's predictive ability was evaluated by annotating the hypotensive events (e.g. MAP < 65 mmHg at 5 and 10 min from an HPI value of 100 or 2 consecutive values between 85 and 100).
Results: Surgery mean duration was 97 min (20–310 min), bringing to approximately 808 concurrently invasive and noninvasive arterial pressure measures. Clearsight® SAP was significantly lower compared to invasive SAP (mean diff −8.5 mmHg, $p < 0.001$), while DAP was equivalent. As shown in Fig. 1, the agreement between the methods was poor (CCC 0.69[0.66–0.73] for both SAP and DAP). HPI predicted 152 hypotensive events; of these, 81 real hypotensive events were observed at 5 and 10 min at the Clearsight®. However, considering the invasive arterial monitoring, only 10 and 7 real hypotension occurred (Fig. 2).
Conclusions: No reliable agreement between invasive arterial monitoring and Clearsight® was observed in cardiovascular surgical patients. Thus, HPI values suggestive of arterial hypotension may be misleading and could result in overtreatment.



As shown in Fig. 1, the agreement between the methods was poor (CCC 0.69[0.66–0.73] for both SAP and DAP): Clearsight® SAP was significantly lower compared to invasive SAP (mean diff −8.5 mmHg, $p < 0.001$), while DAP was equivalent.



HPI predicted 152 hypotensive events; of these, 81 real hypotensive events were observed at 5 and 10 min at the Clearsight®. However, considering the invasive arterial monitoring, only 10 and 7 real hypotension occurred **(**Fig. 2).

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Topic: Perioperative care

001255

Heart transplantation with brain death donors (BD) versus controlled donation after circulatory death (cDCD) in the Canary Islands: Are there differences?

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Introduction: To assess the outcomes of a heart transplantation program at Dr. Negrín University Hospital, Canary Islands, from December 2019 to November 2024. The program, conducted in the ICU of this tertiary hospital, compares the results of using brain death (BD) donors versus controlled donation after circulatory death (cDCD) donors.
Methods: This investigation includes a combined retrospective and prospective analysis of heart transplantation (HT) cases at a 10-bed cardiac ICU and cardiac surgery unit of a regional tertiary referral hospital from December 2019 to November 2024. Demographic data, clinical data, and specific heart transplant-related metrics, along with outcomes and complications, were extracted from the clinical registry. Descriptive statistical analysis was conducted using absolute frequencies for categorical variables. Continuous variables were summarized using means and standard deviations (SD) when the data followed a normal distribution, and medians and interquartile ranges when the distribution deviated from normality. Statistical significance was set at 0.05. The data were analyzed using the R software package, version 4.2.1 (R Development Core Team, 2022).
Results: During the analyzed period, a total of 95 consecutive patients who underwent heart transplantation (HT) were reviewed. Of these, 78 were from brain death donors (BD) (82.1%) and 17 from controlled donation after circulatory death (cDCD) (17.8%). There were no statistically significant differences between the groups regarding preexisting comorbidities of the recipients such as chronic kidney disease (CKD), prior atrial fibrillation (AF), pulmonary hypertension, or previous cardiac surgery.
During the analyzed period, a total of 95 consecutive patients who underwent heart transplantation (HT) were reviewed. Of these, 78 were from brain death donors (BD) (82.1%) and 17 from controlled donation after circulatory death (cDCD) (17.8%). There were no statistically significant differences between the groups regarding preexisting comorbidities of the recipients such as chronic kidney disease (CKD), prior atrial fibrillation (AF), pulmonary hypertension, or previous cardiac surgery.
Postoperatively, 5.2% (5/95) of patients required circulatory support with ECMO, with a higher percentage in the cDCD group (2/17, 11.8%) ($p = 0.60$). A total of 23.2% (22/95) of patients developed right ventricular dysfunction: 15/78 in the BD group and 7/17 in the cDCD group ($p = 0.06$). Renal failure developed in 51.2% of patients, with 26.3% (26/95) requiring continuous renal replacement therapy, showing no differences between BD and cDCD. Lactic acidosis was observed in 80% (76/95) of patients, with a higher percentage in the HT with cDCD group (16/17, 94%) ($p = 0.18$). After coming off cardiopulmonary bypass, 15 out of 95 patients needed IABP, with similar frequency in both groups (15.4% BD vs. 17.6% cDCD). The ischemic time was shorter in HT with cDCD, 126 min (107; 165) $p = 0.06$. Survival in both groups was over 94%.
Conclusions: No selection of recipients was made based on the donor type, as demonstrated by the homogeneity of the preoperative data. The morbidity and mortality outcomes are comparable regardless of the donor type.
In our experience, heart transplantation in the Canary Islands with donors after circulatory death is as effective as transplantation from brain-dead donors and enhances the quality of life for many patients.
Topic: Brain death, organ donation and transplantation

001256

What happens after ICU discharge? Insights from a multidisciplinary post-ICU clinic

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Introduction: After prolonged ICU stays, many patients experience significant sequelae that hinder their return to baseline health. These physical, psychological, or cognitive impairments are collectively known as post-intensive care syndrome (PICS). Post-ICU follow-up clinics aim to detect these complications early and provide targeted interventions.
Objectives: To analyze our post-ICU follow-up clinic data and compare findings with the existing literature.
Methods: A retrospective, descriptive observational study was conducted on patients seen in the post-ICU follow-up clinic from October 2022 to December 2024. Data collected included sex, age, diagnosis, APACHE II score, need for mechanical ventilation and tracheostomy, ICU length of stay, and complications assessed through physical examinations and validated tests.
Results: A total of 96 patients were included; 37 (38.54%) were female, with a mean age of 59.19 ± 12.02 years. Diagnoses were: cardiac (25%), respiratory (21.87%), gastrointestinal (18.75%), neurological (12.5%), infectious (9.37%), nephrological (4.17%), trauma (4.17%), and others (4.17%). The mean APACHE II score was 19 ± 4.24. Mechanical ventilation was required in 74 patients (77.08%) for an average of 16.11 ± 22.63 days; 29 patients (30.21%) underwent tracheostomy. Mean ICU stay was 19.9 ± 2.12 days. ICU complications included delirium in 40 patients (41.67%), critical illness polyneuropathy in 50 (52.08%), and pressure ulcers in 23 (23.97%). Post-ICU clinic assessments revealed neuromuscular sequelae in 20 patients (20.83%), PTSD in 36 (37.5%), cognitive impairment in 7 (7.29%), anxiety in 27 (32.93%), depression in 21 (25.61%), and both anxiety and depression in 19 (23.17%). Family burden, measured by the Zarit scale, averaged 36.02 ± 6.36, with overload observed in 13 cases (22.03%).
Conclusions: Half of the patients exhibited critical illness polyneuropathy, and 20.83% had persistent neuromuscular sequelae 30 days post-discharge. PTSD (37.5%), anxiety (32.93%), and depression (23.17%) rates were consistent with existing literature, while cognitive impairment (7.29%) was lower than reported in other studies.

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Topic: Ethics and end of life care

001257

Deep learning CT-segmentation based model to support clinical decision-making in predicting veno-venous ecmo in ARDS: a retrospective cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001257

Introduction: Deciding whether a patient with acute respiratory distress syndrome (ARDS) requires veno-venous extracorporeal membrane oxygenation (vv-ECMO) is highly complex and time-sensitive, especially in hospitals without ECMO capabilities. Artificial intelligence (AI)-driven models may help improve early risk stratification and guide timely referral decisions.
Objectives: This study aimed to develop and validate machine learning-based models—using clinical data and quantitative CT features—to predict the future need for vv-ECMO therapy in ARDS patients at ICU admission.
Methods: In this retrospective single-center cohort study, patients with COVID-19-associated ARDS admitted to the ICU between March 2020 and April 2022 were included. Lung segmentation and quantitative feature extraction were performed using a convolutional neural network (CNN), yielding 592 radiomic features from thoracic CT scans. Five clinical parameters—age, mean airway pressure (Pmean), lactate, and C-reactive protein (CRP)—were selected based on clinical relevance. Three logistic regression models were trained and evaluated: (1) an imaging model, (2) a clinical model, and (3) a combined model integrating both feature sets. Model performance in predicting the need for ECMO was assessed using area under the receiver-operating characteristic curve (AUROC), overall accuracy, sensitivity, and specificity. In addition, to assess cumulative event differences, Kaplan–Meier curves were generated, and statistical significance was evaluated using the log-rank test.
Results: A total of 375 patients were included: 172 in the training cohort and 203 in the validation cohort. In the training cohort, AUROC values were 0.743 (Imaging Model), 0.828 (Clinical Model), and 0.842 (Combined Model). In the validation cohort, the Combined Model yielded an AUROC of 0.705, outperforming the Clinical (0.674) and Imaging (0.639) Models. Overall accuracy in the validation cohort was 64.0% for the Combined Model, 66.5% for the Clinical Model, and 59.1% for the Imaging Model in the validation cohort. Sensitivity and specificity of the combined model were 68.1% and 58.9%, respectively. Kaplan–Meier curves (Fig. 1) demonstrated a significantly higher cumulative incidence of ECMO therapy in patients predicted as ECMO-positive (log-rank $p < 0.001$), confirming the model's discriminatory power across the 60-day observation period. Applied to the validation cohort, the combined model correctly identified 77 of 113 ECMO patients (positive predictive value: 67.5%) while avoiding unnecessary referral in 53 of 90 patients not requiring ECMO (negative predictive value: 59.6%). These findings suggest potential for clinical benefit in triage and early transfer decisions.
Conclusions: A machine learning approach integrating objective clinical and radiological parameters enables early prediction of ECMO necessity in ARDS patients at ICU admission. The combined model showed the best predictive performance and may serve as a decision-support tool to improve timing and appropriateness of ECMO referrals, especially in nonspecialized settings. Survival analysis supports its prognostic relevance in real-world ICU conditions.

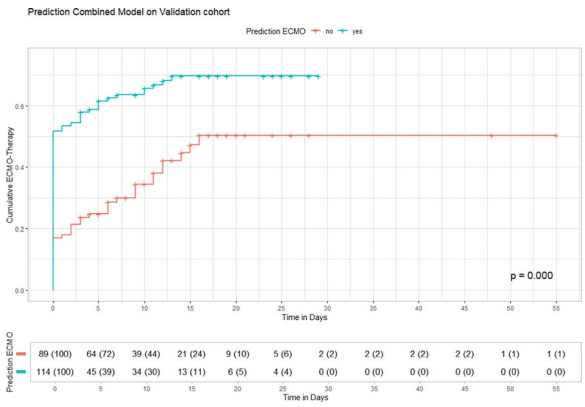


Fig. 1 (abstract 001257) Kaplan–Meier curve for cumulative incidence of ECMO therapy in the validation cohort, stratified by prediction of the combined model. The figure illustrates the estimated cumulative probability of receiving ECMO therapy over 55 days following ICU admission, stratified by ECMO prediction from the combined model. Patients predicted to require ECMO are shown in turquoise; those predicted not to require ECMO are shown in red. Cross marks indicate censored observations (discharge, transfer, or death). A statistically significant difference between the groups was observed (log-rank test, $p < 0.001$). The risk table below shows the number of patients at risk at each time point, with the number of events in parentheses

Topic: Acute respiratory failure and mechanical ventilation

001258

A mathematical approach to measuring the purifying efficacy and efficiency of different citrate protocols available for CRRT

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Intensive Care Medicine Experimental 2025,* 13(1)*:001258

Introduction: Continuous renal replacement therapy (CRRT) with regional citrate anticoagulation (RCA) has become a standard approach in intensive care units for managing acute kidney injury, reducing bleeding risks and extending filter lifespan. Normal kidneys filter approximately 180 L of plasma daily, purifying more than four times the total body water. The objective of CRRT should be to purify at least all body water with good tolerance, in the shortest possible time, and with the lowest effective dose to avoid dialytrauma and reduce therapy costs. Currently, various CRRT protocols are available in Spain, utilizing different modalities (diffusive and/or convective) and dose distributions depending on the machine used.
Objectives: To analyze and compare different CRRT protocols using citrate anticoagulation in terms of guideline adherence,1,2 dose distribution, purification time, and fluid consumption efficiency, with the aim of determining the most efficient protocol for clinical practice.
Methods: We conducted a theoretical mathematical analysis of three citrate-based CRRT protocols available in Spain: CVVH post-dilution (Aquarius™), CVVHDF with diluted citrate (Prismax™ and Prismaflex™), and CVVHDF with concentrated citrate (Multifiltrate™, Multifiltrate Pro™, and Omni™). The analysis was standardized for a 70 kg ideal body weight patient with 42 L of body water, 30% hematocrit, 100 ml/h fluid loss, and 0.99 mmol/l ionized calcium. We calculated renal dose, filtration fraction, body water purification time, and total fluid volume used for each protocol.
Results: The CVVH postdilution protocol achieved a renal dose of 29 ml/kg/h and postdilution dose of 26 ml/kg/h, with a filtration fraction of 34%. This protocol purified total body water in 21 h using 41 L of fluids. The CVVHDF with diluted citrate protocol delivered a higher renal dose (43 ml/kg/h) but a lower postdilution dose (9 ml/kg/h), with a filtration fraction of 29%. It required 29 h to purify body water using 84 L of fluids. The CVVHDF with concentrated citrate protocol had the highest renal dose (48 ml/kg/h) with a post-dilution dose of 16.5 ml/kg/h and a filtration fraction of 31%. It required 32 h for body water purification using 105 L of fluids.
Conclusions: The CVVH postdilution protocol is the only one that meets major guideline recommendations (20–25 ml/kg/h postdilution dose) while demonstrating greater efficiency by using less fluid volume and achieving faster purification of both middle and small molecules. Higher doses do not always equal higher efficacy and may lead

to dialytrauma and excessive loss of trace elements. When using citrate anticoagulation, the need for predilution should be reconsidered, as it reduces both convective and diffusive efficacy. Convection with postfilter replacement most closely resembles normal renal function and provides the most predictable therapy for clearance of all types of molecules with the highest efficiency.

PARAMETER	CVVH Post-dilution (Concentrated citrate)	CVVHDF (Diluted Citrate)	CVVHDF (Concentrated Citrate)
Renal Dose (ml/kg/h)	29	43	48
Post-dilution Dose (ml/kg/h)	26	9	16
Filtration Fraction (%)	34	29	31
Purification Time (hours)	21	29	32
Total Fluid Used (L)	41	84	105
Guideline Compliance	Yes	No	No

(abstract 001258) Summary of the three protocols.

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Topic: Acute kidney injury and hemofiltration

001260

Measuring stress in critical care: results from a multidisciplinary ICU team

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Intensive Care Medicine Experimental 2025,* 13(1)*:001260

Introduction: Professionals working in Intensive Care Units (ICUs) are routinely exposed to high-stakes clinical decisions, emotional strain, and physical demands. These conditions place them at increased risk of chronic stress, which is closely associated with anxiety, depression, and somatic disorders. The Perceived Stress Scale (PSS) is a validated tool that helps identify individuals under psychological strain. Understanding stress levels in ICU staff is crucial not only for their well-being, but also for maintaining patient safety and quality of care.
Objectives: To assess perceived stress levels among ICU professionals and to explore associations with demographic and occupational variables, aiming to raise awareness and promote targeted interventions.
Methods: A cross-sectional, descriptive study was conducted between April and June 2024 in a tertiary hospital ICU in southern Spain. All healthcare professionals working in the unit were invited to complete the 14-item Perceived Stress Scale (PSS-14). The data were analyzed using Excel to calculate mean values and standard deviations.
Results: Out of 100 professionals invited, 71 responded (71.43%). The overall findings reveal a substantial prevalence of moderate to high stress levels:

- Doctors (n = 22): Mean age 43.5 ± 13.7 years; mean PSS 20.5 ± 8.7. Staff physicians scored higher (23.0 ± 9.0) than residents (20.5 ± 8.7). On-call physicians reported higher stress (23.3 ± 9.0) than those without shifts (22.0 ± 8.7).
- Nurses (n = 45): Predominantly female (77.8%), mean age 40.9 ± 6.8 years; mean PSS 20.3 ± 9.0. Night-shift workers showed higher stress (23.9 ± 5.5).
- Nursing assistants (n = 30): Mostly female (93.3%), mean age 52.1 ± 8.8 years; mean PSS 19.3 ± 7.6.

Stress intensity categories (PSS):

- Low stress (< 14): 12.7%
- Occasional stress (15–28): 55.7%
- Frequent stress (29–42): 28.2%
- Very high stress (> 43): 2.8%

Higher stress levels were observed in women across all groups. Additional factors associated with elevated stress included age under 55, fewer than five years of professional experience, and temporary contracts.
Conclusions: Our findings reveal a widespread yet often underestimated burden of stress among ICU professionals. Over half experience occasional stress, while nearly one in three report frequent stress. Female gender, younger age, lower seniority, and contract instability appear to be contributing factors. These results highlight the urgent need for structured mental health support and occupational well-being strategies in ICU settings. Addressing staff stress is not only an ethical imperative but a cornerstone of safe, sustainable intensive care.

Reference

1. No external funding was received for this study.

Topic: Ethics and end of life care

001261

Feasibility and safety of a fully automated closeed loop ventilation mode (INTELLIVENT-ASV) during the pandemic: a pilot study

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Introduction: The COVID-19 pandemic led to widespread intensive care unit (ICU) admissions, with a significant number of patients requiring invasive mechanical ventilation (IMV) due to acute respiratory distress syndrome (ARDS) [1,2]. Ventilation strategies tailored to lung mechanics are critical to minimize ventilator-induced lung injury (VILI).
Objectives: This study aimed to evaluate the feasibility and safety of INTELLIVENT-ASV, a fully automated closed-loop ventilation mode, in COVID-19 ARDS patients, focusing on lung mechanics.
Methods: This pilot study was conducted at University of Health Sciences, İzmir School of Medicine, Dr. Suat Seren Chest Disease and Thoracic Surgery Training and Research Hospital between April 2021 and October 2021. A total of 20 adult COVID-19 ARDS patients were included, all of whom received IMV with INTELLIVENT-ASV. Key ventilatory parameters, including tidal volume, plateau pressure, transpulmonary pressure, and mechanical power, were monitored throughout the study. Descriptive and comparative statistical analyses were performed to assess the association between mechanical ventilation parameters and patient outcomes.
Results: The median age of the patients was 60 years, and 75% were male. INTELLIVENT-ASV successfully maintained lung-protective ventilation in 95% of patients, with tidal volumes within recommended limits (6–8 mL/kg IBW). The median plateau pressure exceeded 30 cmH_2O in 70% of patients; however, inspiratory transpulmonary pressures remained within safe limits in most cases (Fig. 1). The 28-day survival rate was 65%. Survivors had significantly lower driving pressures

(median 14 vs. 17 cmH_2O, $p = 0.047$), transpulmonary driving pressures (median 11 vs. 13 cmH_2O, $p = 0.039$) and, transpulmonary mechanical power (15 vs. 22, J/min, $p = 0.02$) Transpulmonary mechanical power normalized to compliance was also significantly lower in survivors (median 0.57 vs. 0.89, $p = 0.01$).
Conclusions: INTELLIVENT-ASV appears to be a safe and feasible closed-loop ventilation mode for managing COVID-19 ARDS patients. It successfully maintained lung-protective ventilation and adapted to individual lung mechanics. Larger multicenter studies are needed to further evaluate its impact on clinical outcomes and its potential as a standard ventilation mode in ARDS management.

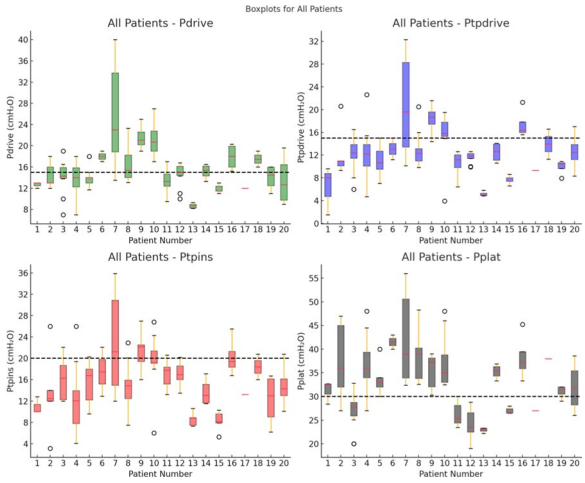


Fig. 1 (abstract 001261) Ventilatory parameters of patients

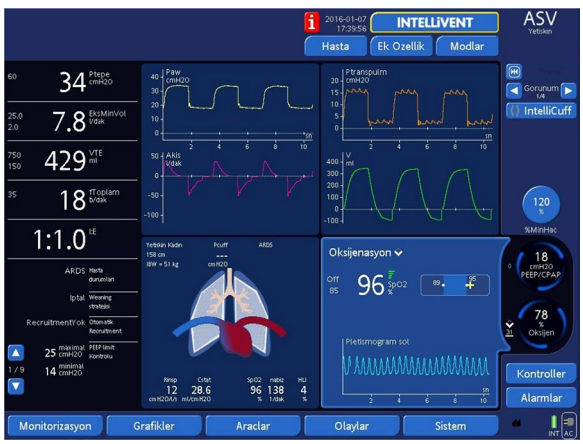


Fig. 2 (abstract 001261) A representative ventilator screenshot of a patient treated with INTELLIVENT-ASV

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Topic: Acute respiratory failure and mechanical ventilation

001264

Veno-arterial extracorporeal membrane oxygenation (VA-ECMO): a decade of experience in a tertiary care hospital

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Intensive Care Medicine Experimental 2025,* 13(1)*:001264

Introduction: Describe the characteristics and clinical evolution of patients with refractory cardiogenic shock requiring VA-ECMO support admitted to the ICU of a tertiary care hospital over a 10-year period.
Methods: A descriptive, retrospective analysis was conducted of all patients admitted to a 10-bed intensive care unit specialized in acute cardiac conditions, cardiac surgery, and heart transplantation who required VA-ECMO support from December 2019 over a 10-year period. Demographic data, clinical information, ECMO-related parameters including maintenance and weaning, and survival data at ICU discharge, 3 months, 6 months, and 1 year were extracted from the clinical records. Descriptive statistical analysis was performed using absolute frequencies for categorical variables, while continuous variables were summarized using means and standard deviations (SD).
Results: During the study period, a total of 90 VA-ECMO devices were implanted. The mean patient age was 57.52 years (± 13.52), with 74.74% being male (67/90). The main indications were postcardiotomy (50%, 45/90), ischemic heart disease (13.48%, 13/90), advanced heart failure (11.24%, 10/90), and post-heart transplantation (2.25%, 2/90). Cannulation modality was central in 10.23% (11/90) and peripheral in 89.77% (79/90). The mean SAVE score was -6.67. The average duration of ECMO support was 6.5 days. Venting strategies were used in 73.3% of cases, with the most commonly used being BCIAo (65%). The major complications included acute kidney injury (87%, 78/90), bleeding (50%, 45/90), lower limb ischemia (27%, 24/90), and infection (22%, 20/90). Overall ICU survival was 33.33% (30/90), with survival at 3 months also 33.33%, at 6 months 18.9% (17/90), and at 1 year 17.77% (16/90). Additional variables are detailed in Table 1.
Conclusions: Postcardiotomy shock was the most frequent indication, for over half of the cases. Most patients were male with a mean age of around 57 years, had an average ICU stay of approximately one week, and frequently developed acute kidney injury and infections as major complications. This dataset may provide valuable insights for generating new hypotheses and implementing quality improvement initiatives.

Table 1 (abstract 001264) ...

VA ECMO (N 90)	
Mean Age (SD)	57,522 (13,53)
Male N (%)	67 (74.4)
Mean weight kg (SD)	77,11 (15,7)
Indication for cannulation, N (%)	
STEMI	10 (11,24)
NSTEMI	3 (3,3)
Myocarditis	7 (7,8)
Post-cardiotomy	45 (50)
Electrical storm	8 (6,7)
Advanced heart failure	10 (11,24)
Cardiac arrest (CA)	7 (7,8)
Cardiac transplant	2 (2,25)
CKD N (%)	16 (17,8)
HTN N (%)	46 (51,1)
DM N (%)	32 (35,6)
Prior IHD N (%)	34 (37,8)
CHF N (%)	34 (37,8)
Coagulopathy N (%)	4 (4,4)
Pulmonary edema N (%)	24 (26,7)
Cannulation Type N (%)	
Central	11 (12,3)
Peripheral	79 (87,7)
Save Score, mean (SD)	-6,67 (5,6)
Pre-ECMO lactate, mean (SD)	10,9 (6,54)
Acute kidnet injury (AKI) N (%)	78 (86,7)
Major bleeding N (%)	45 (50)
Infections N (%)	20 (22,2)
Decannulation N (%)	0 (0)
Thrombosis N (%)	13 (14,4)
Hemolysis N (%)	10 (11,1)
Lower limb ischemia N (%)	24 (26,7)
Anoxic enchephalopathy N (%)	3 (3,3)
ICU survival N (%)	30 (33,33)
3-month survival N (%)	30 (33,33)
6-month survival N (%)	17 (18,9)
1-year survival N (%)	16 (17,77)

Topic: Cardiovascular issues in ICU

001265

Heart transplantation in the Canary Islands: 5 years of experience

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Intensive Care Medicine Experimental 2025,* 13(1)*:001265

Introduction: Describe the experience of the University Hospital of Gran Canaria Dr. Negrín (HUGCDN) as the regional reference center for heart transplantation (HT) in the Canary Islands during its 5 first years.
Methods: A descriptive and prospective study analyzed the outcomes of all heart transplanted patients over the past 5 years. Markers are compared with national index for 2023 (NI). Categorical variables are expressed as frequencies and percentages, and continuous variables as means (± SD) or medians (IQR).
Results: From December 4, 2019, to December 31, 2024, a total of 98 patients were transplanted, exceeding 10 transplants per million population (pmp) per year—above the national average of 7.1 pmp in 2024. The mean age of recipients was 55.22 years (range: 16–71) compared to the NI of 49.5 years. The median waiting time on the transplant list was 28 days (range: 0–380) versus the NI of 84 days. In our HT program, only 3% of donors came from outside the Canary Islands (NI = 43%). Emergency level 0 transplants accounted for 8.16% (NI = 45%). Since the initiation of the controlled donation after circulatory death (cDCD) program, this donor type has contributed to 28% of our HTs (NI = 11.7%), making us the third leading hospital in Spain for this type of transplant per pmp. The mean total ischemia time was 153.9 ± 47.5 min. The average stay in the Intensive Care Unit was 12.8 ± 22.6 days (median: 6.5 days). One-year post-transplant survival was 95.7% (NI = 83%).
Conclusions: 1. Over the past 5 years, patients living in the Canary Islands have had a higher chance of undergoing heart transplantation than the national average, positioning our region as the third best in the country. 2. Our recipients are older than the national average. 3. We are the region with the lowest percentage of hearts received from other regions, confirming the high degree of self-sufficiency of the Canary Islands' heart transplant program. 4. Patients transplanted at HUGCDN have had the shortest waiting times in the country. 5. One-year survival following heart transplantation at HUGCDN is higher than the survival rate reported in the most recent national registry of heart transplants in Spain.

Topic: Brain death, organ donation and transplantation

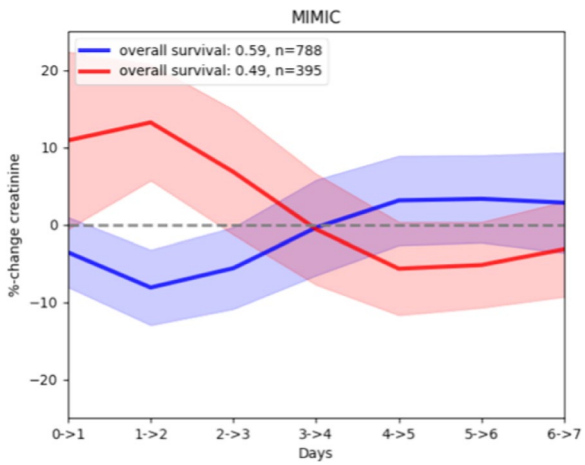
001267

Phenotyping trajectories of renal recovery from acute kidney injury in critically ill patients

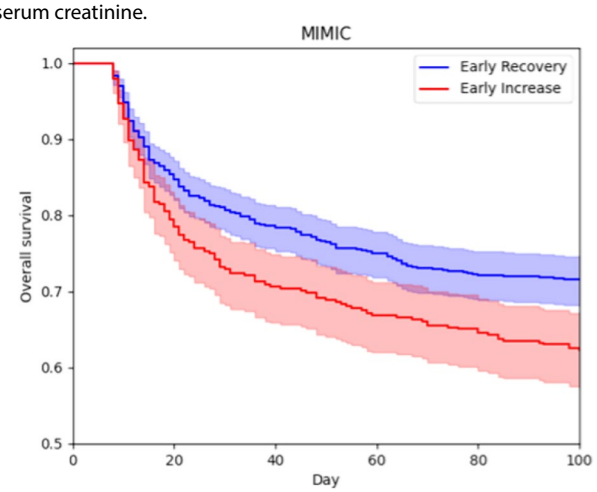
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Intensive Care Medicine Experimental 2025,* 13(1)*:001267

Introduction: Recovery from acute kidney injury (AKI) is an essential determinant of prognosis for critically ill patients with AKI. Whilst recent research focused on AKI recovery based on the changes of absolute serum creatinine (SCr) values and corresponding AKI stages, there is limited understanding of the role of SCr trajectories and daily fluctuations of this biomarker for predicting survival outcomes.
Objectives: Do different phenotypes of renal recovery from AKI exist and if so, how do they differ in their recovery patterns and survival outcomes?
Methods: We included patients from a large, publicly available intensive care database from the electronic health record of the Beth Israel Deaconess Medical Center (MIMIC-IV, United States of America). Our study included 1394 critically ill surgical patients with moderate AKI (stage 2), as defined by KDIGO criteria. We included critically ill patients treated in the ICU and requiring vasopressors and/or mechanical ventilation. Further inclusion criteria were: No need for renal replacement therapy at the time of study enrolment, prior or within 24 h of AKI stage 2 diagnosis, estimated glomerular filtration rate > 20 ml/min/1.73 m^2, ICU length-of-stay of > 7 consecutive days and at least six days of SCr samples available. The primary outcome was renal recovery (resolvement of AKI or improvement to stage 1 AKI) or renal non-recovery (defined as persistence of moderate or severe AKI, death, or requirement of renal replacement therapy). When RRT was started during the observational period, serum creatinine values were interpolated from the last available SCr value for as long as RRT was used.
We analysed the patterns of SCr trajectories within the first 7 days after diagnosis of moderate AKI. To detect recovery patterns, we employed hierarchical clustering, specifically a correlation-based approach.

Euclidean distance methods were used to determine the nearest cluster mean for each data point. We calculated the distance of each trajectory to the averages of both clusters and assigned the sample to the cluster with the smaller distance.
Results: The clustering plot visualises the average trajectory within each cluster. Two clusters were identified: One cluster of patients with early daily improvement of SCr values (blue cluster), and another cluster of patients with an early further daily increase of SCr before improvement of SCr could be observed (red cluster). Daily SCr changes up until day 3 to day 4 were the most important for survival. Kaplan–Meier Estimators within each cluster suggest differences in survival until day 100.
Conclusions: Two different trajectories of daily changes in SCr during the early phase (first 7 days) of moderate AKI are associated with different survival outcomes. A phenotype of early decrease of SCr is associated with better survival outcomes until 100 days after AKI, compared to a phenotype with an initial increase in SCr. This association stays relevant even when both groups move towards similar creatinine values after more than 3 days, suggesting that that the early trajectory of SCr change within the first three days of moderate AKI is most relevant for outcomes. This is in line with the recent AKI literature on the concept of transient versus persistent AKI and improves prognostication for patients with moderate AKI.



Trajectories of serum creatinine over the identified clusters show one cluster with an early increase and one cluster with an early decrease in serum creatinine.



Kaplan–Meier curve of the two identified clusters shows a meaningful difference in the long-term survival.

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Topic: Acute kidney injury and hemofiltration

001268

Postcardiac arrest care guidelines: review of practice in a UK Tertiary University Adult ICU

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Intensive Care Medicine Experimental 2025,* 13(1):*001268

Introduction: Cardiac arrest (CA) is a life-threatening event with a high mortality. Out-of-hospital cardiac arrests (OOHCA) have a global annual incidence of ~ 40–100 per 100,000 population1 with a 16.4% survival to hospital discharge, at best [1]. Protocol-led, evidence-based management by ICU teams is an integral process in reducing secondary injury and/or subsequent CAs.
Objectives: We evaluated adherence to the ICU guidelines in postcardiac arrest care and identify areas that require improvement to enhance patient outcomes.
Methods: LREC approval was waived. Contemporaneous electronic health records (EHR) were retrospectively analysed for patients admitted to a 32 bed UK University tertiary centre adult ICU over 2 years from Jan 2023. Only patients fulfilling clinical criteria for cardiocirculatory arrest with ROSC, requiring mechanical ventilation and ICU support were included.
Results: 77 patients were identified in total (59.7% male). The median age was 61 (IQR 46–74). The median ICU stay was 4 days (IQR 1–7). Of these 60% of patients had had an OOHCA. The commonest causes were thrombosis and hypoxia, affecting 39% of all patients. The ICU mortality was 67.5% with a 6-month mortality of 70.1%. As expected, patients with an initial nonshockable rhythm (71.4% of the cohort) had significantly worse subgroup outcomes (mortality rate of 83.6%, $p < 0.005$).
Pre ICU care was nearly satisfactory for ECGs (88%) and blood tests (96%). However, performance was suboptimal for computed tomography (CT) head (63.6%) and CT pulmonary angiogram (CTPA) scans (48%); and amylase levels when indicated (57%).
1 in 10 patients (10%) had a massive PE (mPE) with a subgroup mortality of 87.5%, despite lysis ($p = 0.218$). Documentation of direct laryngoscopy grade, RASS and glucose targets were disappointing, with adherence of 21%, 25% and 56%, respectively. Initial temperature control was done well, with active warming done where indicated in 82.4% of the patients and pyrexia addressed in 94%. However, management of persistent pyrexia requires improvement, as only 64% of these patients received prompt secondary temperature control measures such as active cooling. Antiepileptic drug choice/use were 100% when indicated. Other parameters are as shown in Fig. A and B.
Conclusions: Several areas require improvement. Documentation of the initial cardiac rhythm is not included in the current Trust guideline, but it should be in our view—for identifying causes for CA and directing further investigations. Given the high mortality with mPE a low threshold for CTPA may be valid. Improved documentation of specific

neuroprotective targets also need addressing. Given EHR use, guidance will be updated to create proformas to help improve communication and clinical management.

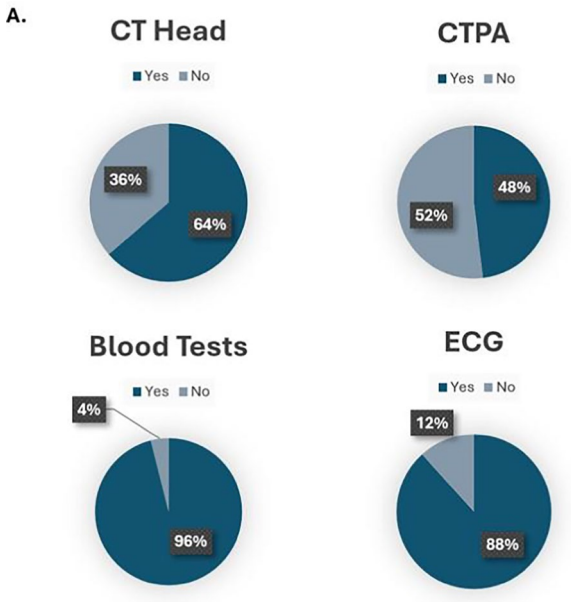


Fig. A (abstract 001268) Adherence to pretransfer investigations (%). *CT* computed tomography, *CTPA* computed tomography pulmonary angiogram, *ECG* electrocardiogram

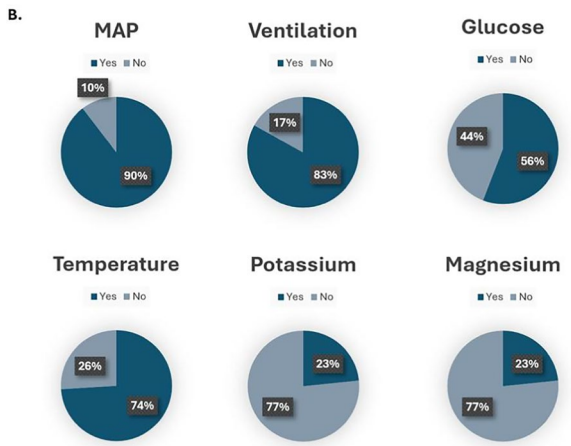


Fig. B (abstract 001268) Adherence to documentation of targets (%). *MAP* mean arterial pressure

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Topic: Cardiac arrest

001270

Double low-dose abdominopelvic CT for acute appendicitis: early exploratory analysis on image quality and diagnostic performance

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Intensive Care Medicine Experimental 2025,* 13(1)*:001270

Introduction: Modern CT technology has enabled lower tube voltages (kVp; kilovoltage peak) while maintaining diagnostic image quality, offering opportunities to reduce radiation dose. Automated kVp selection tailors tube voltage to patient body habitus,while automated tube current modulation and iterative reconstruction algorithms mitigate the associated increase in image noise [1, 2]. These advancements have facilitated a shift from conventional 120–140 kVp settings to lower tube voltages of 80–100 kVp in routine CT imaging.
A key additional benefit of low-kVp imaging is the enhancediodine attenuation, as the lower mean photon energy approximates the K-edge of iodine at 33.2 keV. This physical property supports simultaneous reduction of both radiation and iodinated contrast media (CM) doses [3] without compromising diagnostic contrast enhancement.
Herein, we present an early exploratory analysis from an ongoing prospective single-arm study (NCT****) evaluating a tailored DLCT protocol in young adult patients with suspected acute appendicitis This interim analysis compared image quality and diagnostic performance for acute appendicitis and alternative diagnoses between DLCTs and historical SLCTs performed immediately prior to study initiation.
Objectives: To evaluate the feasibility of a standardized double low-dose CT (DLCT) protocol that simultaneously reduces both iodine contrast media (CM) dose and tube voltage, and to compare its image quality and diagnostic performance with a single low-dose CT (SLCT) protocol using fixed iodine doseand reduced tube voltage, representative of institutional low-radiation dose imaging practice in suspected acute appendicitis.
Methods: In this exploratory analysis of a prospective single-arm study, 49 participants aged 18–44 years presenting to the emergency department (ED) with suspected acute appendicitis underwent DLCT using automated kVp selection and a kVp- and weight-adjusted CM dosing protocol. This protocol targeted a 10% iodine dose reduction for every 10 kVp decrease from a reference standard of 0.521 gI/kg at 120 kVp.A historical control group of 53 patients with the same inclusion criteria, who had undergone SLCT using a fixed CM dose and low-kVp protocol (80–100 kVp) prior to study initiation, was retrospectively included. Quantitative (signal-to-noise ratio [SNR] and contrast-to-noise ratio [CNR]) and qualitative (subjective image quality and appendiceal visibility) assessments were compared. Diagnostic performance was evaluated using positive predictive value (PPV) for acute appendicitis and alternative diagnoses, based on surgical findings, clinical follow-up, or an Alvarado score ≥ 7.
Results: DLCT significantly reduced iodine dose (0.383 $\pm$ 0.049 gI/kg vs. 0.589 $\pm$ 0.085 gI/kg; $P < 0.001$) while maintaining comparable image noise and appendiceal visibility. Although SNR and CNR were lower in the DLCTgroup, diagnostic performance including PPVs for acute appendicitis (63.6% vs. 72.7%) and alternative diagnoses (100% vs. 86.7%) did not significantly differ between groups.
Conclusions: An iodine dose-reducing DLCT protocol tailored to tube voltage and body weight is feasible in the ED setting and offers substantial CM dose saving without compromising diagnostic performance for acute appendicitis or alternative diagnoses.

Topic: Imaging in intensive care

001272

Role of the inflammasome pathway in the expansion and functions of regulatory plasma cells during sepsis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001272

Introduction: Sepsis, the leading cause of death in intensive care units, represents a major public health challenge. Its pathophysiology involves intricate mechanisms associating an exacerbated systemic inflammatory response and profound immunosuppressive mechanisms, primarily driven by the differentiation of immunosuppressive cell subpopulations. Among these, we recently described the induction of plasma cells (rPC) with immunoregulatory functions on T cell activation through increased PD-L1 expression and IL-10 production.
Inflammasomes are supramolecular complexes that act as sensors of cellular stress, controlling the secretion of inflammatory cytokines (IL-1β and IL-18) and pyroptosis, a form of pro-inflammatory cell death. Inflammasome pathways are rapidly activated after sepsis and are associated with an increased risk of death. In patients with gain-of-function mutations in inflammasome-related genes, excessive inflammasome activation contributes to the differentiation of immunosuppressive myeloid cells.
Objectives: In this project, we hypothesize that excessive inflammasome activation plays a central role in inducing rPC during sepsis.
Methods: Using a murine model of sepsis (cecal ligation and puncture (CLP)) that replicates the immune alterations observed in patients and genetically deficient mice for specific components of inflammasome pathway or administration of IL-1β and IL-18 inhibitors, we will identify the molecular and cellular mechanisms linking canonical and/or non-canonical inflammasome pathways to the emergence of rPCS.
Results: We observed that Caspase1/11-double deficient mice and ASC-/- CLP mice exhibited a decreased induction of rPC after sepsis compared to their wild-type (WT) littermate as well as reduced PD-L1 expression and IL-10 production by these cells. No difference was observed in NLRP3-/- mice after sepsis compared with WT littermate.
These results were reproduced in CLP mice treated with inflammasome final products inhibitors (IL1-receptor antagonist and anti-IL18) injected together before surgery and until sacrifice.
Conclusions: Taken together, these data demonstrated a role for inflammasome pathway activation in the expansion and immunoregulatory functions of rPC after sepsis. Beside NLRP3, the involvement of other inflammasome pathways (AIM2, NLRC4, NLRP1, pyrin) remains to be determined. These results reveal potential therapeutic targets to prevent sepsis-induced immune alterations.

References
1. This work was supported by funds from Institut Universitaire de France (FV)
2. Clara Vigneron is a recipient of a Poste d'Accueil Inserm

Topic: Sepsis

001274

A quality improvement project to reduce unnecessary blood loss whilst sampling from arterial catheters in Aberdeen Royal Infirmary Intensive Care Unit

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Intensive Care Medicine Experimental 2025,* 13(1)*:001274

Introduction: Care of critically ill patients involves frequent blood sampling to inform clinical decision making, often via an indwelling arterial line. When sampling from this set up, a volume of blood is discarded before sample collection. Repeated accessing of this system can lead to significant volumes of blood being lost over an ICU admission, contributing to iatrogenic anaemia.
Objectives: This quality improvement project aimed to quantify the amount of blood lost due to sampling and reduce this through interventions that minimise the blood volumes discarded and rationalise sampling frequency.
Methods: Over a 2-month period in 2022, nurses were observed obtaining samples from arterial lines and the volume of blood sampled was recorded. Retrospective analysis of 39 patients over the same period was performed to determine the median number of samples taken during ICU admission and used to estimate the total volume of blood lost to sampling.
Changes enacted:
1. Suggest a sampling frequency on ward round notes for laboratory tests and arterial blood gases (ABG).
2. Short length manometer tubing for line set up to reduce discarded volume.
3. Education on blood sampling practices.
Following these changes, sampling observations were repeated in February 2025 and retrospective analysis of 28 patients was performed. Outcome measures included the use of short manometer tubing, compliance with suggested frequency of blood tests and total volume of blood lost to sampling.
Results: At baseline, short manometer tubing was used in 5% of arterial line set ups, increasing to 55% post intervention. The volume of blood discarded had increased in both short and long tubing set ups, by 1.1 and 0.6 ml, respectively.
Compliance with suggested frequency of laboratory tests was good with a median of 4 more tests performed per admission as compared to the suggested number. However, a median of 2.7 times more ABG were performed than specified as needed over a patient's admission.
There was an overall reduction in the median number of ABG taken per day, from 4.66 to 3.5, with greater reduction in level 3 patients than level 2. In level 3 patients, the median number of daily laboratory tests also decreased, from 3.01 to 2.80. This led to a 13% reduction in median blood volume lost to sampling daily.
In both cycles, increasing volume of blood lost to sampling correlated with requirement for red cell transfusion.
Conclusions: Our interventions led to a reduction in blood lost to sampling during a level 3 admission to ICU, through reduction in both laboratory tests and ABG. However, more ABG are being tested than the number suggested to be needed clinically. Although the use of short manometer tubing increased, the volume of blood discarded also increased, highlighting challenges with making lasting changes to practice. Further engagement with stakeholders is planned to address this, alongside review of the arterial line set up to minimise the required discard volume.

Topic: Transfusion and hemostasis disorders

001275

The utility of the icteric index in assessing hyperbilirubinemia in ICU patients

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Introduction: The icteric index (II) is a reagent-free parameter routinely measured by many modern clinical chemistry analyzers. It reflects the degree of bilirubin interference in plasma samples based on absorbance at specific wavelengths and is often automatically reported as part of hemolysis, icterus, and lipemia (HIL) indices (1). Given its availability and zero reagent cost, the II may offer a valuable surrogate for total plasma bilirubin (TBIL) in critically ill patients. This study aimed to assess the relationship between the II and TBIL in ICU patients to assess if II could serve as a proxy for bilirubin monitoring.
Objectives: To evaluate the correlation between total plasma bilirubin levels and the II in a large cohort of critically ill patients.
Methods: This retrospective study included ICU patients admitted between November 2017 and December 2023. For each patient, daily TBIL values and the corresponding II were collected. The TBIL and II were measured with a Roche Cobas 8000 or PRO clinical chemistry analyzer in lithium-heparin anticoagulated plasma samples. Only paired measurements from the same sample were analyzed. Our tertiary ICU serves a mixed medical–surgical population, including patients with acute liver failure and those undergoing liver transplantation. Correlation and agreement between II and TBIL were assessed using linear regression.
Results: A total of 65,805 paired II and TBIL values were collected from 13,702 patients with a mean (± SD) age of 61 ± 15 years and 63% males. With linear regression analysis, a strong relation was observed between the II and TBIL, with a Pearson's correlation coefficient yielding an R^2 value of 0.99 ($P < 0.001$). This correlation was particularly strong in samples with TBIL concentrations above 100 µmol/L. Below this threshold, a much greater degree of variability was observed in the relationship between II and TBIL.
Conclusions: In ICU patients with total bilirubin levels elevated above 100 µmol/L (5.85 mg/dL), the II demonstrated excellent correlation with total plasma bilirubin. In this range, the II can be considered a reliable and reagent-free surrogate marker for detecting significant hyperbilirubinemia. However, at lower bilirubin concentrations, only moderate agreement was noted, suggesting that direct measurement of TBIL remains preferable in patients with mild bilirubinemia.

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Topic: Information systems and data science

001276

Modification in ICU design including dynamic light therapy may influence daytime polysomnography in mechanically ventilated patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001276

Introduction: According to a recently published pilot study, using a comprehensive redesign of the ICU rooms could help reduce the incidence of delirium and influence circadian melatonin rhythms [1]. In critically ill patients, sleep architecture is significantly disrupted, leading to circadian disruption, fragmented sleep, and the loss of a physiological diurnal cycle [2, 3].
Objectives: To evaluate the impact of a multicomponent room design that includes dynamic lighting therapy on daytime polysomnography in critically ill, mechanically ventilated patients.
Methods: Two double ICU rooms underwent significant architectural changes, including interventions for noise reduction and dynamic light therapy [4, 5]. Polysomnography (PSG) was performed for a maximum of three 24-h periods. The recordings were manually scored by a sleep specialist, blinded to the study, using conventional sleep staging and following the American Academy of Sleep Medicine (AASM) criteria. The depth of sedation was evaluated every eight hours using the Richmond Agitation Sedation Scale (RASS). PSG data collected from 06:00 AM to 10:00 PM were included in this analysis.
Results: In this study sample, the total sleep time accounted for a significant portion of the day for both patients in standard rooms and those in modified rooms (81.67% for standard rooms vs. 63.09% for modified rooms). However, patients in modified rooms showed significantly less total sleep time ($p = 0.03$). The percentage of light sleep (N1; 7.2% for standard rooms vs. 10.0% for modified rooms) and intermediate sleep (N2) were similar between the groups. The proportion of time spent in deep sleep (N3) was significantly higher in standard rooms (46.7% for standard vs. 25.8% for modified; $p = 0.001$; see Fig. 1). REM sleep was nearly absent in both groups with less than 1% each. Patients in modified rooms experienced significantly fewer sleep stage transitions per hour than those in the standard rooms (10.6 for modified vs. 15.0 for standard; $p = 0.035$). Although not statistically significant ($p = 0.06$), there was a trend toward an increased Arousal Index (AI) in the standard rooms, with an average of 49.2 arousals per hour compared to 32.2 in the modified rooms. Sedation levels, measured using the RASS, were comparable between both groups, with a median score of −2 (modified rooms: IQR −3 to 0; standard rooms: IQR −4 to −1; see Fig. 2).
Conclusions: This preliminary analysis suggests that a multicomponent room redesign that includes dynamic lighting therapy may help reduce daytime sleep in mechanically ventilated patients while also influencing the distribution of sleep stages by reducing deep sleep.

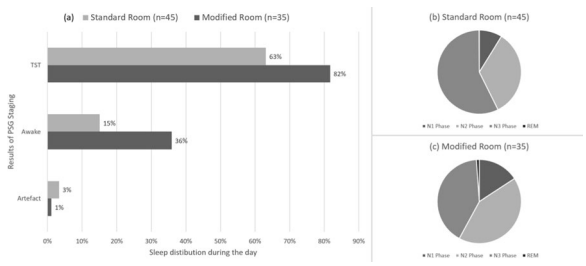


Fig 1 (abstract 001276) a Distribution of sleep from conventional polysomnography sleep staging between 6 a.m. and 10 p.m for patients in standard ($n = 45$) and modified ($n = 35$) rooms [%]. TST, total sleep time. **b** + **c** Distribution of sleep stages from conventional polysomnography as percentages of total sleep time (TST) for each group; N1, N2, and N3 Phases comprise non-rapid eye movement (NREM) sleep; REM, rapid eye movement sleep

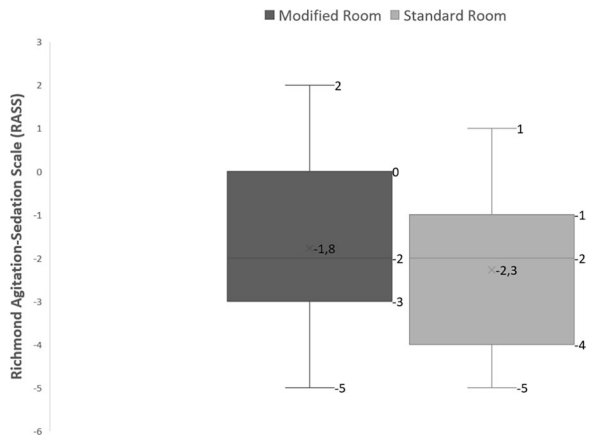


Fig 2 (abstract 001276) Distribution of sedation levels, measured using the Richmond Agitation Sedation Scale (RASS), for patients in standard ($n = 45$) and modified ($n = 35$) rooms. The means are marked with an "x," and the median is indicated by a horizontal line. The 25th and 75th percentiles are represented within the filled bar, and the minimum and maximum values are shown by the whiskers

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Topic: Sedation, analgesia and delirium

001277

Investigate the effect and mechanism of glymphatic system on sepsis associated encephalopathy based on MRI VFA-SPGR sequence

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Intensive Care Medicine Experimental 2025,* 13(1)*:001277

Introduction: Sepsis-associated encephalopathy (SAE) is a severe complication of sepsis, and elucidating its pathogenesis is critical for prevention and treatment. The glymphatic system (GS), a novel pathway for cerebral metabolic waste clearance, is crucial for brain homeostasis, lipid transport, and immune surveillance. Alterations in cerebrospinal fluid flux serve as a pathophysiological basis for acute and chronic cognitive impairments in various diseases. Previous studies indicate that sepsis is associated with amplified inflammatory cascades. During sepsis, the brain injury biomarker S100β protein accumulates in the parenchyma, activating astrocytes and microglia to release pro-inflammatory cytokines and reactive oxygen species. These mediators exacerbate mitochondrial damage through downstream signaling pathways involving ERK1/2, p38/nuclear factor kappa B (NF-κB), and JNK, thereby aggravating SAE-related cognitive deficits. A. Plog demonstrated that suppressing glymphatic transport in traumatic brain injury mice via four distinct methods reduced cerebral waste clearance efficiency, with serum levels of S100β becoming nearly undetectable, confirming that this biomarker is primarily cleared from brain parenchyma to blood via the glymphatic system. This suggests that intact glymphatic function may prevent cerebral accumulation of inflammatory mediators, mitigate neurotoxin-induced proptosis, and potentially halt SAE progression.
Objectives: Demonstrate the impairment of glymphatic efficiency during sepsis constitutes a pivotal mechanism underlying SAE pathogenesis.
Methods: The mode of SAE was induced by cecal ligation and puncture (CLP) in 12-week-old C57BL/6 J mice ($N = 8$). Control group was done sham surgery ($N = 5$). Twenty-four hours later, the mice underwent MRI for characterization of GS transport. The mice were anesthetized with isoflurane and dexmedetomidine and received CSF injection of Gd-DOTAREM (1:20; 0.5 ml/min, 10 min). All MRI was done on a 9.4 T MRI instrument (Fig. 1). Fifty min after administration of Gd-DOTAREM, T1 maps were acquired at a spatial resolution of 100 mm. The volume of T1 voxels = 400-1600 ms (representative of DOTAREM-solute tissue levels and GS transport) where extracted from whole brain and nasal conchae masks from each mouse and compared across groups(Fig. 2).
Results: T1 maps acquired 50 min after Gd-DOTA CSF administration demonstrates significantly reduced glymphatic transport efficiency across multiple brain regions in CLP septic mice compared to sham-operated controls (brainstem $p < 0.01$; hippocampus $p < 0.01$; hypothalamus $p < 0.001$; thalamus $p < 0.05$; olfactory bulb $p < 0.001$)(Fig. 3,4), suggesting that impaired glymphatic function plays a critical role in SAE pathogenesis. Meanwhile, we found in CLP group there was significant intra-group heterogeneity in glymphatic influx/efflux efficiency, mirroring clinical heterogeneity where some septic patients develop SAE while others retain cognitive integrity. These findings imply that maintaining effective cerebral metabolic waste clearance may represent a novel therapeutic strategy for SAE prevention and treatment.
Conclusions: In CLP mice group, GS transport of Gd-DOTA from the CSF compartment into brain parenchyma decreased as compared to sham control group. It indicates the impairment of GS transport efficiency during sepsis as a pivotal modulator in SAE progression.

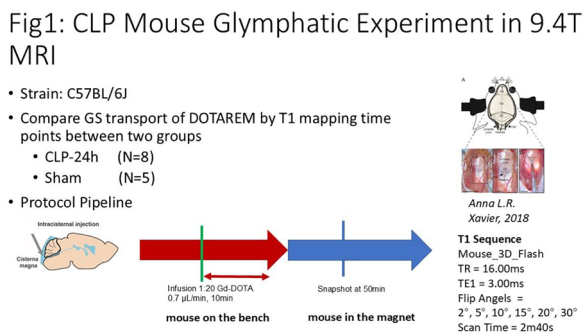


Fig 1 (abstract 001277) Protocol pipline

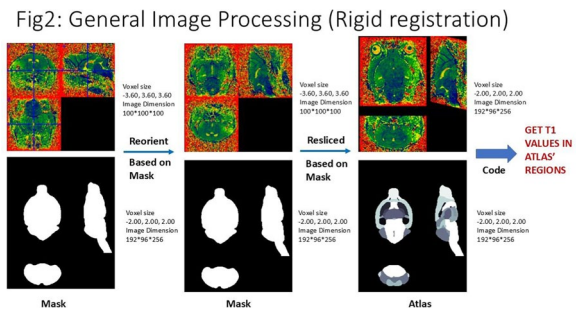


Fig 2 (abstract 001277) Processing pipline

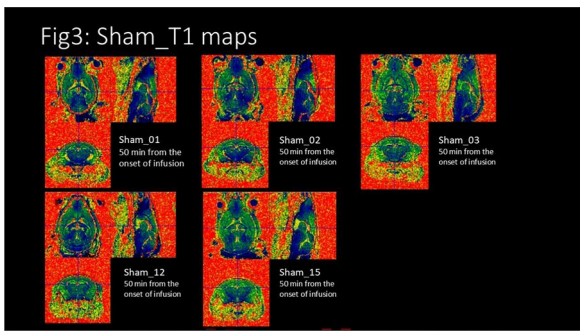


Fig 3 (abstract 001277) T1 mapping for glymphatic influx imaging of 5 shame control mice. Sham-operated mice exhibited substantially lower T1 values and more extensive Gd-DOTA distribution compared to CLP mice

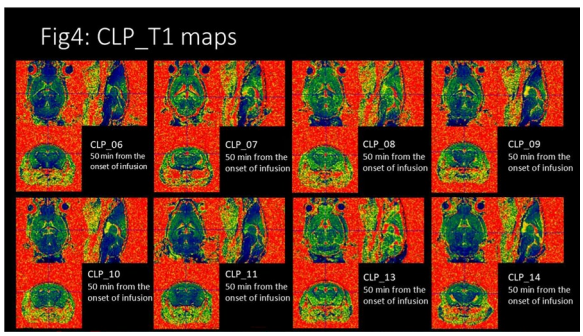


Fig 4 (abstract 001277) T1 mapping for glymphatic influx imaging of 8 CLP mice. GS transport of Gd-DOTA from the CSF compartment into brain parenchyma decreased compared to sham control group. And there is significant intra-group heterogeneity in glymphatic influx/efflux efficiency

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8. Beifing Municipal Natural Science Foundation, 7254396

Topic: Sepsis

001279

Evaluating in-hospital rehabilitation pathways/provision after surviving intensive care

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Introduction: Survivors of critical illness experience a range of long-term health problems, negatively affecting health-related quality of life [1]. Coordination of care across the critical care recovery continuum is essential to improving patient outcomes reflected in national guidelines [2–5]. Although survey data suggest that there remains wide variation in service configuration within the UK [4], this does not provide a complete picture of actual care provision. The granular information captured in electronic health records (EHRs) provides an opportunity for greater understanding of rehabilitation provision using data-driven methods, facilitating benchmarking against standards and information on resource allocation.
Objectives: We aimed to understand the delivery of rehabilitation during the inpatient phase of post-ICU recovery across three acute hospitals in Scotland with a funded regional rehabilitation service. We explored whether data-driven methods could be used to understand the frequency and type of rehabilitation contacts provided by the multidisciplinary team (MDT), factors associated with MDT healthcare contact frequency, and whether there are distinct patterns/clusters of MDT contact identifiable within the dataset.
Methods: We conducted a cohort study of adult critical care survivors in NHS Lothian in South-East Scotland, admitted between 01/03/2019 and 30/03/2021, using linked hospital and national EHRs. The primary outcome was number of MDT contacts between critical care and hospital discharge, with multivariable negative binomial regression used to analyse the association between this and demographic, medical history and admission factors. K-means clustering was used to group patients with similar care pathways, using daily contacts with each MDT member as input features.
Results: In 3272 admissions, 87.6% of patients saw at least one MDT service, with a majority seeing intensive therapy recovery service

(67.5%) or physiotherapy (62.9%). In regression analysis, MDT contact frequency was associated with increased patient age (adjusted incidence rate ratio (adjIRR) 1.13 (1.10–1.17), $p < 0.001$) and conditions, such as intracranial haemorrhage (adjIRR 2.40 (1.82–3.17), $p < 0.001$ and gastrointestinal perforation or obstruction (adjIRR 1.87 (1.39–2.53), $p < 0.001$) (Fig. 1). In clustering analysis, eight clusters were identified, with distinct profiles of MDT involvement (Fig. 2) linked to patient characteristics and treatment factors.

Conclusions: Leveraging EHR data, we observed wide inter-patient variation in frequency and type of post-ICU rehabilitation contacts. Older age and specific conditions were associated with greater MDT contact frequency, and eight distinct clusters of rehabilitation provision were identified. Using a novel, data-driven approach, we were able to quantify rehabilitation contacts for all patients in the cohort, providing the foundations for a system to efficiently monitor one key aspect of post-ICU recovery service provision.

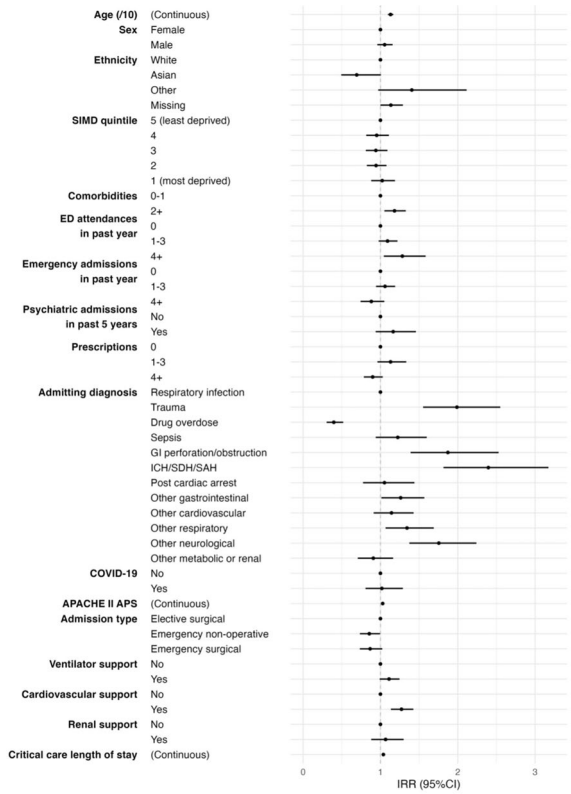


Fig. 1 (abstract 0012579) Forest plot of multivariable associations with number of postcritical care MDT healthcare contacts. *SIMD* Scottish Index of Multiple Deprivation, *ED* emergency department, *GI* gastrointestinal, *ICH/SDH/SAH* Intracerebral haemorrhage/subdural haematoma/subarachnoid haemorrhage, *APS* acute physiology score, *IRR* incidence rate ratio, *CI* confidence interval

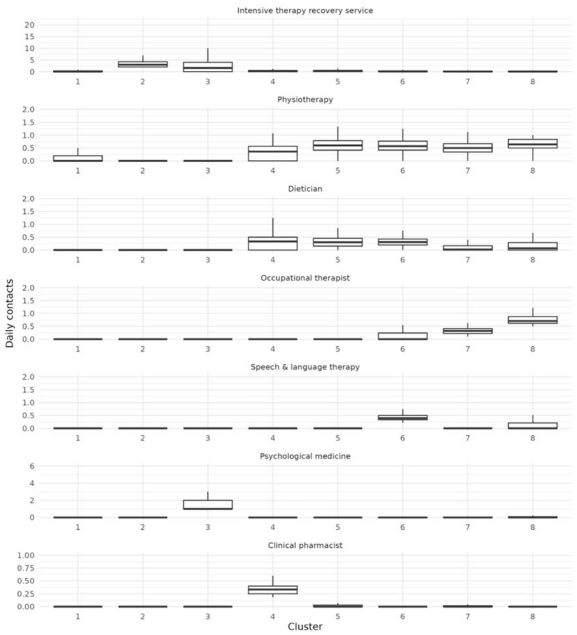


Fig. 2 (abstract 0012579) Box plot of number of daily contacts with each MDT service, stratified by cluster. Outliers not plotted due to disclosure risk

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6. Funder: Scottish Funding Council Beacon Programme. This project was approved by DataLoch (reference: DL-2020–028). This work uses data provided by patients and collected by the NHS as part of their care and support. This project has been facilitated by the DataLoch service. DataLoch enables access to de-identified extracts of health care data from the South-East Scotland region to approved applicants: dataloch.org. Author affiliations relate to those held at time of study.

Topic: Information systems and data science

001280

Protocol adherence and real-world use of vasopressin in septic shock: a retrospective analysis of mortality and adverse events

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Intensive Care Medicine Experimental 2025,* 13(1)*:001280

Introduction: Vasopressin (VP) is recommended as a second-line vasopressor in septic shock (SS) when norepinephrine (NE) exceeds 0.25 mcg/kg/min, according to international guidelines [1–3]. However, real-world adherence to this recommendation remains inconsistent. We assessed protocol adherence to VP initiation and its association with clinical outcomes in critically ill patients with SS.
Methods: We conducted a retrospective observational study in a tertiary hospital ICU (Jan–Dec 2023). Adult patients with SS, defined by Sepsis-3 criteria [4], who received NE > 0.25 mcg/kg/min were included. Protocol adherence was defined as VP administration under this indication.
Baseline characteristics, comorbidities, complications, and mortality were compared between patients who received VP and those who did not. Categorical variables were analyzed using chi-square or Fisher's exact test, and continuous variables with the Mann–Whitney *U* test.
A multivariable binary logistic regression model was used to identify independent predictors of ICU mortality, including VP use, hydrocortisone, age, APACHE II, lactate, and mechanical ventilation.
A separate model explored predictors of arrhythmias, including VP use, dobutamine, age, APACHE II, and lactate, to isolate treatment effects while adjusting for clinical severity.
The study was approved by the Clinical Research Ethics Committee of Hospital Universitari Vall d'Hebron (EOM(AG)014/2024(6245)).
Results: Ninety patients met inclusion criteria (median age 63 [IQR 56–72], APACHE II 26 [21–32]); 52 (57.8%) received VP and 38 (42.2%) did not, despite exceeding the NE threshold.
VP recipients were younger (63 vs. 67, $p = 0.012$), with higher SOFA (12.0 vs. 9.0, $p = 0.004$), lactate (5.7 vs. 3.6 mmol/L, $p = 0.008$), and greater need for mechanical ventilation (94.2% vs. 63.2%, $p < 0.001$) and ECMO (9.6% vs. 0%, $p = 0.016$). CRRT and ventricular dysfunction were comparable (30.8% vs. 28.9%, $p = 0.85$; 17.3% vs. 5.3%, $p = 0.09$). Comorbidities were also similar: cardiopathy (19.2% vs. 23.7%), COPD (11.5% vs. 21.1%), cirrhosis (3.8% vs. 5.3%), chronic kidney disease (15.4% vs. 10.5%), and immunosuppression (23.1% vs. 15.8%; $p = 0.436$). Hydrocortisone was used in 57.7% vs. 42.1% ($p = 0.12$).
The most common infection sites were pulmonary (43.3%), abdominal (24.4%), and urinary (15.6%), with similar distribution between groups. Inflammatory biomarkers at baseline differed between groups. Median procalcitonin was 14.9 [IQR 5.0–83.8] ng/mL in VP patients and 4.4 [IQR 0.8–20.6] ng/mL in non-VP patients ($p = 0.0020$). C-reactive protein was 20.1 [IQR 7.4–29.4] mg/L in the VP group vs. 17.8 [IQR 7.8–26.4] mg/L in the non-VP group ($p = 0.4722$). IL-6 levels were 10,677.0 [IQR 833.3–106,425.0] pg/mL vs. 1,015.0 [IQR 311.9–7,807.5] in non-VP patients ($p = 0.0081$).
Dobutamine use (48.1% vs. 15.8%, $p = 0.002$), arrhythmias (38.5% vs. 13.2%, $p = 0.016$), and digital ischemia (21.2% vs. 2.6%, $p = 0.025$) were more common in the VP group, though no ischemic events led to amputation or death. Given the strong imbalance in ischemic events between groups (11 of 12 cases occurred in VP patients), a multivariable model could not reliably estimate the independent association of VP with ischemia due to near-complete separation. Therefore, results are reported descriptively.
Multivariable analysis of predictors of arrhythmias showed no independent association for VP (OR 0.22, 95% CI 0.04–1.33, $p = 0.098$) or dobutamine (OR 0.29, 95% CI 0.07–1.27, $p = 0.102$).
ICU mortality was 42% overall: 44.2% with VP vs. 39.5% without ($p = 0.43$). Adjusted analysis showed a non-significant trend toward lower mortality with VP (OR 0.37, 95% CI 0.10–1.38, $p = 0.14$); no other covariates were independently associated.
Conclusions: Adherence to VP initiation based on NE thresholds was limited. VP was more frequently used in patients with greater hemodynamic severity, but was not associated with improved survival. A nonsignificant trend toward lower mortality was observed after adjustment. VP and dobutamine were not independently associated with arrhythmias.
Further prospective studies are needed to clarify the complex interplay of contributing factors and better define which patients may benefit most from VP.

Variable	VP group	Non-VP group	p-value
Age	**63.0 [IQR 54.0-70.0]**	**67.0 [IQR 60.2-77.0]**	**0.0118**
Sex (Male)	55.8%	68.4%	0.2762
Cardiopathy	7.7%	18.4%	0.192
COPD	11.5%	21.1%	0.2498
Cirrhosis	3.8%	5.3%	1.0
Chronic kidney disease	15.4%	10.5%	0.5496
Immunosuppression	23.1%	15.8%	0.4364
Patient type (distribution)			0.814
- Medical	55.8%	60.5%	0.6723
- Surgical	44.2%	39.5%	0.6723
Infection site (distribution)			
- Pulmonary	46.2%	39.5%	
- Abdominal	11.5%	7.9%	
- Urinary	5.8%	7.9%	
- Soft tissue	26.9%	28.9%	
- Catheter-related	5.8%	7.9%	
- Unknown	1.9%	2.6%	
- Primary bacteremia	1.9%	5.3%	
APACHE II	26.0 [IQR 20.8-33.0]	25.0 [IQR 20.0-29.5]	0.4687
SOFA	**12.0 [IQR 9.0-14.0]**	**9.0 [IQR 7.2-11.8]**	**0.0038**
Procalcitonin (ng/mL)	**14.9 [IQR 5.0-83.8]**	**4.4 [IQR 0.8-20.6]**	**0.002**
C-reactive protein (mg/L)	20.1 [IQR 7.4-29.4]	17.8 [IQR 7.8-26.4]	0.4722
IL-6 (pg/mL)	**10677.0 [IQR 833.3-106425.0]**	**1015.0 [IQR 311.9-7807.5]**	**0.0081**
Mechanical ventilation	19.2%	23.7%	0.6129
CRRT	**51.9%**	**23.7%**	**0.009**

Fig. 1 (abstract 001280) Baseline characteristics of patients with septic shock meeting vasopressin (VP) criteria. Comparison of demographic data, comorbidities, infection sites, severity scores, inflammatory biomarkers, and organ support between patients who received vasopressin and those who did not, despite norepinephrine (NE) requirements > 0.25 mcg/kg/min. Continuous variables are expressed as median and interquartile range [IQR], and categorical variables as percentages. Bold indicates statistically significant differences ($p < 0.05$). *VP* Vasopressin, *NE* Norepinephrine, *SS* Septic shock, *IQR* Interquartile range, *APACHE II* Acute Physiology and Chronic Health Evaluation II, *SOFA* Sequential Organ Failure Assessment, *PCT* Procalcitonin, *CRP* C-reactive protein, *IL-6* nterleukin-6, *CRRT* Continuous renal replacement therapy, *COPD* Chronic obstructive pulmonary disease

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Topic: Sepsis

001281

T2Bacteria® magnetic resonance assay for early detection of bacteraemia in critical care: a pilot study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001281

Introduction: Challenges exist in diagnosing and treating bacteraemia in the critical care unit. Mimicry of sepsis by non-infective syndromes such as heart failure and inflammatory conditions, the insensitivity and prolonged time to results of blood cultures, and the confounding of signs of organ system dysfunction in sepsis by post-operative complications such as hypotension and haemorrhage are contributory.The T2Bacteria® Panel (T2 Biosystems) is a whole blood, non-culture test that identifies the most common "ESKAPE" bacteria (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Escherichia coli*) within 3–5 h with a reported sensitivity of 90% and specificity of 98%.

These opportunistic organisms are leading causes of nosocomial infections in critical care and represent major therapeutic challenges.
Objectives: To compare paired testing T2Bacteria® Panel versus peripheral blood culture results in patients undergoing blood culture sampling admitted to critical care over a 4-month period in a model 3 hospital. To review antimicrobial changes guided by T2Bacteria® Panel results.
Methods: Institutional ethical approval was obtained. Patients were prospectively enrolled (13 November 2024–19 March 2025). All patients undergoing blood sampling for clinical suspicion of sepsis in the critical care unit had paired T2Bacteria® Panel and peripheral blood culture samples sent for analysis. Clinical and laboratory data were collected, anonymised and basic statistical analysis performed with Microsoft Excel.
Results: $n = 60$ patients admitted to critical care (both HDU and ICU level; model 3 hospital) undergoing paired sampling for sepsis screening were enrolled during the study period. $n = 79$ specimens sent to the laboratory for analysis.
$n = 2$ patients had negative T2Bacteria® Panel but had positive blood cultures with *Staphylococcus capitis* and *Staphylococcus epidermidis*, both clinically deemed contaminants and were excluded from analysis.
$n = 9$ (15%) patients had bacteraemia on peripheral blood culture or T2Bacteria® Panel (Table A). $n = 51$ patients were blood culture and T2Bacteria® Panel negative.
$n = 5$ patients had a positive T2Bacteria® Panel for *E. coli*, including one patient also with *K. pneumoniae*, which correlated to blood culture positivity in $n = 3$ patients. This resulted in antimicrobial changes each of the 5 cases.
$n = 4$ patients had positive blood cultures and negative T2Bacteria® Panels, with organisms not identifiable on the assay (including ESBL and fungal organisms). The antimicrobial changes in these instances were therefore not guided by the T2Bacteria® Panel.
Conclusions: In this single centre pilot study of critically ill patients, the T2Bacteria® Panel was concordant in detecting *E. coli* bacteraemia with a significantly shorter turn-around time as compared to conventional blood cultures. The results also impacted decisions on antibiotic therapy. The limitations of this study include the low prevalence of positive blood cultures and inability of T2Bacteria® panel to detect non-targeted pathogens. Future work aims to further investigate the utility of the T2Bacteria® Panel in a wider cohort of critically ill patients.

ICU diagnosis	T2Bacteria	Organism	Blood cultures (hours)	Organism	Antimicrobials
Septic shock	Positive	*E. coli*	Positive (8 hours)	*E. coli + P. mirabilis*	Co-amoxiclav -> Gentamicin + Pip/Taz
Septic shock	Positive	*E. coli + K. Pneumoniae*	Positive (12 hours)	*E. coli*	Meropenem -> Ceftriaxone
Septic shock	Positive	*E. coli*	Negative	/	Pip/Taz
Septic shock	Positive	*E. coli*	Positive (8 hours)	*E. coli*	Pip/Taz -> Meropenem
Anastomotic leak	Positive	*E. coli*	Negative	/	Pip/Taz/Gentamicin/Anidulafungin
Septic shock	Negative	/	Positive (9 hours)	*K. oxytoca*	Pip/Taz -> Meropenem
Urosepsis	Negative	/	Positive (45 hours)	*Candida Glabrata*	Anidulafungin
Post cardiac arrest	Negative	/	Positive (13 hours)	*Enterobacter kobei (ESBL)*	Meropenem
Respiratory failure	Negative	/	Positive (18 hours)	*S. epidermidis*	Flucloxacillin

ICU diagnosis and paired testing T2Bacteria® Panel versus peripheral blood culture results.

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Topic: Sepsis

001283

The effect of oral health on dysphagia level in acute stroke patients: a cross-sectional and correlational study

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Introduction: Dysphagia is a common complication after a stroke. Maintaining oral health is of vital importance in stroke patients.
Objectives: This study was conducted to determine the relationship between oral health and dysphagia at the time of admission of acute stroke patients.
Methods: This descriptive and correlational study was conducted in the Neurology and Stroke Center Intensive Care Unit of a training and research hospital in Southern Türkiye. The study sample consisted of 82 acute stroke patients. The data were collected within the first 24 h following the admission of the patients to the unit using the "Patient Information Form" the "Turkish Modified Mann Swallowing Assessment Test (TR-MMASA Test)" to determine the dysphagia level, and the "Oral Assessment Guide (OAG)" to assess oral health. Data were analyzed using an independent samples *t* test, one-way ANOVA, Mann–Whitney *U* test, and simple linear regression analysis.
Results: The mean age of the patients was 65.41 ± 12.94, 64.5% were male, and 68.3% were primary school graduates. Of the patients, 24.4% smoked, 13.4% consumed alcohol and 47.6% had a chronic disease. The mean OAG score of the patients was 7.52 ± 3.58 (min–max: 5–15) and the mean TR-MMASA Test score was 83.04 ± 24.68 (19–100). The oral health status of acute stroke patients at the admission to the unit explains 80% of the change in dysphagia levels.
Conclusions: As a result of the evaluations made within the first 24 h after the admission of acute stroke patients to the Neurology and Stroke Center ICU, a medium risk assessment level for oral health and a high risk for dysphagia. Oral health has been determined to have a strong effect on the risk of dysphagia.

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7. The authors have submitted funding applications to their national institutions for the presentation of this study at ESICM ***2025,*** which are currently under evaluation.

Topic: Neurointensive care

001285

Critical care outreach team in focus: evaluating service quality from staff perspective

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Intensive Care Medicine Experimental 2025, **13(1)***:001285*

Introduction: Critical care outreach teams (CCOT) support ward staff and prevent patient deterioration across majority of Trusts. However, its impact on clinical outcomes remains inconclusive, necessitating an alternative evaluation, such as assessing the service quality (SQ) from staff perspectives.
Objectives: The aim of the study is to evaluate the quality of CCOT support from the perspective of the medical and nursing staff using SERVQUAL model as a framework.
Methods: A concurrent embedded mixed-methods design that utilised an online questionnaire with Likert-scale questions, comments and suggestions has been employed. The study was conducted from October 2024 to December 2024 across two sites of an NHS Trust, with purposive sampling of 300 staff (68 respondents, 22.6% response rate). The data were analysed using SPSS (quantitative) and content analysis (qualitative).
Results: Overall, CCOT provides quality service based on the ratings received. Both sites scored high for importance (mean: 4.51–4.78), patient safety enhancement (4.51–4.74), and likelihood of recommendation (4.59–4.81). Sutton staff rated CCOT significantly higher than Chelsea in importance, satisfaction, and clinical practice improvement ($p < 0.05$). Nurses reported greater satisfaction than doctors, particularly in feeling supported ($p = 0.037$). Qualitative themes highlighted strengths (responsiveness, expertise) and areas for improvement (communication training, night staffing, and education for ward teams).
Conclusions: CCOT is meeting the needs of the stakeholders and the organisation though perceptions varied by site and profession. Recommendations include cross-site collaboration, engaging better with doctors, more staff education and training, communication skills training, additional night staffing, and strive for continuous improvement. This study underscores the importance of assessing SQ to ensure that CCOT satisfies staff needs and organizational goals.

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Topic: Health services research and outcome

001287

Five years of severe acute pancreatitis in ICU: a tertiary center perspective

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Introduction: Pancreatitis is an acute or chronic inflammatory condition of the pancreas that may lead to serious local and systemic complications. In its severe form, it can rapidly progress to multiorgan failure and death if not promptly recognized and managed. Given the unpredictable clinical course, early identification of severity markers and risk factors for poor prognosis is essential. Critically ill patients often require ICU support, reinforcing the need for reliable clinical scores and biochemical markers to predict complications and mortality at presentation. Early and accurate risk stratification is crucial to guide timely and effective intervention.
Objectives: To identify the clinical and demographic characteristics, the risk factors associated with the progression to severe forms and worse clinical outcomes in patients admitted to Intensive Care Unit with a diagnosis of acute pancreatitis over a 5-year period.
Methods: This retrospective, monocentric cohort study included all adult patients admitted to the Intensive Care Unit of Hospital Professor Doutor Fernando Fonseca with a first diagnosis of acute pancreatitis between January 2017 and December 2021. Collected data included clinical and demographic characteristics, severity scores (APACHE II), laboratory and imaging findings, therapeutic interventions, organ support requirements (e.g., mechanical ventilation, vasopressors, renal replacement therapy), ICU length of stay, progression to more severe forms and in-hospital mortality.
Results: A total of 51 patients were included (22 females, 29 males), with a mean age 65 (± 17.4). A total of 49 (96.1%) patients had other comorbidities at admission; from all the patients 15 had a history of alcohol abuse and 11 had a history of chronic pancreatitis. Mean APACHE II at admission was 21.5 (± 13). 23 patients presented with organ dysfunction at admission. Organ support was required at 40 patients. Antibiotics were used in 42 patients. Surgery was performed in 22 patients. Pancreatic necrosis at admission was present at 23 patients, and 10 other patients developed necrosis during ICU stay. The mean length of stay at ICU was 15.4 (± 27.3) days. The mortality rate was 60.8% (31 patients), 22 of them in the first 14 days of hospitalization.
Conclusions: Progression to severe pancreatitis and worse outcomes was associated with older age (> 65), lithiasic etiology, high APACHE II, pleural effusion (51%), and pancreatic necrosis (51.1%). Mortality was higher in patients with necrosis (69.6%) and those requiring organ support, especially vasopressors (100%) and mechanical ventilation (90.3%).
This study reinforces the prognostic value of early findings in acute pancreatitis and supports the development of standardized protocols for early assessment. It lays the groundwork for future research focused on risk stratification tools and targeted interventions to improve ICU outcomes.

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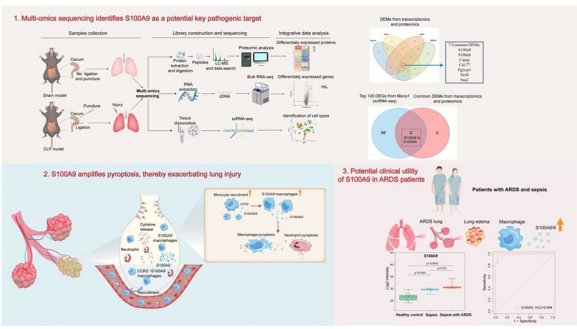
Topic: Metabolism, endocrinology, liver failure and nutrition

001288

Multi-omics analysis identifies S100a9hi monocyte/macrophages as pathogenic targets for sepsis-induced acute respiratory distress syndrome

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Intensive Care Medicine Experimental 2025,* 13(1):*001288

Introduction: Sepsis-induced acute respiratory distress syndrome (S-ARDS), a critical and life-threatening condition prevalent in septic patients, exhibits an aberrant immune response and high mortality rates. However, the underlying cellular and molecular changes associated with inflammation during S-ARDS development remain elusive.
Objectives: This study aims to elucidate the molecular mechanism through multi-omics analysis in S-ARDS and to explore potential immunotherapeutic targets.
Methods: A murine S-ARDS model was generated via cecal ligation and puncture (CLP) using S100A9-KO monocyte/macrophage-specific knockout (S100A9-CKO), and wild-type mice. Multi-omics analyses (bulk/single-cell RNA-seq, proteomics) identified S100A9 + monocyte/macrophage subpopulations. CCR2 antagonist or paquinimod interventions suppressed monocyte migration. In vitro co-culture assays with S100A8/A9-stimulated macrophages/neutrophils and LPS/nigericin-induced pyroptosis validated mechanisms. Lung injury and pyroptosis markers were assessed via histopathology, immunofluorescence and Western blotting. Serum proteomic analysis in S-ARDS patients revealed elevated S100A9 levels correlating with disease severity.
Results: Multi-omics analysis identified a pro-inflammatory S100A9 + monocyte/macrophage subpopulation (Mono1) in septic murine lungs, characterized by co-expression of CCR2 and enriched inflammatory markers. Genetic ablation of S100A9 (global or monocyte/macrophage-specific) significantly attenuated lung injury, reducing histopathology scores and edema. Pharmacological inhibition of S100A9 + cell migration (CCR2 antagonist) yielded comparable protection. Mechanistically, S100A9 triggered macrophage pyroptosis, propagating neutrophil pyroptosis in co-culture models. Clinically, serum S100A9 levels correlated with ARDS severity and mortality.
Conclusions: Our findings suggest the modulation of S100A9 + monocytes/macrophages and S100A9 as targets for immunotherapy in S-ARDS.



Highlights:
1. This study identifies S100A9 + monocytes/macrophages (Mono/Mac) as a key driver of septic ARDS, promoting lung injury via multi-omics sequencing.
2. S100A9 deficiency in Mono/Mac or suppression of the migration of S100A9 + Mono/Mac protects against lung injury and improves survival in sepsis mice, highlighting therapeutic potential.
3. Serum S100A9 levels correlated with the development of ARDS, suggesting diagnostic utility.
Collectively, targeting S100A9 + Mono/Mac and its downstream pathways may offer novel strategies for mitigating sepsis-induced ARDS.

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11. This research was funded by the grant from the National Natural Science Foundation of China (NO. 82472231).

Topic: Sepsis

001289

Nasotracheal intubation vs. conventional airway management in critically ill patients: a randomized controlled study (NaTra-P-Study)

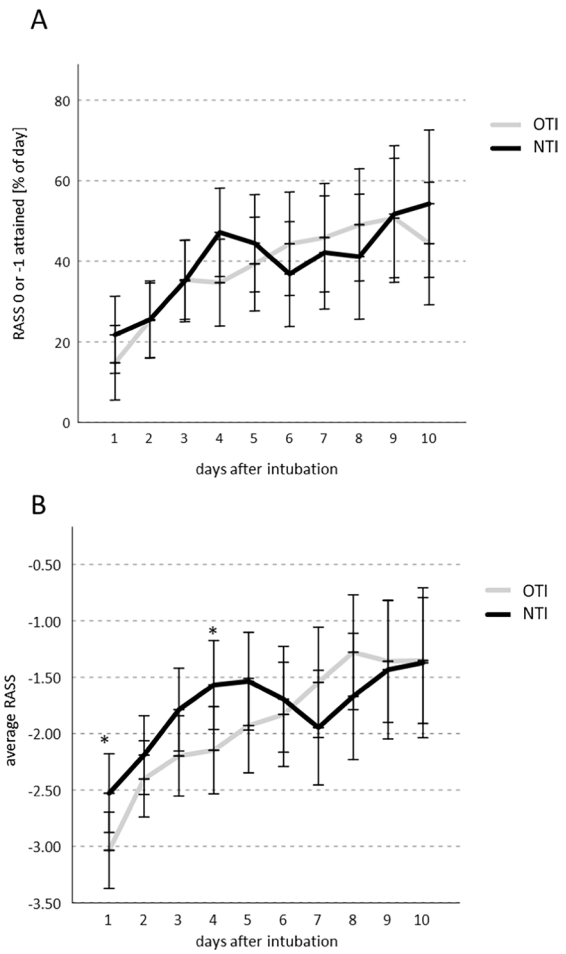
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Intensive Care Medicine Experimental 2025,* 13(1):*001289

Introduction: In the intensive care unit, endotracheal intubation is used to secure the airway [1]. Typically, intubation is performed orotracheally (OTI) with subsequent administration of sedation to ensure tolerance of the orotracheal tube. To avoid the adverse effects of sedation [2] nasotracheal intubation (NTI) might be advantageous [3] due to fewer sedatives, vasopressors, and a higher rate of spontaneous breathing [4].
Objectives: To compare NTI versus OTI on depth of sedation and rate of spontaneous breathing in a prospective randomized trial.
Methods: With ethics approval, this study was conducted at the Department of Intensive Care Medicine of the University Medical Center Hamburg-Eppendorf, Germany. Patients were randomized in a 1:1 ratio to NTI or OTI. Patients were eligible if they were at least 18 years old and required tracheal intubation for any reason. Patients with a length of ventilation < 48 h, indication for deep sedation, known risk factors for bleeding or contraindications to NTI were excluded. The primary outcome measure was depth of sedation assessed by the percentage of time with a Richmond–Agitation–Sedation Scale (RASS) of 0 or −1 for 10 days after intubation. Secondary endpoints were rate of assisted spontaneous breathing (ASB), and complications, i.e. sinusitis. Generalized linear mixed models (GLMM) and chi-squared tests were used for analyses, as applicable.
Results: From 05.03.2023 to 09.10.2024, we included 126 patients with 65 randomized to OTI and 61 to NTI (Table 1). The percentage of the time with RASS 0 to -1 (Fig. 1) did not differ significantly between the groups while average RASS was higher in the NTI group on days 1 and 4 (both $p = 0.04$).The rate of ASB (Fig. 2) did not differ significantly between the two groups. Sinusitis occurred in 3 cases in OTI and 6 in NTI (p = n.s.).

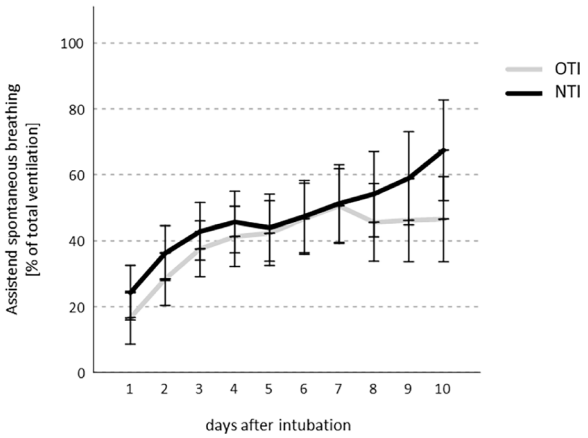
Table 1(abstract 001289) Outcome parameters

Parameter	Orotracheal intubation ($n = 65$)	Nasotrache-alintubation ($n = 61$)	*p* value
Length of ICU stay [d]	29.3 ± 24.6	24.5 ± 21.9	0.122
Length of hospital stay [d]	35.2 ± 28.5	30.8 ± 26.3	0.188
Extubated successfully on first attempt [n]	26 (40%)	28 (46%)	0.504
Tracheostomy [n]	23 (35%)	18 (30%)	0.482
Deceased [n]	19 (29%)	18 (30%)	0.973
Length of ventilation [d]			
Overall [d]	7.5 ± 5.1	7.0 ± 4.4	0.274
Before successful extubation [d]	5.8 ± 3.3	7.1 ± 4.5	0.117
Before any extubation attempt [d]	5.7 ± 3.6	6.2 ± 4.2	0.258
Before tracheostomy [d]	10.6 ± 5.5	7.0 ± 4.8	0.017

Conclusions: Patients in the NTI group may have a shallower depth of sedation while no significant differences on ASB and complications were found between the groups. Nasotracheal intubation may be a feasible alternative to OTI. Further studies are needed to explore the effects on sedation in a larger cohort and to elucidate the impact of NTI on other outcome parameters such as rate and timing of tracheostomy, or patient comfort.



RASS: Richmond–Agitation–Sedation Scale Measurements. OTI: orotracheal intubation group, NTI: nasotracheal intubation group. * p < 0.05.



Proportion of assisted spontaneous breathing.
OTI: orotracheal intubation group, NTI: nasotracheal intubation group.

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5. The study was funded entirely from departmental funds.

Topic: Acute respiratory failure and mechanical ventilation

001290

Predicting bleeding in critically ill at risk patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001290

Introduction: Critically ill patients admitted to the ICU often display hemostatic imbalance and are susceptible to bleeding. Bleeding complications worsen outcome, rendering a better understanding of risk factors pivotal to prevent bleeding. Identification of patients at risk for bleeding may also help in tailoring the use of anticoagulant medication.
Objectives: To identify risk factors for bleeding complications in critically ill who are at risk.
Methods: In this multicenter prospective cohort study, adult patients (≥ 18 years) who were admitted to the ICU of 8 European hospitals and who had a risk factor for developing diffuse intravascular coagulation (DIC) were included. The data collected from November 2017 to July 2023 was analyzed. The development of a fatal, major or minor bleeding was defined according to WHO criteria.
Patient characteristics, vital parameters and laboratory values were chosen as possible predictors based on clinical relevance, and were included into a prediction model of bleeding. A multivariable analysis using binary logistic regression was used with backward selection to identify associated risk predictors. The diagnostic performance of the model was evaluated by computing a receiver operator characteristics curve (ROC curve) based on the predicted probabilities.
Results: Of 842 patients included, 201 (23,9%) developed bleeding, of which six (3%) were fatal, 100 (49,7%) were major bleeding and 95 (47,3%) were minor. The most prevalent site of bleeding was the gastrointestinal tract. Low platelets (odds ratio 0.997 [0.995–0.999]), a low admission hemoglobin level (0.82 [0.72–0.93]) and a prolonged aPTT (1.04 [1.02–1.07]) showed a statistically significant relationship with the development of a bleeding complication. The ROC-curve showed a significant AUC of 0.75 [0.70–0.80]. Furthermore, patients with an obstetric complication (7.91 [1.51–41.39]) and critical illness due to a solid tumor (3.48 [1.12–10.88]) were more susceptible to hemorrhage compared to patients with septic coagulopathy.
Conclusions: Low platelets, a low hemoglobin level and a prolonged aPTT are risk factors for bleeding in the critically ill. A primary diagnosis of an obstetric complication or the presence of a solid tumor was also associated with an increased risk of bleeding. These variables can be used with moderate sensitivity for predicting bleeding complications in critically patients at risk for DIC.

Topic: Transfusion and haemostasis disorders

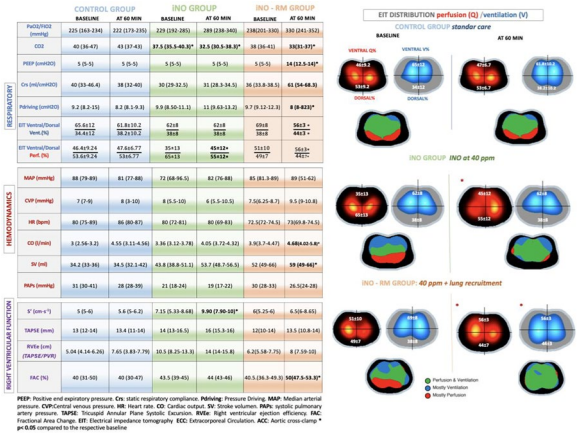
001291

Effects on inhaled nitric oxide with and without lung recruitment on right ventricular function after cardiac surgery

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Intensive Care Medicine Experimental 2025,* 13(1)*:001291

Introduction: Right ventricular (RV) dysfunction is a frequent perioperative complication after cardiac surgery under cardiopulmonary bypass (CPB). An underrecognized factor is the presence of lung collapse that increases pulmonary vascular resistance contributing to an increased afterload in an recovering ischemic RV.
Objectives: To study the effects of inhaled nitric oxide (iNO) alone or in combination with lung recruitment to mitigate the effects of lung collapse on RV function after cardiac surgery.
Methods: This was a prospective, single-center, randomized study conducted in patients after cardiac surgery. We included patients with preserved heart function, without pulmonary hypertension that underwent uncomplicated cardiac surgery. Patients were under passive mechanical ventilation ventilated with PEEP 5 cmH_2O and VT 6—8 ml/kg, with postoperative lung collapse: compliance ≤ 35 ml/cmH_2O, and dorsal electrical impedance tomography (EIT) distribution of ventilation < 40%, were randomized into one of three groups: Control**:** standard postoperative management; **iNO:** 60 min of 40 ppm iNO and RM-iNO: lung recruitment and postrecruitment PEEP 10 – 12 cmH2O + 60 min of 40 ppm iNO. Measures: gas exchange, lung mechanics, hemodynamic parameters, EIT relative distribution of ventilation-perfusion and RV function by transesophageal echocardiography. This measures were obtained at baseline and after 60 min.
Results: We included 17 patients in this preliminary analysis underwent different types of cardiac surgery, such as coronary (7) or valvular (10) procedures.The left ventricular ejection fraction was 65 ± 9%. The median age was 65 years (range 55–76), and the mean BMI was 30 ± 4. At baseline, EIT dorsal ventilation was 34 ± 4%
1. **Control group** gas exchange, lung mechanics, hemodynamics, and RV function remained unchange *(table)*
2. **INO group** we observed a significant redistribution of pulmonary perfusion towards the ventral regions of the lung (table), improving the V/Q ratio and reducing shunt, which led to improved oxygenation. TEE determined pulmonary artery systolic pressure decreased by 8% and stroke volume increased by 10%. Respecting RV function contractilty parameters slightly improved as did right ventricle ejection efficiency a parameter intimately related to ventricular vascular coupling
3. **MR-INO group** we observed significant improvements in lung mechanics, gas exchange, and hemodynamic parameters. Pulmonary perfusion was redistributed to the ventral regions (51% to 56%), with decreased lung collapse (increase in dorsal ventilation from 29 to 44%), leading to improved V/Q matching and ventricular–vascular coupling, and consequently, improvement in all parameters of RV function

Conclusions: The postoperative use of iNO decreases pulmonary artery pressure improving ventricular–vascular coupling, with the consequent improvement of RV function in patients under cardiac surgery. All this is enhanced by the combination with lung recruitment, also improving pulmonary mechanics and oxygenation.



(abstract 001291) *PEEP* Positive end expiratory pressure, *Crs* static respiratory compliance, *Pdriving* Pressure driving, *MAP* Median arterial pressure, *CVP* Central venous pressure, *HR* Heart rate, *CO* Cardiac output, *SV* Stroke volumen, *PAPs* systolic pulmonary artery pressure, *TAPSE* Tricuspid annular plane systolic excursion, *RVEe* Right ventricular ejection efficiency, *FAC* Fractional area change, *EIT* Electrical impedance tomography, *ECC* Extracorporeal Circulation, *ACC* Aortic cross-clamp. *$p < 0.05$ compared to the respective bas.

Reference

1. Air liquid

Topic: Cardiovascular issues in ICU

001292

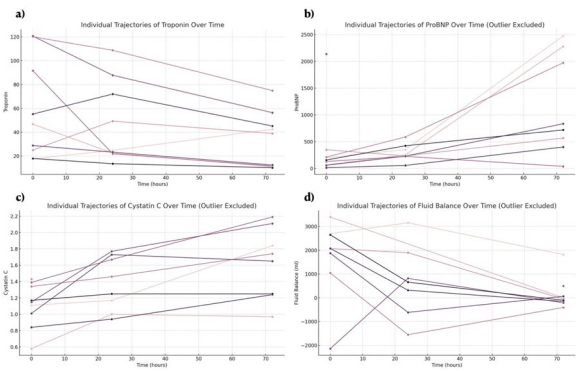
Preload evaluation and biomarker profiling for early detection of renal dysfunction after liver transplantation

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Introduction: The perioperative period of liver transplantation (LT) poses a challenging and highly stressful situation in which the heart must maintain adequate blood flow to achieve optimal organ perfusion. Furthermore, achieving an optimal balance between preload optimization and prevention of fluid overload is essential to ensure adequate perfusion of both the graft and kidneys. Acute kidney injury (AKI) remains a major postoperative complication following liver transplantation and has multifactorial pathophysiology. Although biomarkers, such as cystatin C, BNP, and troponin, have been investigated, their comparative utility in this setting is still evolving. In addition, the E/e'ratio as a surrogate of left ventricular filling pressure has emerged as a noninvasive echocardiographic tool for monitoring preload and potential volume overload.
Objectives: This study aims to evaluate the relationship between preload status and biomarker trajectories for the prediction of postoperative renal dysfunction in liver transplant recipients.
Methods: This is a preliminary finding of an ongoing study on fluid management in the immediate postoperative period after liver transplantation. We analyzed nine liver transplant recipients for clinical, hemodynamic, and biochemical data collected 0, 24, and 72 h postoperatively. Associations were made between cystatin C, troponin, BNP, and volume parameters (fluid intake, balance, cumulative fluid) with reduced creatinine clearance (< 40 ml/min) at 24 h of LT. Acute kidney injury occurrence was explored using non-parametric tests (Mann–Whitney, Spearman), trajectory analysis, and logistic regression.
Results: Nine patients were included in the preliminary report: 3 (30%) were female, the mean age was 57 ± 6 years, and the MELD score was 13.0 (IQR: 11.0–17.0). Three patients 33% exhibited with reduced creatinine clearance (< 40 ml/min) at 24 h after LT. The troponin level gradually decreased. However, BNP levels exhibited a progressive increase and Cystatin C levels showed a significant increase.
Changes in the key biomarkers and fluid balance over time after the immediate postoperative period following liver transplantation are shown in Table 1.

Table 1	0 h(Median [IQR])	24 h(Median [IQR])	72 h(Median [IQR])	*p* value
Fluid Balance	2076 [1877–2695]	740 [87–2212]	−51 [−151 to 64]	0.072
Troponin	46.8 [25.0–91.6]	24.7 [22.4–72.0]	38.9 [11.6–45.2]	0.045
Pro-BNP	158 [66–213]	254 [230–423]	836 [567–2277]	0.004
Cystatin C	1.1 [1.0–1.3]	1.5 [1.2–1.7]	1.7 [1.2–2.1]	0.001
NGAL	259 [195–288]	194 [129–247]	N/A	0.164

Among the various clinical and biochemical variables analyzed, only baseline Cystatin C levels (measured 0 h post-liver transplantation) significantly predicted reduced creatinine clearance (< 40 ml/min). No significant associations were found between fluid balance and renal dysfunction, although marked interindividual variability was noted.
A statistically significant positive correlation was observed between the E/e' ratio and pro-BNP levels 24 h after liver transplantation (Spearman's $\rho = 0.73$, $p = 0.025$).
Conclusions: These preliminary findings suggest that, among the biochemical parameters evaluated, baseline cystatin C (measured at 0 h post-transplantation) was the only independent predictor of impaired renal function at 24 h post-liver transplantation. Dynamic changes in troponin and BNP were observed, indicating myocardial stress and progressive ventricular loading, respectively. Similarly, the E/e ratio was associated with elevated BNP levels, reinforcing the utility of both markers in evaluating preload and potential volume overload in the early postoperative period. However, neither factor was found to be significantly associated with renal dysfunction. Further data collection and a larger sample size are required to strengthen these preliminary findings and improve the robustness of statistical associations.



Individual trajectories of biomarkers and fluid balance over time.

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5. FONDECYT regular 1241463

Topic: Cardiovascular issues in ICU

001296

Prognostic value of the shock index in patients diagnosed with septic shock

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Introduction: The shock index could have a predictive value in the evolution of septic patients. We wanted to evaluate the different shock indices described in the literature and their predictive capacity in a cohort of septic patients in a Spanish tertiary hospital.
Objectives: To analyze the prognostic value of the different shock indices (SI) described in the literature in patients with septic shock.
Methods: An observational, prospective study in patients diagnosed with septic shock (according to SSC guidelines) who were admitted to the ICU of the HGUGM, between October and November 2024. Epidemiological, clinical, and analytical variables, as well as the need for organ support and clinical outcomes, were collected. The different shock indices: systolic (HR/SBP), diastolic (HR/DBP) and mean (HR/MBP), were calculated at the first hospital visit (Triage) and upon admission to the ICU.
Quantitative variables were expressed as mean with standard deviation or median with interquartile range, and qualitative variables were expressed as percentages. The possible association of shock index with the onset of organ failure and/or mortality was analyzed using simple logistic regression.
Results: A total of 51 patients were analyzed. Age: 58 ± 15 years. Of wich 61% were male. Charlson I. 2 ± 3. Infections origin: respiratory 35%, abdominal 20%, and urinary 20%. Primary bacteremia 14%. Microbiological isolation: *E. coli* 26%, *Klebsiella spp* 16%, *S. pneumoniae* 12%. Admission severity: APACHE II 18 (IQR 13–23), SOFA 7 (IQR 4–13), lactate 3.7 ± 3.4 mmol/l. IS triage: systolic 1.31 ± 0.51, diastolic 2.18 ± 0.68 and modified 1.71 ± 0.67; on admission to ICU: systolic 1.17 ± 0.44, diastolic 2.92 ± 0.68 and modified 1.66 ± 0.79. Severe shock (NA > 0.5 µg/kg/min) was present in 25.5%, AKI in 71% and moderate/severe cardiac dysfunction in 16%. 53% required IMV, duration 6 days (IQR 2–12). ICU stay 4 days (IQR 3–12), with a 20% mortality rate.
In the univariate analysis, none of the shock indices analyzed were associated with organ failure and/or mortality (Table 1).
On the contrary, other variables related to prognosis, APACHE II (OR 1.12; 95% CI 1.02–1.23), SOFA (OR 1.39; 95% CI 1.14–1.71) and lactate (OR 1.77; 95% CI 1.17–2.68), were significantly associated with an increase in mortality.
Conclusions: In our experience, none of the shock indices analyzed were associated with the development of organ failure or mortality in patients with septic shock admitted to the ICU.

Table 1 (abstract 001296) Association of shock indices with organ failure and mortality

		Severe shock (NA > 0,5 γ) OR (CI95%)	AKI OR (CI95%)	Dysfunction VI OR (CI95%)	Mortality OR (CI95%)
Triage	SSI	1,06 (0,27-4,15)	1,47 (0,41-5,31)	1,78 (0,40-7,97)	0,96 (0,19-4,69)
	DSI	1,63 (0,59-4,67)	1,81 (0,68-4,83)	1,53 (0,46-5,08)	1,93 (0,57-6,56)
	MSI	1,37 (0,51-3,69)	1, 47 (0,53-4,13)	1,62 (0,55-4,79)	1,46 (0,50-4,39)
ICU admission	SSI	1,63 (0,57-4,67)	1,76 (0,39-7,80)	4,26 (0,84-21,52)	1,01 (0,21-4,89)
	DSI	0,95 (0,76-1,19)	1,42 (0,59-3,43)	0,98 (0,83-1,15)	0,95 (0,73-1,24)
	MSI	0,96 (0,43-2,18)	1,60 (0,59-4,32)	1,49 (0,67-3,37)	0,95 (0,38-2,35)

* SSI: Systolic Shock Index; DSI: Diastolic Shock Index; MSI: Mean Shock Index

Topic: Cardiovascular issues in ICU

001298

Analysis of mortality after discharge from the intensive care unit

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Introduction: Owing to advances in medicine, more and more patients with significant comorbidities are being admitted to intensive care units. That said, we wanted to analyse the profile of the patients who are admitted and survive in the ICU of the HGU Gregorio Marañón, Madrid.
Objectives: Analysis of hidden mortality after discharge from intensive care medicine in a highly complex hospital.
Methods: Observational, prospective, single-centre study, between December 2023 and June 2024, of follow-up of patients after discharge from the intensive care unit.
Results: 391 patients were included, 61% male. Mean age 60 ± 16. Hospital stay after ICU less than 3 days 14%, 4–7 days 25%, 8–21 days 59% and more than 21 days 2%.
The reason for admission: respiratory failure 42.5%, neurological deterioration 28.6%, shock 23%, metabolic disorder 5.4%. Categorised as septic 25.6%, respiratory 23%, neurological 18.4%, metabolic disorder 6.6%, digestive 5.9%, oncological 5.4%, haematological 4.3%.
Classified by functional status as patient independent in performing activities of daily living (ADLs)79%, patient partially dependent for ADLs 18.2%, patient dependent in ADLs 2.8%. Other relevant aspects were delirium 32%, DAUCI 30.9%, need for MV 83.1% divided into NIV 58% and IMV 42%, ALS 61.1%.
Problems at ICU discharge: 1 problem: 4.9%, 2: 29.9%, 3: 41.7%, 4: 18.9%, 5 or more: 4.6%. According to limitation at discharge they were classified as without LET 87.7%, with restrictions 5.1%, LET 7.2%. Days of hospitalisation after ICU were less than 7 days 39%, between 8 and 21 days 59%, more than 22 days 2%.
Mortality at discharge was 9%. On admission, patients with shock had a mortality of 16.9%, by oncological categorisation 40%, haematological 23.3%, septic 12.2% and according to functional status PDABVD or DABVD over 20%.
Mortality by problems at ICU discharge was 1 problem: 0%, 2: 1.7%, 3: 11.8%, 4: 12.3%, 5 or more: 29.4%. Mortality for the most significant problems was ICUAD 13.3%, neurological deterioration 14.3%, respiratory failure 8.6%, renal failure 11.3%. Mortality according to limitation by readmission was 5.3% and 57.1% in non-readmission patients.
Among the re-admittable patients, VAD, VMI, DAUCI, ARF, ARF and discharge problems were associated with mortality. Social problems were not associated with higher mortality.
7.2% of patients at discharge had criteria for non-readmission.

Multivariate analysis was performed including discharge problems [OR 2.0 CI 95% (1.33–2.99) p 0.001] and previous functional status [OR 4.2 CI 95% (2.0–9.1) p 0.000], with an AUC for this model of 0.82.
Conclusions: Our population stands out for its high mortality at discharge from the intensive care unit, with a high percentage of patients with limited therapeutic effort. They are also characterised by a risk profile of poor outcome, with a predominance of oncohaematological patients. Our predictive model includes dependency status and number of problems at discharge with a high predictive capacity.

Topic: Health services research and outcome

001301
An ethnographic study of teamwork in intensive care units in the United Kingdom: findings from FEARLESS ICU
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Introduction: Teamwork amongst healthcare professionals remains a crucial component of not only staff wellbeing and retention, but also patient safety and satisfaction. Despite this importance, teamwork may be strained, with negative implications for both staff and patients. The most recent National Health Service (NHS) Staff Survey in the UK indicates that perceptions of teamwork are declining, with variations amongst different professions.
These teamworking practices have becoming increasingly challenged since the COVID-19 pandemic. This post-pandemic landscape adds pressure to teams, notably those in intensive care units (ICUs), where new demands for flexible, ad hoc teams and cross-boundary working frustrate ways of working together. These demands have negative consequences, manifesting as added stress, higher turnover rates and increased patient safety concerns. These effects hamper both clinical and system resilience and continue to impact on the teamwork in ICUs.
Objectives: The objectives of Fostering teamwork for resilient staff and safe care in ICU (FEARLESS ICU) are to.
1. Investigate the changing nature of teamwork in ICUs post-pandemic
2. Identify facilitators and barriers to effective teamworking practices

Methods: This study consists of a rapid ethnography carried out across eight different ICUs in the United Kingdom. ICUs were purposively selected based on geography, size, speciality and NHS Staff Survey teamwork scores. Ethnographic fieldwork consisted of non-participant observations, shadowing of staff and one-on-one semi-structured interviews. Fieldnotes were kept digitally, and all interviews were recorded and transcribed. Analysis consisted of standard ethnographic principles of thematic coding, categorisation and abstraction. This approach provided an in-depth opportunity to observe how different health professionals interacted with one another and to explore factors influencing collaborative work.
Results: Initial findings underscore the additional challenges in the post-pandemic landscape. Healthcare staff discussed the added pressure of being redeployed to different ICUs in their hospital due to staff and skill shortages at short notice. This had direct implications on their teamworking practices, both with the established team and the new team. This extended to changes in organisational processes since the pandemic which further challenged teamworking practices. Furthermore, separate physical spaces within ICUs may hinder interprofessional communication. Observations revealed different communication styles between professions. Various intersectional demographic characteristics may have also contributed to observed dynamics. Facilitators to teamworking practices included identifying opportunities to teach and adopting more inclusive leadership styles.
Conclusions: This ethnographic study provides an in-depth understanding of ICU team working dynamics, particularly in a post-pandemic landscape. Effective teamwork is consistently linked to lower staff burnout rates, higher staff retention, improved staff wellbeing, and better patient outcomes. This research is vital to ensure that overburdened healthcare systems continue to maximise the existing resources (i.e. staff members) to address current crises. Through this study, we identify factors facilitating and inhibiting effective teamwork and offer practical steps for those working and managing staff in ICU to take to realise the improved staff wellbeing and patient outcomes that effective teamwork fosters.

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Topic: Health services research and outcome

001302
Descriptive analysis and follow-up after discharge from the intensive care unit
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Introduction: The increasing survival of critically ill patients, due to advances in intensive care, has led to a growing population of ICU survivors with complex post-discharge needs. Many of these patients develop persistent complications encompassed under Post-Intensive-Care Syndrome—which include physical, cognitive, and mental health impairments. However, despite the pre-existing comorbidities and prolonged ICU stays, the trajectories of these patients and their outcomes remain understudied.
Objectives: To identify and describe a population of patients and their characteristics after ICU discharge.
Methods: Observational, prospective, single-center study over nine months in 2024, following ICU discharge. Collected variables included clinical, epidemiological, etiological data, comorbidities, organ support, complications, interventions, discharge problems, and outcomes. Descriptive analysis was performed.
Results: 476 patients included, 61% male, mean age 59 $\pm$ 16 years. Mean ICU stay was 10.34 $\pm$ 15.49 days; hospital stay, 23.64 $\pm$ 25.65 days.
Reasons for admission: respiratory failure (42.2%), neurological deterioration (27.9%), shock (23.1%), metabolic disorders (5.7%). By category: septic (24.6%), respiratory (22.5%), neurological (18.5%), oncohematological (10.5%).
Comorbidities: hypertension (47.6%), dyslipidemia (32.4%), diabetes (30.3%), obesity (26.7%), respiratory disease (37.6%), heart disease (24.8%), chronic kidney disease (15%). Solid tumors (22.1%), hematological disease (9.9%), liver disease (12.4%), psychiatric disorders (17%), alcohol use (21.8%), other substances (38.7%). Functionally independent (80.9%), dependent (2.7%).
Support: sedation (63.7%), invasive ventilation (35.5%), non-invasive ventilation (48.3%), tracheostomy (11.3%), vasoactive drugs (61.6%), renal replacement therapy (8.2%), neuromuscular blockade (29.6%).
Delirium in 30%, linked to longer ICU (19.45 vs. 6.50 days) and hospital stay (36.56 vs. 18.10) ($p < 0.000$), not mortality.
At discharge, 61.6% had $\geq$ 3 problems. Non-admissible 7.4%, limited admissibility 5%. Readmissions: 3.8%. ICU mortality: 17.8%; post-discharge mortality: 8.8%. 17.4% needed medium/long-term follow-up.
Conclusions: Patients were comorbid with prolonged stays, high incidence of delirium and PICS, elevated ICU and post-discharge mortality, and low readmission rates. Most had appropriate therapeutic limitation and many required continued care post-discharge**.**

Topic: Health services research and outcome

001303

Complications resulting from the use of venous–arterial extracorporeal membrane oxygenation associated with intraaortic balloon pump: systematic review and meta-analyses

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Introduction: Cardiogenic shock is a challenging clinical entity that requires a multifaceted approach to treatment. Circulatory assist devices have been developed as a supportive option to help manage these patients, providing a greater chance of recovery from the underlying cause of shock.
Objectives: The objective of this meta-analysis is to compare the clinical outcomes of veno-arterial extracorporeal membrane oxygenation (ECMO-VA) with or without intra-aortic balloon pump (IABP) for the treatment of cardiogenic shock.
Methods: A systematic review and meta-analysis was conducted using articles from the Embase, PubMed, and Scopus databases. Observational studies comparing the use of IABP in patients with cardiogenic shock on ECMO were included. A random-effects model was employed, and a 95% confidence interval was defined for the analyses.
Results: A total of 199 studies was screened by two independent reviewers, with 16 included. The ECMO-VA + IABP group showed lower mortality (Odds ratio 0.77–0.63; 0.93). Meanwhile, the ECMO + IABP group had a higher rate of limb ischemia (Odds ratio 1.47–1.08; 2.01). Regarding major bleeding, need for renal replacement therapy, and infection, there was no statistically significant difference between the groups.
Conclusions: This meta-analysis showed a higher mortality in the ECMO group alone, despite similar rates of complication in both groups. However, interpretation is limited due to the inclusion of observational studies only. More research is needed on the topic, especially randomized control trials.

Topic: Cardiovascular issues in ICU

001305

Impact of mechanical ventilation on renal regional inflammation, oxygenation, and perfusion using PET–MRI: the VIKI study

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Introduction: Biotrauma is a potential mediator of distant organ failure (i.e. kidneys) by ventilator induced lung injuries (VILI), while cardiorespiratory interactions may alter regional and systemic hemodynamics. We aimed to evaluate the impact of experimental high tidal volume (VT) ventilation on renal perfusion, oxygenation and inflammation using renal coupled functional imaging.
Methods: After animal conditioning (general anesthesia, surgical tracheotomy, and pulmonary artery catheterization), swine weighting 30 ± 5 kg were randomized to protective ventilation (PV) in the prone position (PEEP [positive end-expiratory pressure] 5 cmH2O, VT 6–10 ml.kg-1), protective ventilation (same as prone group) in the supine position or high VT ventilation (HVT) in the supine position (PEEP 0 cmH_2O, VT set to reach an end-inspiratory transpulmonary pressure between 30 and 35 cmH2O), applied for 24 h. Animals underwent at H24 a renal dynamic positron-emission tomography (PET) with [15O]-H2O to quantify renal regional perfusion, a magnetic resonance imaging (MRI) with blood oxygenation level dependent (BOLD) sequence to evaluate renal tissue O2 content, and a renal dynamic PET with [11C](R)-PK11195 to quantify macrophage recruitment. All acquisitions were segmented to separate cortical and medullar regions. BOLD-MRI results were expressed as the ratio of cortical over medulla values, to account for inter-individual variability. Respiratory mechanics, hemodynamics and renal function were continuously monitored. The primary outcome was the regional renal standardized uptake value of [11C](R)-PK11195 at H24. PV-prone animals were the control group.
Results: 17 animals were enrolled (5 PV-prone, 6 PV-supine, 6 HVT-supine). At H24, VT, airway pressure at end-inspiratory and central venous pressure were significantly higher in the HVT-supine group, compared to PV prone, with no difference in PaO_2/FiO_2 ratio, $PaCO_2$, cardiac output and creatinine clearance (Fig. 1). Creatinine clearance was significantly higher in the PV-supine group, compared to PV-prone (Fig. 1-G). At H24, there was a non-significant trend in higher [11C](R)-PK11195 renal SUV in the HVT and PV-supine groups, compared to PV-prone (Fig. 2A). No significant difference existed in cortical or medullary perfusion between groups at H24, while there was a trend in lower cortical O_2 content in the HVT group, compared to PV-prone ($P = 0.06$, Fig. 2B and C).
Conclusions: After 24 h of application, high VT ventilation and protective ventilation in the supine position led to a nonsignificant increase in renal macrophage presence, as compared to prone protective ventilation, with varying effects on creatinine clearance. Also, high VT ventilation led to alterations in cortical O_2 content, as compared to the prone protective ventilation. The analysis of data is ongoing and these results are preliminary.

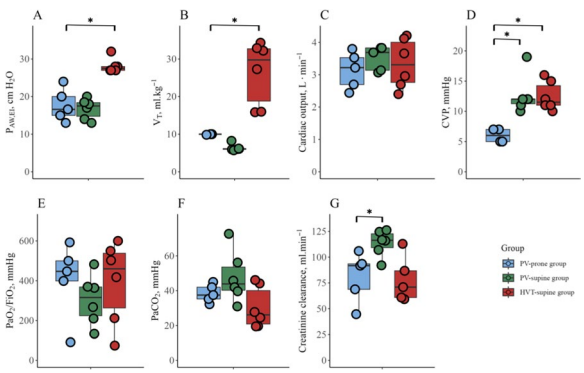


Fig. 1 (abstract 001305) Respiratory mechanics, hemodynamics and renal function at H24. The figure shows airway pressure at end-inspiratory (**A**), Tidal volume (**B**), cardiac output (**C**), central venous pressure (**D**), PaO_2/FiO2 ratio (**E**), arterial $PaCO_2$ (**F**) and creatinine clearance (**G**) at H24. Boxplots (PV-prone group in blue, PV-supine group in green and HVT-supine group in red) represent data by group and dots are each individual value ($n = 17$). Comparisons between the PV-supine and HVT-supine groups with the PV-prone group were performed using the Dunnett test, with the PV-prone group as the control. *$p < 0.05$ compared with PV-prone group. *CVP* central venous pressure, *HTV* high VT, central venous pressure. *PAW,EI* airway pressure at end-inspiratory, *PV* protective ventilation, *VT* Tidal volume

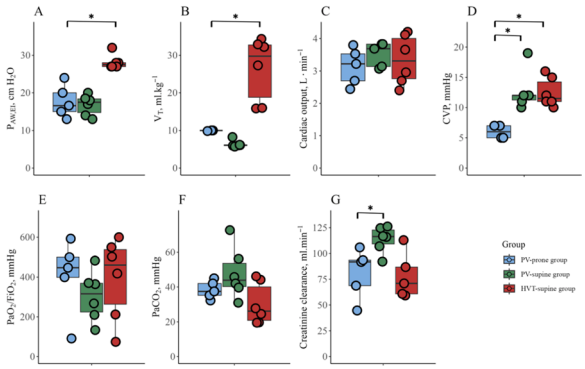


Fig. 2 (abstract 001305) Renal outcome at H24. The figure shows the standardized uptake value (SUV) of [11C](R)-PK11195 (**A**) and the regional kidney perfusion (in milliliters of blood per gram of tissue per minute) (**B**) in the cortex and the medulla and the R2*ratio between the medulla and the cortex (**C**) at H24. The R2* is the apparent relaxation rate measured in BOLD–MRI sequences and inversely proportional to oxygen levels. It is not a direct measure of regional oxygenation but rather reflects relative differences between regions. Hence, a [Medulla/Cortex]R2*ratio > 1 meant that the pO_2 was higher in the cortex as compared to the medulla, while an increase in the R2*ratio meant that there was an increase in cortex oxygenation compared to the medulla (or a decrease in medulla oxygenation compared to the cortex). Boxplots (PV-prone group in blue, PV-supine group in green and HVT-supine group in red) represent data by group and dots are each individual value (n = 17). For panels A and B, comparison of data between regions and groups were performed using mixed effects linear regression, with the animal number as a random effect. For panel C, comparisons between the PV-supine and HVT-supine groups with the PV-prone group were performed using the Dunnett test, with the PV-prone group as the control. *BOLD* blood oxygenation level dependent, *K1* regional blood perfusion, *HTV* high VT, *MRI* magnetic resonance imaging, *SUV* standardized uptake value, *VT* Tidal volume

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Topic: Acute kidney injury and haemofiltration

001306

Challenges in empirical antibiotic prescription in intra-abdominal infections

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Introduction: The diversity of infection sources, pathogen profiles, and resistance patterns all play a role in optimal antibiotic selection1,2. A strategic approach, guided by clinical evidence and microbiological data, is essential to improve patient outcomes and restrain antimicrobial resistance3,4.
Objectives: To analyze risk factors for IAI by pathogens resistant to piperacillin–tazobactam (pip/taz) and those associated with sensitivity to non-pseudomonal cephalosporin plus metronidazole (NP Cef + Met).
Methods: Retrospective cohort study of patients with IAIs receiving empiric antibiotic therapy admitted to the ICU of a secondary care hospital between April 1, 2021, and December 31, 2023.
Results: There were 73 patients included in the study: 44 (60%) were sensitive to NP Cef + Met and 20 (27%) were resistant to pip/tazo. General characteristics of patients included and description of risk factors associated with resistance to pip/tazo are shown in Table 1. After adjustment to sex, diabetes, immunosuppression, prior hospitalization (90 days), prior antibiotic therapy (90 days), surgery in the last month, hospital-acquired infection, hospital length of stay prior to ICU admission, focus of infection, the final model retains as independent variables number of hospital days prior to ICU admission and prior antibiotic therapy with an adjusted OR (95% CI) of 1.505 (1.165–1.944) per day and 4.718 (1.203–18.506), respectively. The same risk factors were studied to predict sensitivity to NP Cef + Met and only residence in a long-term care facility was found to be associated with a crude OR of 1.704 ($p = 0.028$).

Table 1 (abstract 001306) Characteristics and description of risk factors associated with resistance to pip/taz

Risk factor	Total	Resistant to pip/tazo	OR	*p* value
Age, mean ± SD	67 ± 15	70 ± 17	1.007	0.671
Male sex, n (%)	37 (51)	14 (38)	2.522	0.087
Hospital-acquired infection, n (%)	26 (36)	11 (42)	2.713	0.061
Hospitalization in the last 90 days, n (%)	28 (38)	12 (43)	3.000	**0.040**
ATB in the last 90 days, n (%)	20 (27)	11 (55)	5.256	**0.004**
Diabetes, n (%)	26 (36)	4 (15)	0.321	0.068
Immunosuppression, n (%)	15 (21)	7 (47)	2.750	0.093
Surgery in the last month, n (%)	14 (19)	7 (50)	3.214	0.058
Days previously to ICU admission, median (IQR)	0 (0–2)	2 (0–10)	1.455	**0.001**
Focus of infection, n (%)	45 (62)	10 (22)	1.000	0.091
Hepato-bilio-pancreatic	5 (7)	3 (60)	5.250	0.270
Gastro-entero-colic	23 (32)	8 (35)	1.867	
Peritonitis due to perforation				
Days until source control, median (IQR)	2 (1–7)	1 (1–10)	1.026	0.269
Low risk IAI, n (%)	7 (10)	2 (10)	0.989	0.990

Risk factor	Total	Resistant to pip/tazo	OR	*p* value
Septic shock, n (%)	59 (81)	15 (75)	0.582	0.398
SOFA, mean ± SD)	8 ± 4	8 ± 5	0.984	0.811
SAPS II, mean ± SD	44 ± 19	47 ± 23	1.012	0.373
APACHE II, mean ± SD	18 ± 9	20 ± 11	1.042	0.174

APACHE Acute Physiology And Chronic Health Evaluation, *ATB* Antibiotic, *IAI* Intra-abdominal Infection, *IQR* inter-quartile range, *OD* Odds Ratio, *SAPS* Simplified Acute Physiology Score, *SOFA* Sequential Organ Failure Assessmentm *SD* standard deviation

Conclusions: Sensitivity to NP Cef + Met was low, with no clear predictors. In contrast, resistance to pip/tazo was also low but it was independently associated with number of hospital days prior to ICU admission and prior antibiotic therapy. Pip/tazo seems to be a good empirical proposal, but in patients with risk factors doctors should be alert to the need of alternative antibiotic schemes particularly in patients who fail to respond promptly after focus control.

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Topic: Infections and prevention

001307

Exploring sex differences in pain, analgesia, and sedation practices among ICU patients

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Intensive Care Medicine Experimental 2025,* 13(1):*001307

Introduction: Pain is a common concern for intensive care unit (ICU) patients, particularly during procedures like turning. Effective sedation and analgesia are essential for managing pain and preventing adverse outcomes in critically ill, noncommunicative patients. Despite established protocols, not much is known about how sex influences pain perception and the administration of analgesics and sedatives. Understanding these disparities is crucial for improving patient care and ensuring equitable treatment in ICU settings.
Objectives: This study explores sex-based differences in pain, analgesia, sedation, and their associations during turning procedures in non-communicative, critically ill patients.
Methods: A prospective cohort of adult ICU patients with stays exceeding 48 h was observed. Pain was assessed using the critical care pain observation tool (CPOT) before, during, and 20 min after routine turning procedures, conducted twice daily across five consecutive days. Analgesic and sedative use was documented within the hour prior to each assessment.
Results: A total of 123 patients (79 men, 44 women) were included, with mean ages of 55.3 (SD = 17.6) and 61.3 (SD = 18) years for men and women, respectively ($p = 0.074$). CPOT scores did not differ significantly between sexes ($p > 0.05$). Pain (CPOT > 2) was observed in 67.1% of men and 56.8% of women ($p = 0.257$), with more men reporting pain on Day 1 (41.9% vs. 19%; $p = 0.012$). CPOT > 2 scores decreased over time in men from Day 1 to Day 5 (OR = 0.75; 95% CI 0.65–0.85; $p < 0.001$), and in women from Day 2 to Day 5 (OR = 0.71; 95% CI 0.54–0.92; $p = 0.011$). While overall analgesic and sedative use showed no sex-related differences, men received higher doses of remifentanil ($p < 0.05$). In women, no significant association was found between medication use and pain, but in men, dexmedetomidine administration reduced the likelihood of experiencing pain (OR = 0.33; 95% CI 0.19–0.57; $p < 0.001$).
Conclusions: The findings suggest that sex may influence pain, analgesia, and sedation in critically ill patients. These results highlight the need for sex-sensitive management strategies in the ICU, including updated protocols, continuous staff education, and further research to enhance critical care outcomes.

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Topic: Sedation, analgesia and delirium

001308

Echocardiographic control during ClotPro-guided individualised thrombolytic therapy: results of a feasibility, randomised, interventional study

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Introduction: Pulmonary embolism (PE) is the 3rd leading cause of cardiovascular mortality. According to the current ESC guidelines, systemic thrombolysis (ST) is reserved for those at high risk. However, persistent haemodynamic instability or unresolved right ventricular (RV) dysfunction occurs despite ST. The use of fixed, high-dose alteplase (tPA) regimens has been increasingly questioned in recent literature. Echocardiography is endorsed by the European Society of Intensive Care Medicine as a critical bedside tool for identifying RV dysfunction.
However, no clear guidance exists on which echocardiographic parameters should be monitored to guide prolonged thrombolytic therapy in critically ill patients.
Objectives: This study aimed to develop a safer and more effective therapeutic approach using prolonged, third-generation ClotPro viscoelastic test-guided systemic thrombolysis, combined with echocardiographic monitoring, to enable individualised treatment of patients with pulmonary embolism (ethics license: 65187-5/2021/EÜIG; clinical trial registration: NCT06667882).

Methods: This prospective, randomised, interventional study included patients aged ≥ 18 years diagnosed with PE between December 2021 and October 2023, and who provided informed consent. Exclusion criteria included lack of consent, absolute contraindications to thrombolytic therapy, and pregnancy. Patients were randomised into two groups:
ClotPro-guided (CPG) group: Coagulation was monitored hourly using viscoelastic testing (VET) with the ClotPro system before and during thrombolysis. The dose of tPA was adjusted based on VET results. Bedside transthoracic echocardiography (TTE) was performed every two hours to assess RV function. Thrombolysis was discontinued once echocardiographic signs of RV strain—specifically, the presence of a D-sign—had resolved.
Control (C) group: VETs were performed at the same intervals, but results did not influence clinical decisions. Echocardiography was performed only before and after thrombolysis, and not used for real-time monitoring.
Results: Of the 33 patients initially screened, 11 were excluded (1 due to head injury, 2 with active bleeding, 2 without consent, and 6 with low early mortality risk). One patient in the C group was excluded due to early termination of thrombolysis after 50 mg tPA because of severe chest pain. One CPG patient was later excluded after arterial occlusion caused by angiosarcoma was diagnosed. Ultimately, 20 patients were included in the final analysis:

- **ClotPro-guided group (CPG):** 13 patients (4 females, 9 males; mean age: 55.76 ± 13.34 years)
- **Control group (C):** 7 patients (3 females, 4 males; mean age: 66.0 ± 9.02 years)

Initial results related to the ClotPro-guided thrombolysis protocol were presented at the 2023 ESICM LIVES Congress. This analysis focuses on the echocardiographic monitoring component of therapy.
For assessment of the effectiveness of the ST, the following echocardiographic parameters were evaluated and expressed as the percentage of patients achieving normalisation by the end of therapy: RV diameter: CPG 23% vs. C 16%; RV/LV ratio: CPG 66% vs. C 50%; TAPSE: CPG 84% vs. C 66%; Stroke volume index (SVI): CPG 90% vs. C 60%; Eccentricity index: CPG 69% vs. C 40%.
Conclusions: During ClotPro-guided prolonged thrombolysis for pulmonary embolism, effective revascularisation was observed in nearly all cases, in contrast to lower early phase clinical effectiveness seen with conventional thrombolysis. Owing to the limited sample size, detailed statistical analysis was not feasible. A multicenter, controlled interventional trial is planned to validate these preliminary findings.

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Topic: Cardiovascular issues in ICU

001310

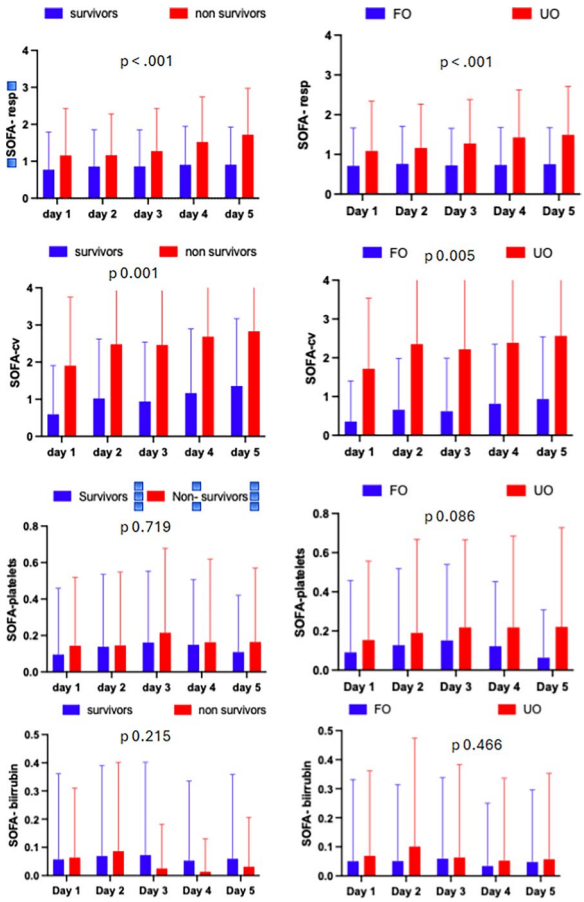
Extra-cerebral organ dysfunction in non-traumatic subarachnoid haemorrhage: a retrospective observational study

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Introduction: Non-traumatic subarachnoid haemorrhage (SAH) is a significant global health issue. It is recognized that SAH affects not only brain tissue but also contributes to non-neurologic complications. The aim of this study was to assess whether there is a correlation between early organ dysfunction and intensive care unit (ICU) mortality or functional outcomes in SAH patients.
Methods: A retrospective analysis was conducted on data from all SAH patients admitted to the ICU at Hôpital Universitaire de Bruxelles (Belgium) over a 10-year period, from January 2012 to December 2022. The Sequential Organ Failure Assessment (SOFA) score, used to assess organ dysfunction, was recorded daily during the first five days after ICU admission. Neurological outcomes were evaluated at three months using the Glasgow Outcome Score (GOS), with an unfavourable outcome defined as a GOS score of 1–3.
Results: A total of 387 patients were admitted over the study period, with a mean age of 54.6 (± 13.1) years and 62% of them being females. On admission, the median World Federation of Neurological Surgeons (WFNS) score was 3 (1–5); and Fisher score was 4 (3–4). A total of 125 (32.3%) patients died in the ICU, and 189 (48.8%) had an unfavourable outcome at 3 months. The median total SOFA score on admission was 3 (1–7). There was a statistically significant difference, higher SOFA score was associated with higher mortality, unfavourable neurological outcome at 3 months (all of them $p < 0.001$). This difference persisted over the first five days.
The respiratory and cardiovascular SOFA subscores increased over time in non-survivors and those with unfavourable neurological outcomes, compared to others. Cardiovascular SOFA differed over time based on the WFNS grade ($p < 0.001$), while respiratory SOFA subscores showed differences starting on day 3 ($p < 0.05$).
In a multivariate model adjusted for age, DCI, ICHT, re-bleeding and Fisher scores, a higher cardiovascular SOFA subscore was independently associated with unfavourable neurological outcome (β -3.97, OR 0.02, 95% CI 0.02–0.02, $p < 0.001$). No correlation was found

between the cardiovascular SOFA subscore and mortality, or the respiratory SOFA subscore with either mortality or neurological outcome. The haematologic SOFA subscore was significantly associated with higher values in individuals who experienced unfavourable outcomes, with statistical significance observed on days 1 and 5. Although a higher renal SOFA subscore was associated with increased mortality and unfavourable outcomes, the difference was not statistically significant.

Conclusions: In this cohort of SAH patients, respiratory and cardiovascular dysfunction worsened over time in nonsurvivors and those with unfavorable outcomes as compared to others. These results highlight the importance of monitoring cardiovascular and respiratory function in critically ill patients.



Sequential organ failure assessment (SOFA), favorable outcome (FO), Unfavourable outcome (UO)

Topic: Neurointensive care

001311

Functional outcomes and rehabilitation in acute and chronic liver disease: an observational cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001311

Introduction: Intensive care unit (ICU) acquired weakness and reduced functional outcomes are well-recognised sequalae of a prolonged critical care admission. Extensive research supports early rehabilitation, but its impact on patients with acute liver failure (ALF) and chronic liver disease (CLD) remains unclear. ALF patients frequently present in a pro inflammatory state and multiorgan failure, whereas CLD patients are prone to sarcopenia secondary to malnutrition, protein catabolism, and reduced physical activity.

Methods: An observational cohort study (July–October 2024) was conducted in a specialist Liver Intensive Care Unit to explore the rehabilitation trajectory and functional outcomes of patients admitted for ALF and decompensated CLD patients with ICU stay $\geq$ 5 days.

Muscle strength, functional outcomes and indirect measures of muscle mass were assessed at the initiation of rehabilitation, ICU discharge, and hospital discharge. Measurements included hand grip strength (using a Jamar Plus digital hand dynamometer), the Medical Research Council (MRC) sum score, ICU Mobility Scale (ICUMS), and muscle mass (measured via mid-upper arm circumference). Patient demographics, frailty scores, rehabilitation frequency, ICU and hospital length of stay (LOS) were also collected.

The results were analysed using descriptive statistics (median (range)).

Results: 38 patients were analysed (ALF: 18, CLD: 20). ALF patients were predominantly female (72%), younger (37 vs 48 years) and less frail (frailty score 2 vs 3) at admission as compared to those with CLD.

Rehabilitation commenced at a similar time frame for both groups of patients following admission (10 days ALF Vs 9 days CLD).

ICU and hospital length of stay (LOS) was shorter for ALF than CLD (19 vs. 23 days and 30 vs. 48 days, respectively). Despite lower functional scores and muscle strength at ICU discharge, ALF patients reached comparable levels of function to CLD patients by hospital discharge. Indirect muscle mass showed a slight decline in ALF patients but improved in CLD patients. Although more rehabilitation sessions were planned for CLD patients (150 vs. 109), fewer were delivered proportionally (64% vs. 76%), largely due to medical instability.

Mortality was significantly higher in the CLD group (50% vs. 5.5%).

Conclusions: Patients admitted to ICU with ALF and decompensated CLD achieve similar measures of muscle strength and physical outcomes at hospital discharge. However, patients with ALF have both shorter ICU and hospital LOS and a lower in hospital mortality than those with CLD.

Patients with CLD had more rehabilitation sessions planned during their hospital admission, but delivered less frequently, primarily due to medical issues.

Owing to the high mortality in the CLD group, these results should be interpreted with caution and greater patient numbers needed to draw further conclusions.

Table 1 (abstract 001311) Patient demographics and clinical characteristics

Variable	ALF (n=18)	CLD (n=20)
Age, median (range)	37 (18-66)	48 (20-66)
Gender	Male 28% (n=5) Female 72% (n=13)	Male 45% (n=9) Female 55% (n=11)
SOFA Score, median (range)	11.5 (3-17)	12 (5-17)
Clinical Frailty Scale (CFS), median (range)	2 (1-3)	3 (2-6)
Days from admission to active rehabilitation	10 (3-27)	9 (2-27)
ICU Length of Stay, days (range)	19 (5-68)	23 (6-48)
Hospital Length of Stay, days (range)	30 (8-68)	48 (12-74)
Mortality	5.5% (n=1)	50% (n=10)

Table 2 (abstract 001311) Functional outcomes

Measure	Timepoint	ALF (n=18)	CLD (n=20)
Grip Strength	Initial	<20: 55% <40: 28% <60: 11% <80: 0% >80: 6%	<20: 60% <40: 10% <60: 20% <80: 5% >80: 5%
	D/C ICU	<20: 6% <40: 13% <60: 56% <80: 19% >80: 6%	<20: 0% <40: 18% <60: 27% <80: 37% >80: 18%
	D/C Hospital	<20: 0% <40: 0% <60: 8% <80: 34% >80: 58%	<20: 0% <40: 0% <60: 0% <80: 33% >80: 67%
ICU Mobility Scale	Initial	2 (1-6)	3 (2-6)
	D/C ICU	5 (3-8)	7 (3-10)
	D/C Hospital	10 (8-10)	10 (8-10)
MRC Sum Score	Initial	25 (0-48)	22 (0-60)
	D/C ICU	50 (20-54)	48 (24-60)
	D/C Hospital	58 (40-60	56 (48-58)
Muscle Mass Score	Initial	25.7 (22.2 – 29.6)	24.9 (20.8 – 32.6)
	D/C ICU	25.2 (22.2–28.8)	25.8 (20.9–32.4)
	D/C Hospital	25.1 (23.1–28.0)	27.3 (23.8–32.4)

Table 3 (abstract 001311) Rehabilitation delivery

Measure	ALF (n=18)	CLD (n=20)
Rehabilitation Sessions Planned	109	150
Rehabilitation Sessions Completed	83	96
% Rehabilitation Achieved	76%	64%

Table 4 (abstract 001311) Reasons for non-completion

Reason	ALF (n=18)	CLD (n=20)
Patient Unavailable	1	0
Patient Declined	9	11
Medical Complications	4	27
Staffing issues	12	16

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Topic: Nursing care and physiotherapy

001312

Value of H2FPEF score in the diagnosis of heart failure in intensive care unit patients

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Introduction: The H2FPEF score is a clinical tool designed to aid in the diagnosis of HFpEF [1,2]. The H2FPEF score, incorporates key clinical parameters, such as age, body mass index, hypertension, diabetes, atrial fibrillation, and elevated filling pressures to stratify patients with suspected HFpEF. In addition, the H2FPEF score has been shown to have a relationship with rehospitalization rates and prognosis in patients with HFPEF. Since diastolic dysfunction is frequently seen in intensive care patients and its early diagnosis and management are important, simple and effective tools such as the H2FPEF scoring system may be potentially valuable.

Objectives: The study aimed to investigate the diagnostic value of the H2FPEF score in intensive care patients with heart failure.

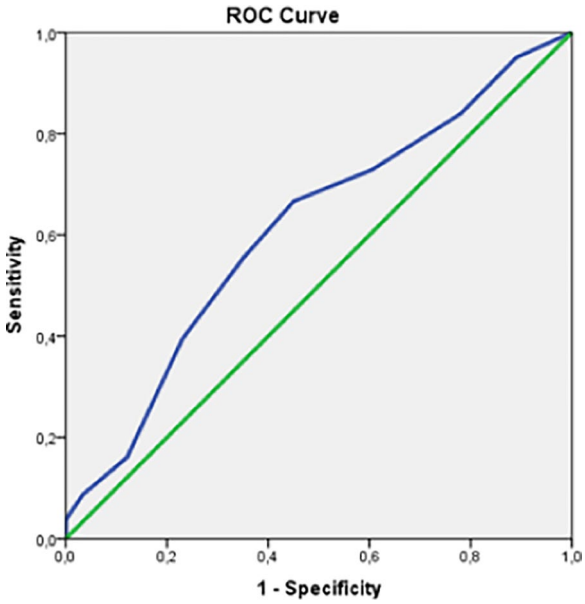
Methods: This retrospective study included 195 intensive care patients, and heart failure was diagnosed by examining the echocardiography records of the patients. Echocardiography of the patients was performed during their stable periods.

Results: Fifty-three percent of the patients were males and 47% were females, and their average age was 71 ± 14 and APACHE II scores were 18 ± 7. Seventeen patients were diagnosed with HFrEF, 25 patients with HFmrEF, 120 patients with HFpEF and 86 patients with right heart failure. According to the statistical analysis results, there was no significant difference between the H2FPEF scores of patients with and without HrEF, HFmrEF, and HFpEF, and the H2FPEF scores of patients with right heart failure were significantly higher than those without(Table). In ROC curve analysis, the sensitivity of an H2FPEF score above 2.5 in predicting right heart failure was 75%, and the specificity was 40% (Figure).

Conclusions: The study results suggest that the H2FPEF score may predict right heart failure in intensive care patients. This may be because the score includes pulmonary artery pressure, or that one of the most common causes of right heart failure is problems with the left heart. Further studies are needed on this subject.

Table (abstract 001312) ...

H2FPEF Score	present	absent	p
HFrEF	4+ 2.5	3.6+1.6	.550
HFmrEF	4.5±2.1	3.8±2.4	.182
HFpEF	4.1±2.4	3.7±2.3	.295
Right Heart Failure	4.4±2.4	3.5±2.3	.008



ROC curve for H2FPEF score and Right Heart Failure

AUC:0.612, 95% CI (0.527–0.697), *p*: 0.011. H2FPEF score > 2.5, sensitivity:73%, specificity:%40. H2FPEF score > 3.5, sensitivity:67%, specificity:%55.

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Topic: Cardiovascular issues in ICU

001313

Outcomes of critically ill patients who leave against medical advice in a resource limited set-up: a prospective observational study in an Indian scenario

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Intensive Care Medicine Experimental 2025,* 13(1)*:001313

Introduction: Discharge or leave against medical advice (LAMA) from critical care units has always been a serious concern in global health care scenario. There are various factors affecting this decision and need to be evaluated. Through limited studies, we assume that severity of disease and prognosis along with financial constraints are the major impactors in decision making1,2 "Financial toxicity" 3 is the current term coined for the adverse the economic stress faced by patients or relatives during ICU treatment. This burden is shared worldwide and becomes a huge liability on healthcare scenario especially in resource limited set-up. Despite free health insurance by government penetration of insured individuals remains below 40%. This study carried out in tertiary NABH accredited hospital in semi-urban region is majorly aimed at determining the outcomes of critically ill patients leaving against medical advice, factors involved and implications.
Methods: This is a prospective observational cohort study, carried out in Sevasadan Hospital, during January 2023 to December 2024. The Institutional Ethical Committee approval was duly obtained. Inclusion criteria: all patients above 18 years admitted to critical care unit. Decision for LAMA or request initiated by family or patient. Exclusion criteria: treatment under palliative care for terminal illness. Missing contacts, documents for follow-up. The baseline demographics, socioeconomic background along with SOFA scoring on admission and day of LAMA, length of stay were noted. On discharge, the reason for LAMA was recorded and counselling was offered. The follow-up data at 7-day and 30-day noted survival, re-hospitalization and barriers to care. Statistical analysis was done using SPSS software. Categorical variables presented as frequencies and percentages.
Results: Data were collected from 1087 cases, off them 143 cases were excluded. 14.7% went LAMA against total normal discharges. The avg age 52.3 years, males to females % 61:39. The socioeconomic status recorded 13% from middle-higher income, low income 45%,32% very low income group. 66% came from interiors while 34% were from district places. Admissions through Emergency 615; Trans-in 245; OPD 84 were recorded. 73% were medical cases while 27% were surgical. 41% had history of prior admission within a week elsewhere. SOFA on admission was 5 ± 0.6 and on day of LAMA 10 ± 0.4. ICULOS was 6 ± 0.8. 56% mortality, survivors 31%, 9% readmission either at same or other hospital and 4% lost to follow-up recorded at 7 days. At 30-day figures changed to 67% mortality, 17% survival, 8% readmission and 6% were lost to follow-up. The analysis of discharge counselling revealed 46% LAMA were due to financial constraints. Other reasons were poor prognosis 19%, refusal for escalating treatment/demand for DNR 15%, 14% to other hospital and 6% to home. ICU LOS in patients availing LAMA for finances was 8 ± 0.7 and SOFA scoring on LAMA was 11 ± 0.5. diagnosis wise category recorded were ARDS 18%, CVA 13%, neurosurgery 11%, ALD 9%, IHD 10%, sepsis/MODS 21%, CKD/AKI 7%, trauma 6%, others 5%.
Conclusions: A significantly high mortality at 30-day is noted in LAMA patients, readmissions increasing morbidity. Financial constraints remain the most important reason for LAMA, with direct co-relation to length of stay, age and prognosis of the patient. Elderly, poor prognosis, longer stay from rural background were the key factors. Prior inpatient days exhausting funds impacted outcome. Refusal to escalate the treatment was noted in 14% of LAMA patients marking the rising need for clear guidelines on end of life care.

Fig 1:**outcome of LAMA**

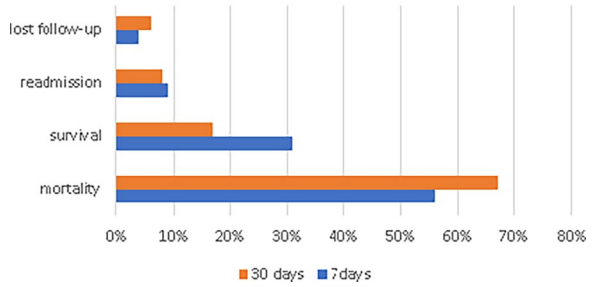
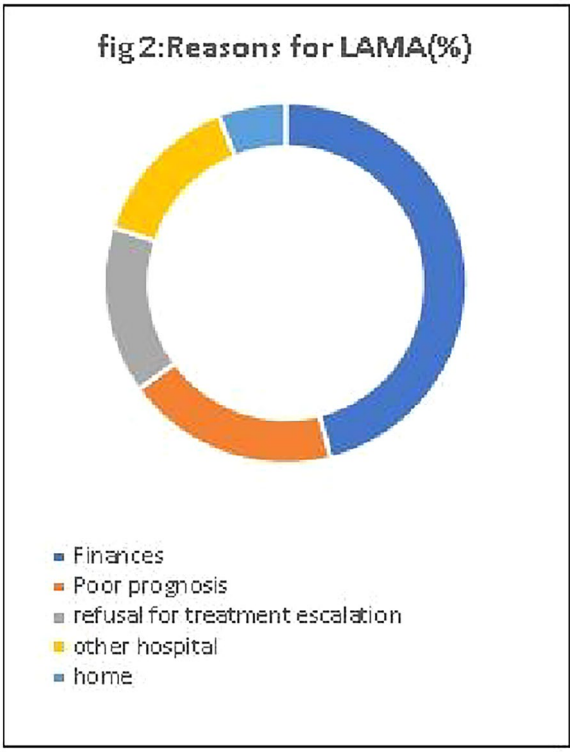


Chart depicting outcome of LAMA at 7th day, 30th day.



Reasons for LAMA.

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Topic: Health services research and outcome

001314

Predicting colonization with multidrug-resistant microorganisms upon intensive care unit admission: time to update the risk profile?

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Intensive Care Medicine Experimental 2025,* 13(1)*:001314

Introduction: Early identification of patients at risk of colonization with multidrug-resistant organisms (MDROs) upon admission to the Intensive Care Unit (ICU) is essential for implementing effective infection control measures and for selecting the most appropriate antibiotic strategy, particularly when admission is due to severe infection or sepsis.
The risk factor checklist proposed by the Spanish ICU "Zero Resistance" project [1] is designed to identify such patients. However, recent studies suggest that it may fail to detect up to one in three colonized individuals [2].
Objectives: To evaluate the prevalence of MDRO colonization at ICU admission, assess the predictive performance of the zero resistance checklist, and identify additional risk factors to improve early detection strategies.
Methods: We conducted a retrospective, observational, single-center case–control study in the ICU of a University Hospital in Spain, between 2021 and 2023. Surveillance cultures (nasal, oropharyngeal and rectal swabs, and tracheal aspirate in ventilated patients) were obtained at ICU admission from all patients expected to stay > 48 h, targeting identification of methicillin-resistant *Staphylococcus aureus* (MRSA), ESBL-producing *Enterobacterales*, carbapenem-resistant *Enterobacterales*, MDR *Pseudomonas aeruginosa*, carbapenem-resistant *Acinetobacter baumannii* (CRAB), *Stenotrophomonas maltophilia* and vancomycin-resistant *Enterococci* (VRE). Exclusion criteria: age < 18, ICU stay < 48 h, or missing surveillance cultures. Cases were defined as patients with at least one positive surveillance culture; controls had all negative cultures.
The results are presented as mean, median or percentages. Chi-square, Student's *t* or Mann–Whitney *U* tests were used as appropriate. Variables associated with colonization in the bivariate analysis were used to build a predictive model through logistic regression.
Results: Of the 3,465 patients, 2,134 met inclusion criteria; 332 (15.6%) were colonized with MDROs at ICU admission. Compared with controls, cases were older (64.9 vs. 61.5 years, $p < 0.001$), had longer pre-ICU hospital stays (4.6 vs. 2.4 days, $p = 0.033$), higher APACHE II (20.2 vs. 17.4, $p < 0.001$), and Charlson index (2.1 vs. 1.4, $p < 0.001$). Hypertension (52.7% vs. 42.8%, $p < 0.001$), diabetes with organ damage (7.5% vs. 3.9%, $p = 0.003$), peripheral vascular disease (9.9% vs. 3.2%, $p < 0.001$), and proton pump inhibitor use (56.3% vs. 41.1%, $p < 0.001$) were also more frequent.
Colonization rates increased over time ($p < 0.001$): 11.7% (2021), 14.2% (2022), 19% (2023). The main isolation sites were rectal swabs (44.9%) and respiratory samples (42.5%). Predominant organisms: ESBL-*E. coli* (31.9%), MRSA (16.9%) and *S. maltophilia* (16.9%). The most frequently identified risk factors according to the zero resistance checklist were prior hospitalization ≥ 5 days (44.6%), chronic comorbidities associated with a high risk of MDRO colonization (cystic fibrosis, bronchiectasis, chronic ulcers,…) (18.4%), known MDR carrier status (13.6%), and institutionalization (9.9%). The overall predictive performance of the Zero Resistance tool was moderate (AUC ROC 0.66, sensitivity 14%, specificity 98%). Notably, 41.6% of the cases had no identifiable risk factors.
In logistic regression, independent predictors of MDRO colonization at ICU admission were immunosuppression (OR 1.56, 95% CI 1.15–2.11, $p < 0.01$), proton pump inhibitor use (OR 1.55, 95% CI 1.2–2, $p < 0.01$), APACHE II (per point) (OR 1.03, 95% CI 1.02–1.05, $p < 0.01$), and admission from surgical ward (OR 1.61, 95% CI 1.05–2.47, $p = 0.03$).

Conclusions: MDRO colonization at ICU admission affected 15.6% of patients and showed a rising trend over time. The zero resistance checklist demonstrated high specificity but low sensitivity, failing to identify over 40% of colonized patients. Logistic regression revealed additional predictors that may enhance risk stratification. These findings suggest the need to revise current screening tools to better guide early preventive and therapeutic decisions.

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Topic: Infections and prevention

001315

Monocyte distribution width as a prognostic marker after liver transplantation

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Intensive Care Medicine Experimental 2025,* 13(1)*:001315

Introduction: Monocyte distribution width (MDW) is an in vitro diagnostic parameter that reflects a change in the volume of circulating monocytes in response to pro-inflammatory signals. This study analyzes the utility of MDW as a prognostic factor in the early period after liver transplantation (LT).
Methods: Retrospective, single-center cohort study including adult patients who underwent LT between January 2021 and October 2023. Patients were classified into two groups based on whether they presented persistently high MDW (defined as a MDW > 20.0 during the first 6 h after LT). Demographic and evolutionary variables were collected. The results are presented as median (IQR) or %, with differences analyzed using the Mann–Whitney *U* test or chi-square test, respectively. Kaplan–Meier curve was plotted to explore the influence of persistently high MDW on graft survival at 3 months, defined as absence of graft failure requiring re-transplantation or patient death during the first three months. A p value < 0.05 was considered statistically significant.
Results: We included 308 LT procedures. Baseline characteristics and clinical outcomes for persistently high MDW are shown in Table 1. A total of 52 patients (41%) presented values of MDW > 20.0 during the first 6 h of postoperative period. Persistently high MDW was significantly associated with alcohol etiology and MELD score as well as with worse clinical outcomes. There was a significant decrease in graft survival at 3 months in patients with MDW persistently high (Fig. 1).

Table 1 (abstract 001315) Cohort baseline characteristics and clinical outcomes

	Total ($n = 308$)	MDW persistently high ($n = 52$)	MDW persistently low ($n = 73$))	*p* value
Age (years), (IQR)	59 (50–65)	60 (48–68,4)	62 (55,75–66)	0,063
Sex (male), n (%)	223 (72.4)	36 (69)	57 (78)	0,31
Alcohol, n (%)	152 (49.4)	15 (29)	42 (57)	0,002
HCV, n (%)	83 (26.9)	6 (11)	13 (18)	0,43
DBD, n (%)	208 (68.4)	30 (58)	43 (59)	1,00
MELD score (IQR)	14(9–19)	15 (11–19)	10 (8–15)	< 0,001
Days on the waiting list (IQR)	86.5 (18–185.25)	35 (2–200)	61,5 (17,25–100,75)	0,097
CIT (IQR)-min	340 (275–448.75)	360 (275–480)	312,5 (277,5–383)	0,12
WIT (IQR)-min	45 (36.5–55)	45 (35–50)	40 (35–45)	0,24
AKI, n(%)	169 (56.1)	34 (65)	41 (56)	0,11
EAD, n(%)	68 (22.1)	12 (23)	7 (9.5)	0,46
3 month graft survival	271 (88)	41 (78)	68 (93)	0,028
ICU stay (IQR)-d	4 (3–8)	6 (3–9)	3 (2–5,75)	0,001
Hospital stay (IQR)-d	15(11–25.75)	15 (11–23)	11 (8–20)	0,215

HCV hepatitis C virus, *HBV* hepatitis B virus, *DBD* donation after brain death, *MELD* model for end-stage liver disease, *CIT* cold ischemia time, *WIT* warm ischemia time, *AKI* acute kidney injury, *EAD* early allograft dysfunction Continuous variables are reported as median and IQR and categorical variables as absolute numbers and relative frequencies

Conclusions: Persistently high MDW could be an early marker of graft failure and worse clinical outcomes.

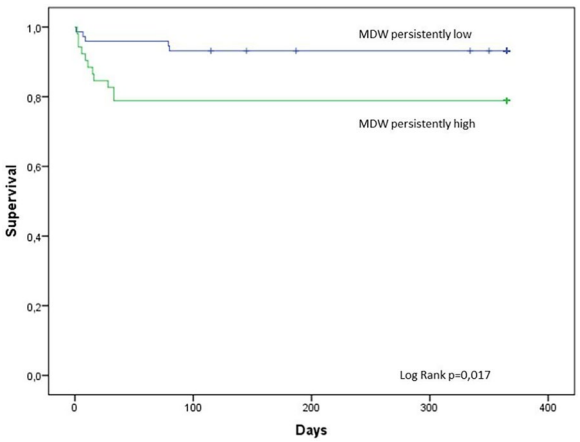


Fig. 1 (abstract 001315) Graft survival at 3 months, defined as absence of graft failure requiring re-transplantation or patient death during the first three months according to MDW persistently high. Survival analysis. Log rank test

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Topic: Perioperative care

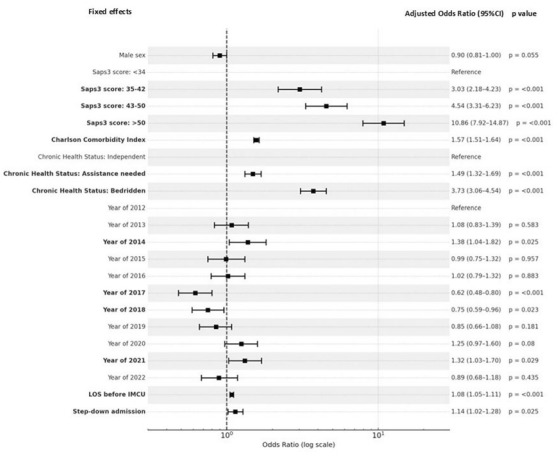
001317

Step-up vs. step-down admissions in intermediate care units: a 10-year retrospective study in Brazil

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Introduction: Intermediate Care Units (IMCUs) were established to bridge the gap between general wards and intensive care units (ICU), providing an intermediate-level of care (1). Over time, IMCUs have evolved significantly in structure, organization, staffing, and care models (2). Therefore, understanding IMCU bed usage is essential for improving patient flow and outcomes.
Objectives: This study aims to compare clinical characteristics, resource utilization, and outcomes of patients admitted to IMCUs as step-up versus step-down admissions.
Methods: This retrospective cohort study was conducted in three open medical-surgical IMCUs (95 beds in total) of a private, tertiary care, hospital in São Paulo, Brazil. Patients (≥ 18 years) admitted to the IMCUs from the ICU were categorized as 'step-down' group and patients admitted from other sources (emergency room, operating room, hemodynamics department and wards) were classified as the 'step-up' group. Patients' demography, clinical characteristics, resource use, and main clinical outcomes were described and compared according to the admission source. The association between admission source and hospital mortality as well as transfer to the ICU were investigated using a multilevel logistic regression model incorporating the type of IMCU unit (neurological, cardiological or general unit) as random effect and patient-level characteristics as fixed effects. Similarly, we evaluated IMCU length of stay (LOS) using a negative binomial regression model. The results were presented as adjusted odds ratio (aOR) along with 95% confidence interval (95%CI). Two-tailed tests were used, and statistical significance was set at $p < 0.05$.
Results: A total of 51,026 IMCU admissions from 2012 to 2022 were analyzed. Out of those, 38,797 (76%) were 'step-up' and 12,229 (24%) were 'step-down' admissions. Step-down group had a higher median SAPS 3 on IMCU admission as compared to step-up (44 [37–52] vs. 42 [34–50]; $p < 0.001$). Step-down group had a higher hospital mortality (5.3% vs. 4.0%; $p < 0.001$) and higher hospital LOS (10 [6–19] vs. 5 [3–10] days; $p < 0.001$) as compared to step-up admissions (Table 1). Step-down group had higher risk of in-hospital death (aOR: 1.14; 95% CI 1.02–1.28; $p = 0.025$) (Fig. 1) and a higher risk of longer IMCU LOS (aOR: 1.25; 95% CI 1.22–1.27; $p < 0.001$) compared to step-up admissions. In contrast, step-down patients had significantly lower odds of being transferred to the ICU compared to those admitted as step-up (aOR: 0.86; 95% CI 0.79–0.93; $p < 0.001$).
Conclusions: We observed significant differences in IMCU patient characteristics, resource utilization and outcomes based on admission source, with step-down patients exhibiting a higher risk of in-hospital mortality and a longer IMCU LOS compared to step-up patients. These findings underscore the significance of admission source as an important factor influencing IMCU outcomes and emphasize the need for targeted strategies to manage the complex needs of step-down patients effectively.

Figure 1. Adjusted odds ratios for hospital mortality.



SAPS 3: Simplified acute physiology score 3; IMCU: intermediate care unit; LOS: Length of stay.

	Step-up N=38,797	Step-down N=12,229	P value*
Age	70 [53-82]	70 [55-82]	0.613#
Male gender	21,267 (54.8)	6960 (56.9)	**<0.001&**
Charlson Comorbidity Index	1 [0-2]	1 [0-3]	**<0.001#**
SAPS 3	42 [34-50]	44 [37-52]	**<0.001#**
Chronic Health Status			**<0.001&**
Independent	26,203 (67.5)	7,347 (60.1)	
Need for assistance	11,560 (29.8)	4,362 (35.7)	
Restricted to bed	1,034 (2.7)	520 (4.3)	
IMCU mortality	443 (1.1)	165 (1.3)	0.085&
IMCU LOS	2 [1-4]	3 [2-5]	**<0.001#**
Hospital mortality	1,560 (4.0)	649 (5.3)	**<0.001&**
Hospital LOS	5 [3-10]	10 [6-19]	**<0.001#**

*P values were calculated using # Mann-Whitney U test or & X^2 test. Values represent median (IQR) or n/n total (%). SAPS 3: Simplified acute physiology score 3; IMCU: intermediate care unit; LOS: Length of stay.

*p values were calculated using # Mann–Whitney U test or/and χ^2 test. Values represent median (IQR) or n/n total (%). SAPS 3: Simplified acute physiology score 3; IMCU: intermediate care unit; LOS: Length of stay.

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Topic: Health services research and outcome

001318

Breathing with dignity: palliative extubation in the ICU: clinical practice, comfort measures, and survival outcomes

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Introduction: Palliative extubation (PE), the withdrawal of invasive mechanical ventilation when treatment goals shift from life-prolonging interventions to comfort-focused care, is a key component of end-of-life (EOL) management and compassionate ICU care. Although high-quality evidence is limited, expert opinions continue to support its integration into end-of-life care in the ICU setting. However, implementation remains inconsistent due to clinical, ethical, and organizational challenges. In Portugal, there is minimal evidence on care transitions, structured communication, and early identification of palliative needs in ICU settings, especially palliative extubation.
Objectives: This study aims to examine the clinical and demographic profiles of patients undergoing palliative extubation in a Portuguese ICU, explore factors influencing decision-making and timing, and analyze post-extubation trajectories.
Methods: Retrospective, single-center study, including all patients who died in a general ICU in 2024. Data collected included age, sex, SAPS II, type of ventilatory support, palliative status at admission, family discussions, documentation of palliative care plans, medications prior to extubation, postextubation support, and survival time. Descriptive statistics, nonparametric tests (Mann–Whitney *U*), and multiple linear regression analysis were used.
Results: The study included 246 patients (60.6% male, mean age 67.6 ± 14.6 years) with high clinical severity (mean SAPS II 64.6 ± 18.4). Only 7.3% were identified as palliative at ICU admission, 92.7% of cases transitioned to palliative care during their stay, and documented transition in 89.0% of cases. Although 80.1% received invasive mechanical ventilation until death, PE occurred in just 13.8% ($n = 34$). Prior to extubation, patients had low oxygen requirements (mean FiO_2 0.28 ± 0.09), with 76.5% receiving symptom management, predominantly opioids (44.1%), followed by combination treatment with opioids and benzodiazepines (11.8%). Survival after PE averaged 9.2 ± 10.7 h, with no significant correlation to age, SAPS II or FiO2. Patients who underwent PE had significantly longer ICU stays ($p = 0.008$). Opioid use did not influence short-term survival ($p = 0.85$).
Conclusions: Although there's growing awareness of therapeutic limitations and end-of-life planning, PE is rarely practiced in the ICU, reflecting the influence of cultural, ethical, and institutional challenges. Our findings suggest that longer ICU stays may influence the decision to use PE. The variation in survival time and lack of association with clinical variables underscore the need for individualized planning and consistent symptom management. These findings highlight the need for improvement, including early patient identification, clear communication with families, documentation of transition plans and palliative interventions, and comfort-oriented care protocols, promoting multidisciplinary training for timely, compassionate care.

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Topic: Ethics and end of life care

001319

Rapid point-of-care detection of endotoxin tolerance in bacteremia positive patients by using Septiloop: a feasibility study

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Introduction: Sepsis-induced paralysis of the innate immune system (immunoparalysis) can be defined by the occurrence of endotoxin tolerance (ET), i.e., reduced TNFα production upon a blood lipopolysaccharide (LPS) stimulus. Our previous work demonstrated that endotoxin tolerance predicts bacteremia in Emergency Department (ED) patients. Therefore, point-of-care devices to assess ET are urgently needed.
Objectives: To evaluate the feasibility and performance of Septiloop, a qualitative point-of-care (PoC) device designed to detect ET by profiling TNFα response after challenge with LPS.
Methods: A total of 146 bacteremia-positive ED patients were screened using Septiloop, which provides a binary classification of ET based on TNFα production following LPS stimulation: < 200 pg/mL indicates endotoxin tolerance, and ≥ 200 pg/mL indicates preserved immune response. The device provides results within 3 h and requires minimal laboratory infrastructure.
Results: The device generated valid results in 143 of 146 patients. Among those valid results, 133 patients (93%) were classified as endotoxin tolerant, while 10 patients (7%) had TNFα levels ≥ 200 pg/mL, indicating absence of ET. Device failure occurred in 3 cases (2%), mainly due to technical issues under investigation.
Conclusions: The Septiloop PoC device offers a rapid and practical method to assess innate immune function at the bedside in patients with suspected bacteremia. The high prevalence of endotoxin tolerance among bacteremia-positive patients highlights the potential clinical utility of this tool for early immune profiling and sepsis stratification. Further studies are warranted to assess its potential.

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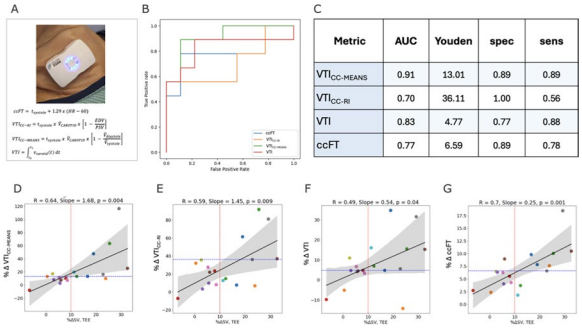
Topic: Sepsis

001320

A novel carotid artery velocity time integral pulse contour correction for tracking stroke volume change measured by trans-esophageal echocardiography

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Introduction: The velocity time integral (VTI) from the left ventricular outflow tract (LVOT) can be calculated as the systolic time multiplied by the mean beat velocity (VMEAN). Assuming constant LVOT diameter, change in the LVOT VTI is the change in stroke volume (SVΔ). Both systolic time and VMEAN can be measured in the common carotid artery, however, a recent framework for relating the LVOT VTI to the common carotid artery VTI states that correcting for the carotid artery flow fraction (CAFF) is imperative. One approach to accounting for the CAFF is by estimating velocity decay, akin to pulse contour analysis. Therefore, a corrected carotid artery VTI (VTICC) is generally approximated as: systolic time × VMEAN × velocity decay.
We tested two methods of estimating velocity decay for the VTICC, and we hypothesized that the area under the receiver-operator curve (AUROC) of the VTICC to detect a + 10% SVΔ would be better than that of uncorrected carotid VTI. We also hypothesized that the regression coefficient between the change in VTICC and SVΔ would be superior to change in the uncorrected carotid VTI and SVΔ. We tested this as a feasibility study from 18 postcoronary artery bypass grafted patients.
Objectives: 1. Determine the diagnostic accuracy of two novel VTICC equations to detect a 10% SVΔ in post-CABG patients.
2. Determine the regression coefficient between SVΔ and VTICCΔ
3. Compare these values to the corrected coronary artery flow time (ccFT) and uncorrected carotid VTI.
Methods: The Research Ethics Board of Health Sciences North approved the study. This is a feasibility study comprising 9 preload responsive and 9 preload unresponsive patients following coronary artery bypass grafting from a previously-published dataset. Exclusion criteria were history of severe carotid stenosis and contraindication to transesophageal echocardiography (TEE).
Anesthesia and ventilator settings were standardized as described in reference 1. The wearable Doppler patch (Flosonics Medical, Sudbury, ON, Canada) is a continuous-wave 4 MHz ultrasound placed over the carotid artery and calculates ccFT by Wodey's equation. LVOT velocity time integral (VTI) from TEE was measured by a cardiac anesthesiologist using a Phillips Epiq (Cambridge, MA, USA) 2.9 MHz probe in the trans-gastric window; the insonation angle was 0 degrees and sample window 4 mm.
Synchronized Doppler data from the carotid artery and TEE were recorded during a 60 s baseline and throughout an entire 90 s Trendelenburg maneuver following a coronary artery bypass grafting (CABG) with the chest open.
For each subject, baseline and intervention windows were chosen as the minimum and maximum value of 15 consecutive LVOT VTI cardiac cycles during the baseline and intervention periods, respectively. Synchronized carotid Doppler cardiac cycles from the same windows were chosen to compare. Four measures from the carotid artery were studied: the ccFT (1), uncorrected VTI (2), and VTICC-RI (3) and VTICC-MEANS (4) using resistive index (RI) and velocity means as decay factors (Figure). Comparisons were dichotomized into LVOTΔ (i.e., SVΔ, assuming constant LVOT diameter) of ≥ + 10% or < + 10%, Pearson's correlation was performed between LVOT VTIΔ and carotid Doppler measures.
Results: Patient characteristics can be found in reference 1. Data from 18 patients and preload challenges are included. Figure shows the receiver-operator characteristics and regressions for the 4 carotid Doppler measures.
Conclusions: The clinical relevance of our findings are as follows: 1. VTICC where pulse contour was assessed by mean systolic and diastolic velocities showed the highest diagnostic accuracy and regression coefficient comparable to the ccFT 2. The accuracy of uncorrected carotid VTI was comparable to ccFTΔ to detect SVΔ. 3. Carotid VTI pulse contour analysis lends itself to calibration such that SV trending might be possible.



Metric	AUC	Youden	spec	sens
$VTI_{CC-MEANS}$	0.91	13.01	0.89	0.89
VTI_{CC-RI}	0.70	36.11	1.00	0.56
VTI	0.83	4.77	0.77	0.88
ccFT	0.77	6.59	0.89	0.78

Fig. (abstract 001320) **A** Wireless, wearable Doppler ultrasound on a healthy volunteer and equations for ccFT, VTICC-MEANS, VTICC-RI, and uncorrected VTI. **B** Receiver-operator curves and equations. **C** Diagnostic performance of the 4 carotid measures based on Youden's *J* thresholding to determine the specificity and sensitivity. **D**–**G** Correlation analyses for VTICC-MEANS, VTICC-RI, VTI uncorrected and ccFT, respectively

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Topic: Cardiovascular issues in ICU

001321

Analysis of antibiotic consumption in a second level ICU after surgery

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Introduction: The implementation of measures for reducing the use of broad-spectrum antibiotics is important to prevent the increase of high resistance rates to antimicrobials.
Objectives: To analyze the evolution of antibiotic consumption and characteristics of patients admitted to the Intensive Care Unit (ICU) in response to the increased consumption in the years 2022–2023 and after the implementation of corrective measures in 2024.
Methods: The data were obtained from the ENVIN registry of the ICU: demographics, reason and origin of admission, severity scores (APACHE II), percentage of patients receiving antibiotics in the ICU, duration of treatment and changes in empirical treatment. Data were analyzed from April to June 2022 to 2024, both years included.
Medications from the ATC J01 group were included, and consumption was calculated according to their established Defined Daily Dose (DDDs) and adjusted annually for every 100 stays.
Various measures were implemented during the year 2024: training sessions, daily communication of antimicrobial adjustment in clinical

sessions, a clinical pharmacologist joined the medical team and joint sessions were held with the microbiology service.

Results: The populations analyzed were 132, 120 and 139 admissions in the years 2022, 2023 and 2024, respectively. Demographic and severity variables were similar in the three periods. Admission for medical reasons predominated (2022: 59.09%; 2023: 60%; 2024: 62.6%), with a similar number of surgical admissions. Admission for acute coronary syndrome decreased progressively (28.79%; 25.83%; 21.6%). The percentage of admissions due to sepsis/septic shock was 25.7% in 2022, 28.3% in 2023 and 35.7% in 2024. There was no relevant variation in the origin of admissions with the most frequent being the emergency department. The percentage of severely immunosuppressed patients was 16.3% in 2022, 23.3% in 2023 and 25.9% in 2024 with respect to total admissions. The death rates were respectively 17.42%; 13.3%; 8.63%.

The evolution of total antibiotic consumption in DDDs/100 stays was 130.62 in 2022; 152.27 in 2023 and 147.69 in 2024. A 3% reduction was achieved between 2023 and 2024 after the implementation of these measures.

Regarding antibiotics, antibiotic utilization time was reduced from 2023 to 2024, after the intervention: Linezolid from 6.8 (SD 4.53) days to 6.09 (SD 3.5), Piperacillin tazobactam from 8.86 (SD 7) to 6.67 (SD 6.67), Amoxicillin clavulanate from 4, 79 (SD 2.36) days to 3.54 (SD 2.03), Vancomycin from 10 (SD 8.04) days to 9.45 (SD 15.4), ceftriaxone from 5.58 (SD 3.97) days to 5.04 (SD 3.67). In the case of meropenem there is an opposite and equivalent trend for imipenem.

Conclusions: The type of patient admitted to the ICU has changed, with an increase in immunosuppressed patients due to sepsis/septic shock. This explains the overall increase in antibiotics use. Measures for improved antibiotic use must be implemented and maintained for a better use of antibiotics, since it is foreseeable that the number of patients requiring them, and their complexity will continue to increase.

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Topic: Infections and prevention

001324

Clinical characteristics and mortality predictors in critically ill patients with hematologic malignancies: a retrospective cohort study

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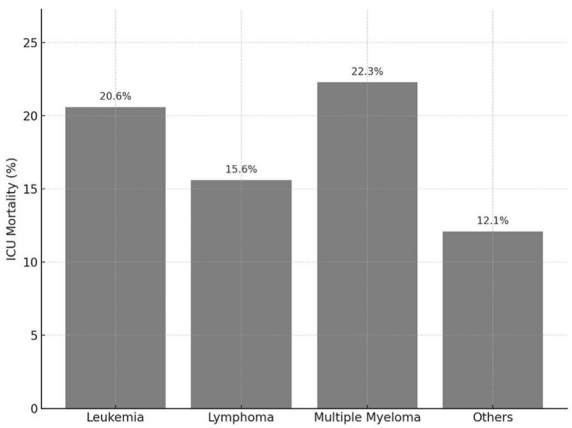
Introduction: Patients with hematologic malignancies are increasingly admitted to intensive care units (ICUs), often requiring complex organ support and facing high mortality. Identifying early prognostic indicators is crucial for guiding care and resource allocation (1).

Methods: We conducted a retrospective cohort study with patients (≥ 18 years) with hematologic malignancies admitted to the ICU of a tertiary academic center from 2012 to 2019. Demographics, comorbidities, and ICU interventions—including respiratory, hemodynamic, and renal support—were recorded. Patients on palliative care were excluded. Independent predictors of ICU mortality were identified, using multivariable logistic regression. Adjusted odds ratios (aORs) and 95% confidence intervals (95% CIs) were reported. Statistical significance was defined as $p < 0.05$. Discriminative performance was assessed using the area under the receiver-operating characteristic curve (AUROC).

Results: A total of 692 patients were included (median age: 68 years; 62% male). ICU mortality was 18.6%. Patients with multiple myeloma had the highest ICU mortality rate (22.3%), followed by those with leukemia (20.6%), lymphoma (15.6%), and other malignancies (12.1%); however, differences were not statistically significant ($p = 0.210$) (Fig. 1). Within the first hour of ICU admission, noninvasive ventilation (31.0% vs. 12.6%) and vasopressor use (38.0% vs. 17.8%) were higher in nonsurvivals ($p < 0.001$). When compared with survivors, nonsurvivors had significantly higher rates of mechanical ventilation (47.0% vs. 23.1%), vasopressor use (63.8% vs. 28.5%), and renal replacement therapy during ICU stay (54.3% vs. 10.1%) (all $p < 0.001$) (Table 1). In multivariable analysis, a SAPS 3 score was an independent predictor of ICU mortality (OR 2.10; 95% CI 1.98–4.94; $p < 0.001$). The use of noninvasive ventilation (OR 1.36; 95% CI 1.03–3.42; $p = 0.043$) and vasopressors (OR 1.96; 95% CI 1.07–3.60; $p = 0.038$) at ICU admission also predicted ICU death. In addition, longer hospital length of stay prior to ICU admission was independently associated with mortality (OR 1.07; 95% CI 1.09–1.14; $p = 0.005$). The final model had an AUROC of 0.801.

Conclusions: Among critically ill patients with hematologic malignancies, early need for respiratory and circulatory support—particularly within the first hour of ICU admission—was independently associated with mortality. A longer hospital stay prior to ICU transfer was also linked to worse outcomes, potentially reflecting progressive clinical deterioration. These findings highlight the importance of timely escalation of care and may inform triage strategies for this high-risk population.

Figure 1. ICU mortality by type of hematological malignancy.



ICU: intensive care unit.

Characteristics	ICU Survivors N=563	ICU non-survivors N=129	P Value*
Age	68 [57-77]	67 [57-76]	0.717#
Male gender	349 (62.0)	78 (60.5)	0.825$
BMI	25 [22-28]	24 [22-27]	0.316#
Charlson Comorbidity Index	3 [2-4]	3 [2-5]	0.201#
SAPS 3	58 [48-66]	71 [62-79]	**<0.001#**
Chronic Health Status			0.972$
Independent	331 (58.8)	77 (59.7)	
Needs Assistance	222 (39.4)	50 (38.8)	
Bedridden or Mobility Restricted	10 (1.8)	2 (1.6)	
Previous Autologous BMT	30 (5.3)	5 (3.9)	0.648$
Previous Allogeneic BMT	28 (5.0)	11 (8.5)	0.172$
LOS prior to ICU admission	2 [0-13]	14 [3-43]	**<0.001#**
Comorbidities			
CHF NYHA Class II–III	66 (11.7)	16 (12.4)	0.948$
CHF NYHA Class IV	7 (1.2)	3 (2.3)	0.603$
CRF (No Dialysis)	75 (13.3)	19 (14.7)	0.781$
CRF (On Dialysis)	34 (6.0)	9 (7.0)	0.845$
Solid Tumor (Locoregional)	91 (16.2)	17 (13.2)	0.479$
Metastatic Solid Tumor	16 (2.8)	6 (4.7)	0.436$
Severe COPD	38 (6.7)	4 (3.1)	0.173$
Arterial Hypertension	261 (46.4)	52 (40.3)	0.251$
Diabetes	142 (25.2)	32 (24.8)	1.000$
Myocardial Infarction	38 (6.7)	7 (5.4)	0.725$
Cardiac Arrhythmia	21 (3.7)	7 (5.4)	0.526$
Deep Vein Thrombosis	32 (5.7)	8 (6.2)	0.986$
Resource Use during first hour of ICU admission			
Mechanical Ventilation	71 (12.6)	40 (31.0)	**<0.001$**
Non-Invasive Ventilation	71 (12.6)	35 (27.1)	**<0.001$**
Vasopressors	100 (17.8)	49 (38.0)	**<0.001$**
Renal Replacement Therapy	4 (0.7)	4 (3.1)	0.067$

*p values were calculated using # Mann–Whitney U test, and χ^2 (Chi-square) test or $ Fisher exact test. Values represent median (IQR) or n (%). BMI: body mass index; SAPS 3: simplified acute physiology score 3. BMT: bone marrow transplant; LOS: length of stay; ICU: intensive care unit; CHF: congestive heart failure; CRF: chronic renal failure; COPD: chronic obstructive pulmonary disease.

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Topic: Hematologic–oncologic issues in the ICU

001325

Diabetic ketoacidosis in children: a 10-year retrospective study

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Introduction: Diabetic ketoacidosis (DKA) is a serious complication of diabetes mellitus, particularly inchildren, which significantly increases the risk of morbidity and mortality.
Objectives: This study aims todetermine the incidence of DKA in pediatric patients and to analyze the clinical features andbiological outcomes during the management of DKA in an intensive care unit.
Methods: We conducted a retrospective study involving children under the age of 15 who wereadmitted for DKA in the pediatric intensive care unit at Mohammed VI University Hospital in Marrakech, Morocco, from January 2013 to December 2023. Inclusion criteria were based onstandardized diagnostic markers of DKA, including hyperglycemia, ketonuria or ketonemia,and acidosis. The severity of DKA was assessed through blood gas analysis, and renalfunction was evaluated using the KDIGO score. Epidemiological, clinical, paraclinical data,triggering factors, therapeutic management, and patient outcomes were collected andanalyzed.
Results: Over a 10-year period, 240 cases of DKA were identified among 8,222 admissions, representing 2.31% of total admissions. The average age of patients was 7.54 years, with a higher incidence observed in children over 10 years old. DKA was the initial presentation ofdiabetes in 67.81% of cases. The most common clinical signs included polyuria–polydipsiasyndrome, Kussmaul breathing, vomiting, and altered consciousness. Moderate acidosis wasobserved in 50.3% of cases, while severe acidosis was present in 23.4% of cases. Infectionswere the most frequent trigger for DKA, identified in 57.94% of cases. The majority of patients had a favorable outcome, with an average hospital stay of 2.4 days. However, 20.60% of cases experienced complications, and one death was recorded.
Conclusions: DKA remains a severe complication of pediatric diabetes, with significant risks of seriousconsequences. Increasing awareness among healthcare professionals, ensuring earlydiagnosis, and implementing comprehensive management are essential to improve clinicaloutcomes and reduce the incidence of complications.

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14. No Grant.

Topic: Metabolism, endocrinology, liver failure and nutrition

001326

APRV mechanical ventilation in COVID-19 patients

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Introduction: Airway pressure release ventilation (APRV) is a special type of mechanical ventilation that has also been used in critically ill COVID-19 patients. The data from the literature regarding the effectiveness of APRV in this patient cohort are conflicting. A possible reason may be the presence of auto-PEEP in case of a pre-existing chronic respiratory disease, such as chronic obstructive pulmonary disease and asthma, which may limit the effectiveness of APRV.
Objectives: We aimed to investigate the possible effect of a chronic respiratory disease on the effectiveness of APRV.
Methods: This was a retrospective single-center study, that took place in the ICU of the General Military Hospital of Thessaloniki in Greece. Critically-ill patients who were older than 18 years, intubated due to COVID-19 and mechanically ventilated with APRV for > 1 day, were included in the study. Two groups were formed ("without history" and "with history"), which were compared in terms of a range of demographic and clinical parameters. All data were driven from patients' electronic files.
Results: Forty-five patients were included in the study, 23 in the group "without history" and 22 in the group "with history". Their mean age was 61 ± 12 years and 80% of them were men. There was no difference between the two groups in APACHE II score (15.13 ± 3.75 vs. 15.91 ± 3.57, $p = 0.48$), total ICU days (17.31 ± 8.39 vs. 20.6 ± 8.65, $p = 0.203$) and day of APRV initiation ($p = 0.190$). Contrary to the initial hypothesis, no difference was found between the two groups in blood gases as assessed by PaO2 ($p = 0.303$), PaCO2 ($p = 0.544$) and PaO2/FiO2 ratio ($p = 0.447$). As far as outcome is concerned, complications were observed in 39% and 45% of patients in the first and second group respectively ($p = 0.668$), while 86% of patients died in the first group and 65% in the second group ($p = 0.099$). Further statistical analysis showed that neither gender nor age exerted a significant role on the outcome measures ($p > 0.05$ for all variables).
Conclusions: It appears that the presence of a pre-existing chronic respiratory disease does not affect the efficacy of APRV in critically ill COVID-19 patients.

Topic: Acute respiratory failure and mechanical ventilation

001327

Exosome-based proteomics of patients with severe TBI: a pilot study

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Introduction: Traumatic brain injury (TBI) has a high morbidity and mortality rate in intensive care units (ICUs). Recently, plasma biomarkers have been identified with the aim of predicting neurological prognosis and response to therapy (1). However, there is limited consensus on their usefulness due to heterogeneity and temporal variability (1). Extracellular vesicles (EVs) are stable carriers for biomolecule transport. The recent studies have highlighted the role of EVs as biomarkers in TBI, offering several advantages over soluble biomarkers, such as a longer half-life, greater resistance to degradation, and the ability to determine their tissue origin (2, 3).
Objectives: The objective of this pilot study was to compare the proteomic profile of EVs from TBI patients with that of control patients.
Methods: This observational case–control study included adult patients admitted to the ICU, with either: a) severe TBI, defined as a Glasgow Coma Scale (GCS) score < 9 upon admission (TBI group), or b) immediate postoperative status following cardiac surgery ($n = 11$ per group). Blood samples were collected upon admission and every 8 h for the first 48 h, then centrifuged at 3000 rpm to obtain plasma. EV extraction was performed by differential ultracentrifugation of plasma samples at 100,000G and 4 °C. Differential proteomic expression analysis was conducted using SWATH mass spectrometry.
Results: The proteomic profiles of TBI and control patients were clearly distinguishable at admission and at 24 h (Fig. 1). The search for individual proteins that differentiate both groups did not yield significant results, possibly due to sample size and multiple comparisons. Among the proteins close to reaching significance were some related to neuroinflammation, such as PTN or BGN, ganglioside accumulation such as HEXB, and natural killer-mediated immunity such as RASAL3. In the functional analysis, the proteomic profile of EVs from TBI patients vs. controls showed overexpression of biological processes related to:
1. Regulation of neuronal differentiation;
2. Axonal growth, and
3. Inflammatory response to antigens.

Conversely, the following processes were underexpressed:
1. Action potential of cardiac muscle cells;
2. Communication in the His–Purkinje bundle, and
3. Cardiac muscle cell adhesion.

Conclusions: The proteomic profile of plasma EVs allows differentiation of TBI patients and reflects pathophysiological processes consistent with their condition. This pilot study provides a foundation for research in the field of exosomal biomarkers in TBI and lays the groundwork for a future project correlating these biomarkers with parameters of neurological dysfunction.

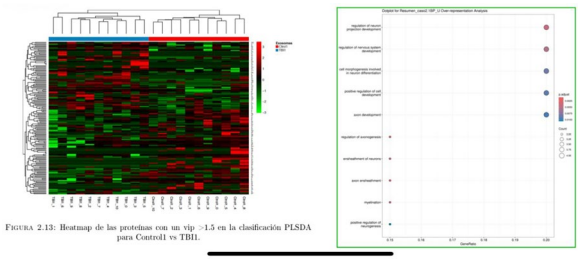


Figura 2.13: Heatmap de las proteínas con un vip >1.5 en la clasificación PLSDA para Control1 vs TBI1.

(abstract 001327) EV-based proteomics of patients with traumatic brain injury vs. controls. (1) Heatmap of proteins identified in EVs according to classification power (red—control, blue—TBI). (2) Biological GO functions overexpressed in EV-based proteomic analysis of TBI patients versus control patients.

Topic: Neurointensive care

001329

Concordance between change in MAP and CO_2 as strategies to evaluate cerebral vascular reactivity by transcranial Doppler in patients under invasive mechanical ventilation

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Introduction: Since the description of transcranial Doppler (TCD) in 1981 as an imaging technique that allows monitoring the cerebral blood flow velocity (CBF) of cerebral circulation (1), its use has spread in different fields of medicine (2) due to its benefits over other conventional imaging techniques. At the beginning of the nineteenth century, the relationship between the regulation of cerebral circulation with different stimuli was described, such as the variation of the partial pressure of carbon dioxide (CO2) and blood pressure (3). Although the use of DTC in conjunction with CO_2 variation and mean arterial pressure (MAP) as techniques to assess cerebral vascular reactivity has been widely described, different studies propose standardizing these tests to minimize the factors that may bias the information obtained. Currently the evidence between the correlation of these methods and their application in critically ill patients is uncertain.
Objectives: To evaluate the concordance between the change in MAP and CO2 as methods to evaluate cerebral vascular reactivity by TCD in patients under mechanical ventilation.
Methods: An experimental, cross-sectional, single-center study was carried out, where 3 measurements of the right and left middle cerebral artery velocity (MCA) values obtained by DTC were collected, the first measurement was made without any intervention, considering the baseline value, the second was performed after adjusting the dose of vasopressors in a controlled manner to raise the MAP by an average of 12 mmHg (7.3–14.3 mmHg). the third was obtained after adjusting the dose of vasopressors to return to the baseline value of the MAP and modifying the respiratory rate to obtain a change in arterial CO2 of 8.3 mmHg on average (7.3–9.1 mmHg) higher than the basal CO2. Statistical analysis was performed with Spearman's test between the MAP and CO2 switching groups to assess the correlation between these strategies.
Results: A total of 12 patients were included, all without comorbidities. In the measurements of the right and left MCA there is a very strong correlation; > 0.977 and > 0.933 respectively, between MAP and CO_2, all of which were statistically significant ($p < 0.001$).
Conclusions: The change of MAP and CO_2 as strategies to evaluate cerebral vascular reactivity in our study demonstrated a positive correlation between both tests, with high statistical value, in both the right and left MCA groups. However, a larger sample is needed to elucidate the role of cerebral vascular reactivity associated with other variables that may contribute to the success or failure of neurological monitoring.

Table 1 (abstract 001329) Correlation between basal and changing left middle cerebral artery (L-MCA) velocities of medical blood pressure (MAP) and carbon dioxide (CO_2)

		L – MCA basal	L – MCA MAP	L – MCA CO2
L – MCA basal	r_s	1.000	0.993	0.993
	p		< 0.001	< 0.001
L – MCA MAP	r_s	0.993	1.000	1.000
	p	< 0.001		
L – MCA CO2	r_s	0.993	1.000	1.000
	p	< 0.001	.	

Table 2 (abstract 001329) Correlation between basal and changing right middle cerebral artery (R-MCA) velocities of medical blood pressure (MAP) and carbon dioxide (CO_2)

		R – MCA basal	R – MCA MAP	R – MCA CO2
R – MCA basal	r_s	1.000	0.988	0.977
	p		< 0.001	< 0.001
R – MCA MAP	r_s	0.988	1.00	0.993
	p	< 0.001		< 0.001
R – MCA CO2	r_s	0.977	0.993	1.000
	p	< 0.001	< 0.001	

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5. I am deeply grateful to my professors for their guidance, to my fellow residents for their support and shared learning, to my family for being my greatest source of strength, and to my soulmate for their unconditional love and encouragement throughout this journey.

Topic: Neurointensive care

001330

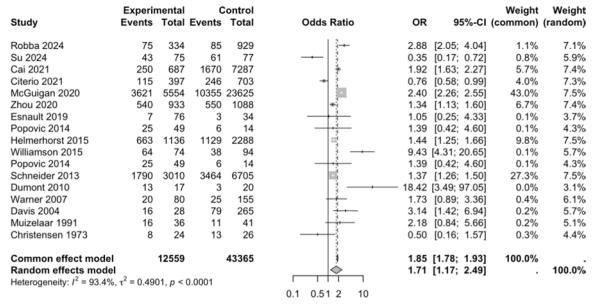
Neurological outcomes and mortality of hypocapnia in acute brain injury: a meta-analysis

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Introduction: Hypocapnia is frequently observed in patients with acute brain injury (ABI) and has been associated with adverse effects, including cerebral vasoconstriction and reduced cerebral blood flow, which may worsen secondary ischemic damage. Despite its historical use for intracranial pressure control, its impact on mortality and neurological outcomes remains to be elucidated. To date, no meta-analyses have been conducted on the topic.
Objectives: The objective of our study was to analyze the association between hypocapnia and both mortality and poor neurological outcomes in apatients with acute brain injury.
Methods: We conducted a systematic review and meta-analysis of studies assessing the association between hypocapnia and both mortality and poor neurological outcomes in ABI patients, including patients with traumatic brain injury (TBI), postcardiac arrest (PCA), subarachnoid hemorrhage (SAH), ischemic stroke and intracranial hemorrhage. Only human studies that defined hypocapnia based on partial pressure of carbon dioxide (pCO_2) were included. Random-effects models (DerSimonian and Laird) were used to calculate pooled odds ratios (ORs).
Results: For mortality, 17 studies encompassing 80,959 patients were analyzed, including the following subgroups: 9 studies on traumatic brain injury (TBI), 1 on subarachnoid hemorrhage (SAH), 5 on postcardiac arrest (PCA), and 2 on general ABI. For poor neurological outcomes, 10 studies with a total of 3,183 patients were included. Hypocapnia was significantly associated with increased mortality in ABI patients, with a pooled OR of 1.6135 [1.0813; 2.4075]. Moderate heterogeneity was observed across studies, likely due to differences in hypocapnia definitions, injury severity, and ventilation strategies. For poor neurological outcomes, the pooled OR was 1.7576 [0.8482; 3.6420], indicating a trend toward worse functional prognosis, though the confidence interval crossed unity, suggesting a lack of statistical significance.
Conclusions: These findings suggest that hypocapnia may contribute to increased mortality in ABI patients and could negatively impact neurological recovery. The detrimental effects may stem from reduced cerebral perfusion, exacerbating secondary ischemic injury. While hypocapnia has been used for intracranial pressure management,

its routine application should be reconsidered, particularly given the potential risks. Further research is necessary to establish safe pCO_2 thresholds and optimize ventilation strategies to balance intracranial pressure control with cerebral perfusion preservation.



Meta-analysis for mortality of hypocapnia versus no hypocapnia in adult patients with ABI.

Topic: Neurointensive care

001331

Pre- and intrahospital airway management in trauma patients: an observational study

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Introduction: Airway management is a critical aspect in polytraumatized patients 1. Patients' clinical condition, intubation setting, and chosen drugs 2 can have impact on clinically relevant outcomes. However, no recommendations are currently available on this topic. The aim of this study was to describe the characteristics of polytraumatized patients requiring emergent endotracheal intubation, evaluate the drugs used for the procedure and compare patients intubated in the prehospital setting, with those intubated once arrived in the hospital.
Methods: This was a single-center, prospective observational study performed from February 2023 to October 2024 at ASST Niguarda Hospital. Trauma patients aged > 14 years, intubated either in the prehospital setting (Prehospital Group) or at admission to the shock room (Intrahospital Group), were enrolled. Demographics, clinical data, drugs used for intubation and clinical outcomes were recorded. Pre- and Intrahospital groups were compared.
Results: A total of 73 patients were enrolled. Fifty-six (77%) patients were intubated in the prehospital setting and were characterized by more severe trauma, a higher incidence of head injury, and a lower level of consciousness than those intubated in the shock room. Differently, the 17 (23%) patients intubated in the shock room experienced a higher incidence of trauma involving the abdomen together with a second district and arrived at the hospital with only minor consciousness impairment (**Table 1**). No difference in preintubation blood pressure nor in the choice of induction drugs was found. Lastly, the prehospital group was admitted to the ICU more frequently ($p = 0.04$) and had a higher mortality as compared to the Intrahospital Group ($p = 0.009$).
Conclusions: Our analysis revealed that prehospital intubation was mainly driven by the severity of trauma and a reduced consciousness level. However, regardless of the patient's condition and the intubation settings, no clinically relevant differences were found regarding the choice of induction drugs and their dose.

Table 1 (abstract 001331) Demographics, clinical data, drugs used for intubation and clinical outcomes, data are expressed either as count (percentage), mean and SD or as median and IQR

	Total N=73	Prehospital Group N=56	Intrahospital Group N=17	P value
Female	15 (21)	11 (20)	4 (24)	0.48
Age years	40 [27, 54]	45 [28, 55]	32 [27, 48]	0.12
GCS	9 [4, 14]	7 [3, 13]	15 [14, 15]	<0.001
ISS	22 [14, 33]	27 [17, 41]	14 [9, 20]	0.002
Involved district				0.002
Head	30 (41)	29 (52)	1 (6)	
Thorax	3 (4)	2 (4)	1 (6)	
Abdomen plus a second district	28 (38)	17 (30)	11 (65)	
Pelvic Bones and Limbs	5 (7)	2 (4)	3 (18)	
Spinal	4 (5)	3 (5)	1 (6)	
Shoot/blasting trauma	3 (4)	3 (5)	0 (0)	
Induction drugs:				
Ketamine	47 (64)	36 (64)	11 (65)	0.61
Dose (mg)	100 [100, 100]	100 [100, 150]	80 [100, 100]	0.03
Propofol	16 (22)	10 (18)	6 (35)	0.12
Dose (mg)	100 [80, 150]	100 [80, 150]	150 [80, 150]	0.77
Midazolam	35 (48)	27 (48)	8 (47)	0.57
Dose (mg)	5 [5, 10]	5 [5, 10]	4 [3, 5]	0.008
Fentanest	50 (68)	36 (64)	14 (82)	0.13
Dose (µg)	100 [100, 100]	100 [100, 100]	100 [100, 150]	0.48
Rocuronium	64 (88)	49 (88)	15 (88)	0.65
Dose (mg)	80 [50, 100]	80 [50, 100]	80 [50, 100]	0.41
Succinylcholine	20 (27)	16 (29)	4 (24)	0.47
Dose (mg)	100 [100, 100]	100 [100, 100]	100 [100, 100]	1.00
Hemodynamics				
MAP Pre-intubation	86±22	87±23	85±17	0.77
Pre-intubation Heart rate	103±27	102±29	110±23	0.28
Destination				0.04
General ICU	23 (40)	15 (38)	8 (47)	
Neuro ICU	28 (49)	23 (58)	5 (29)	
Other wards	6 (11)	2 (5)	4 (23)	
Hospital Mortality	13 (21)	13 (29)	0 (0)	0.009
ICU Length of stay	10 [4, 22]	8 [4, 20]	12 [5, 29]	0.61
Hospital Length of stay	21 [7, 47]	20 [5, 44]	28 [20, 51]	0.18

GCS Glasgow Coma Scale, *ISS* Injury Severity Score, *MAP* Mean Blood Pressure, *ICU* Intensive Care Unit

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Topic: Trauma

001332

Analysis of complications in critically ill patients with SARS-CoV-2 according to variants

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Introduction: Throughout the pandemic, the emergence of SARS-CoV-2 variants has posed interrogatives regarding their impact on the presentation and severity of complications in critically ill patients. An increase in multiorgan failure (MOF), thrombotic events and secondary infections has been observed.
Objectives: The objective of this study is to analyze the frequency and severity of these complications in patients with COVID-19 admitted to the ICU, in relation to the identified viral variant.
Methods: Observational, retrospective study in a second level ICU from March 2020 to December 2021. Demographic, clinical, and complication data (infectious, thrombotic, and development of MOF) were collected for each COVID-19 variant and its relationship with vaccination status. Quantitative variables are described with mean and standard deviation or with median and interquartile range, while categorical variables were analyzed using the chi-squared and Fisher's exact tests.
Results: From a total sample of 345 patients, we included 156 patients in whom each variant had been analyzed. The median age was 58.8 years, and 63% were male. Five variants were identified: Wild type ($n = 103$), B.1.1.7 ($n = 32$), Delta ($n = 18$), Gamma ($n = 1$), and South African ($n = 2$). Data from the Gamma and South African variants are limited due to the small sample size and may not be relevant. The main findings are detailed in Table 1.
The type and number of infectious and thrombotic complications and the development of MOF, whose results are detailed in Table 2, were collected.
A statistically significant association was observed between the development of bacteremia in the wild-type variant compared to the rest of the variants ($p = 0.02$). No association was observed between the COVID variant type and the number of ventilator-associated pneumonia (VAP), ventilator-associated tracheobronchitis (VAT), and urinary tract infection (UTI).
No statistically significant differences were observed regarding the number of thrombotic complications.
A statistically significant association was observed between the development of MOF and the wild variant ($p = 0.002$), with no relationship with the rest of the variants. There was no association between the development of MOF and vaccination status ($p = 0.680$), which could be limited by the sample size of vaccinated patients.
Conclusions: In our sample, the wild type of variant showed a greater association with the development of MOF and with the presentation of bacteremias as compared to Delta and B.1.1.7. These findings highlight the importance of considering the viral variant in the risk assessment of complications in critically ill patients with COVID-19.

Table 1 (abstract 001332) Clinical parameters of the different COVID-19 variants

	Wild (n 103)	B.1.1.7 (n 32)	Delta (n 18)	Global (n 156)
Median age	59,3 ± 11	56,7 ± 10,8	58,6 ± 11,4	58,8 ± 11,2
Sex (male)	61,17%	59,37%	83,33%	63%
Charlson scale	2,25 ± 1,7	2,38 ± 1,96	2,5 ± 2	2,31 ± 1,78
APACHE Scale	12,81 ± 5,4	12,47 ± 4,84	10,6 ± 4,3	12,5 ± 5,19
Pulmonary disease	13,59%	12,50%	5,56%	12,18%
Cardiovascular disease	7,77%	6,25%	5,56%	7,05%
Obesity	61,17%	50%	50%	57,69%
Inmunosupression	3,88%	6,25%	5,56%	4,49%
Mechanical Ventilation	93,2%	81,25%	55,5%	86,54%

Table 2 (abstract 001332) Complications of each viral variant

	Wild (n 103)	B.1.1.7 (n 32)	Delta (n 18)	Global (n 156)
VAP	34,95%	37,5%	33,33%	34,62%
VAT	10,68%	21,88%	27,78%	16,67%
Bacteremia	27,18%	6,25%	5,56%	19,87%
UTI	9,71%	15,63%	16,67%	11,54%
PE	17,48%	6,25%	22,22%	15,38%
DVT	9,71%	3,13%	0%	7,69%
FMO	58,25%	50%	22,2%	52,56%
Average stay	18,9 ± 19	18,6 ± 15	19,8 ± 23	19,1 ± 18,2
Mortality	38,83%	15,63%	11,11%	30,77%

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Topic: Infections and prevention

001333

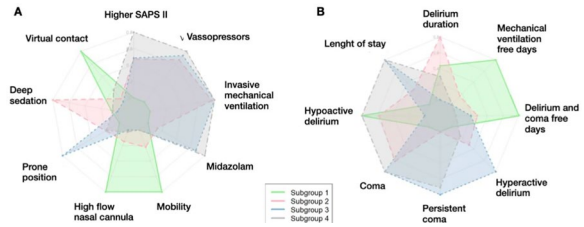
Acute brain dysfunction endotypes in COVID-19: a machine learning-based analysis of the COVID-D cohort

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Introduction: Acute brain dysfunction (ABD, i.e. delirium and coma) is associated with significantly increased morbidity incritically ill patients, its high heterogeneity posing a challenge for prevention and treatment. Although machine learning is promising for subgroup identification, this approach has not yet been applied to COVID-19, despite the its remarkableprevalence of ABD.
Objectives: The aim of our study was to identify distinct endotypes among critically ill patients with COVID-19 and evaluate their association with clinical outcomes.
Methods: We retrospectively analyzed an internationalmulticentre database (COVID-D study) of critically ill adult patients with

COVID-19 and acute brain dysfunction; clinical features at the day of admission were included as input variables. We applied unsupervised machine learning to discover subphenotypes of ABD patients. Hierarchical clustering was performed with a bootstrap-based robustness assessment after dimensionality reduction. Clusters were analyzed for differences in neurological outcomes, mechanical ventilation and survival.
Results: For 13 PCs, 1,631 patients were divided into four robust endotypes with distinct clinical outcomes. Although endotype 1 ("moderate disease") included less severe patients with non-invasive ventilation, lighter sedation and the shortest duration of ABD, endotypes 2–4 represented more severe patients and differed in the choice of sedatives, anti-delirium measures and mechanical ventilation type, resulting in differences in delirium subtypes and duration, as well as persistent coma. Interestingly, no differences in survival were found.
Conclusions: Machine-learning-based endotypes highlight the heterogeneity of ABD in COVID-19 and offer insight into preventive strategies, such as family contact or choice of sedatives.



Radar chart of endotype characteristics in COVID-D patients with acute brain dysfunction. (A) Input variables (B) Outcomes.

Topic: Information systems and data science

001334

Tumor necrosis factor-α dynamics and endotoxin tolerance in cardiac surgery: a secondary analysis of the SIRAKI02 trial

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Introduction: Cardiopulmonary bypass (CPB) produces systemic inflammation that has been implicated in the pathophysiology of cardiac surgery-associated acute kidney injury (CSA-AKI). Our previous work demonstrated that extracorporeal blood purification (EBP) attenuates perioperative TNFα release. However, the clinical relevance of this modulation remains unclear.
Objectives: To analyze the relationship of TNFα changes with CSA-AKI, particularly in vulnerable subphenotypes, and to explore the relevance of immunoparalysis defined by endotoxin tolerance (ET) in this context.
Methods: A secondary analysis of the SIRAKI02 randomized clinical trial (n = 343), which evaluated EBP during cardiac surgery, was conducted. We analyzed the association between TNFα increase from baseline (T0) to end of surgery (T1) and the development of CSA-AKI, defined by KDIGO criteria. Comparative subgroup analyses were performed in patients with diabetes, hypertension, chronic kidney disease (CKD) or reduced left ventricular ejection fraction (LVEF < 40%). In addition, in a subgroup of 40 patients (20 per group), ET was assessed ex vivo by measuring TNFα production after lipopolysaccharide (LPS) stimulation of whole blood samples collected at T0, T1, 3 h(T2) and 24 h(T3) after surgery.
Results: A TNFα increase (T0 vs T1) over a certain threshold, associated with higher CSA-AKI risk. Patients in the EBP group had lower increases in TNFα when compared with standard care group. This effect of EBP was stronger in high-risk subphenotypes (i.e., diabetes, CKD, and low LVEF). In the ET substudy, TNFα production after LPS stimulation was significantly reduced at T1 compared to T0, indicating strong immunoparalysis, with no differences between EBP and standard care groups. Of note, this effect was partially reversed at 3 h and was completely inverted at 24 h postoperatively.
Conclusions: TNFα increase during surgery is associated with risk of CSA-AKI. EBP appears to mitigate this risk, at least in part, by modulating TNFα dynamics specially in high-risk subphenotypes. These results support the role of immune modulation during cardiac surgery in preventing AKI. The absence of differences in ET between intervention and standard care groups excludes any effect of EBP on the occurrence of ET.

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001335

Epidemiological profile of nosocomial infections in a Moroccan pediatric intensive care

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Introduction: Nosocomial infection is a major global public health problem at several levels: for the patient and the community as well as for health budgets.
Objectives: The objective of our study was to study the epidemiological profile of nosocomial infections in our department with analysis of the most incriminated microorganisms and their resistance profile as well as the morbidity and mortality linked to nosocomial infections.
Methods: This descriptive prospective work is carried out by analyzing the files of 303 patients who have been hospitalized for 48 h or more in the pediatric intensive care unit of the Mohammed VI university hospital center in Marrakech between July 2021 and February 2022. Criteria of infection used were those of the Centers for Disease Control (CDC).
Results: We identified 86 episodes of nosocomial infections in 58 patients, an incidence of 28.38%. The incidence density was 8.3 per 1000 days of hospitalization. The most affected age group was that varying between 28 days and 2 years. Esophageal atresia was the most common pathology in patients with nosocomial infection. Bacteremia was the predominant localization of nosocomial infection with an incidence of 14.85%. Pneumopathies with an incidence of 10.5% and they all occurred in intubated and ventilated children. Other sites of infection were: catheter-related infections (1.65%), urinary tract infections (1.32%) and surgical site or skin swab infections (in burn patients) (6.27%). The different incidence densities relating to the use of invasive procedures were relatively low. Thus, theincidence density of bacteremia was 5.7 per 1000 days of central venous catheterization, 7.5 per 1000 days of artificial ventilation and 4.7 per 1000 days of urinary catheterization. BGNs were the most isolated microorganisms in our series with a predominance of enterobacteriaceae (58.7%) represented by *Klebsiella pneumoniae* and *Enterobacter cloacae*, then non-fermentative BGNs (41.3%) represented by *Acinetobacter cloacae* and *Pseudomonas aeruginosa*. The probabilistic treatment of nosocomial infection was the combination Pipera-Tazo + an aminoglycoside for

post-op patients and Imipenem + Amikacin for the others with a therapeutic adjustment in 16% of our patients after microbiological identification and antibiogram. The evolution was marked by the occurrence of death in 54% of infected patients.

Conclusions: The incidence rates and incidence density of nosocomial infections calculated in our study are relatively lower than those found in studies from developing countries. However, they remain quite high compared to the results reported by studies carried out in developed countries. In addition, it appears in the light of our results that the resistance of germs to antibiotics is worrying and therefore the prevention of infections makes it possible to improve the prognosis and reduce morbidity and mortality.

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Topic: Infections and prevention

001336

Silent threats in the ICU: unveiling the deadly toll of invasive candidiasis

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Introduction: Invasive candidiasis (IC) represents a growing concern in intensive care units (ICUs) due to their rising incidence, diagnostic challenges, and significant impact on patient outcomes. Critically ill patients are particularly vulnerable to these infections but timely recognition and management of IC are essential to reduce morbimortality.
Objectives: To characterize the epidemiology of IC in critically ill patients and identify factors of poor prognosis.
Methods: Retrospective, single-center, observational cohort study of critically ill patients with at least one episode of IC during their admission to the Intensive Care Department of a University Hospital between 2018 and 2023. SPSS was used for statistical analysis.
Results: 214 patients (1.17% of all ICU admissions) were included, mostly male (56.5%) with median age of 66y and 25.2% of them without co-morbidities. On admission, median SAPS II and SOFA scores were 52 (IQR 36.75–66) and 7 (IQR 4–10) respectively. The presence of a central venous catheter (66.4%) and previous use of antibiotics (70.1%) were the main risk factors for IC. Most episodes were ICU-acquired (40.7%) followed by hospital (36%) and community (23.4%) acquired. The most frequent source of IC was intra-abdominal infection (68.5%) followed by primary fungemia (20.7%). Septic shock was present in 43.9% of the cases and median C-reactive protein serum levels and leukocytes were 205.5 mg/l and 11200/µl, on diagnosis. Candida albicans (61.7%) was the most frequent yeast isolated followed by C. glabrata (14.5%) and C. parapsilosis (7.5%). Blood cultures were positive in 41.6% of the cases. Antifungal susceptibility testing was done in 18.7% of the isolates and resistance to azoles and echinocandins was documented in 20% and 12.5% of them, respectively. Antifungal (AF) therapy was started in 85.5% of the patients, mostly empiric (95.6%). Echinocandins was the most AF prescribed (66.1%). Median duration of AF therapy was 14 days (IQR 7–21) and it was changed in 20.3% of the patients. Median ICU and hospital length of stay were 15 and 38 days, respectively. ICU mortality was 38.3% and hospital mortality was 47.2%.
In logistic regression analysis, age (OR 1.043), SAPS II (OR 1.034), immunosuppression (OR 5.250), site of acquisition (Hospital—OR 3.714; ICU—OR 5.678), total parenteral nutrition (OR 0.286) and, compared to echinocandins, azoles use (OR 0.405) were independently associated with ICU mortality. Age (OR 1.044), SAPS II (OR 1.025), immunosuppression (OR 4.177), ICU acquisition (OR 3.629) and, compared to echinocandins, azoles use (OR 0.370) were independently associated with hospital mortality.
Conclusions: IC in critically ill patients is associated with prolonged length of stay and high mortality, in both ICU and hospital. Independent risk factors for mortality included age, SAPS II, immunosuppression and ICU acquisition. Azoles use and parenteral nutrition were protective.

Topic: Infections and prevention

001339

Intra-abdominal candidiasis in the ICU: Is it time to challenge the antifungal dogma?

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Introduction: Intra-abdominal candidiasis (IAC) is a challenging and potentially life-threatening infection that frequently affects critically ill patients, especially when diagnosis and appropriate antifungal (AF) therapy are delayed. Although echinocandins are usually considered first-line therapy, there are several PK/PD concerns, namely regarding penetration and dosing.
Objectives: To characterize the epidemiology of IAC in critically ill patients and compare the effectiveness of empiric first-line use of echinocandins and azoles in this population.
Methods: Retrospective, single-center, observational cohort study of critically ill patients with IAC in the Intensive Care Department of a University Hospital between 2018 and 2023. SPSS was used for statistical analysis.
Results: During this period, 124 microbiological documented IAC were included, 49.2% males with median age of 67y. No comorbidity was present in 30.6% of them. Median SAPS II and SOFA scores on admission were 52 (IQR 37–67.75) and 7 (IQR 3–9), respectively. Most of the episodes were hospital-acquired (41.1%) followed by ICU-acquired (34.7%) and septic shock was documented in 47.6% of all IAC. Median ICU length of stay (LOS) and hospital LOS were 15 and 35.5 days. ICU mortality was 33.6% and hospital mortality was 43.8%. Candida albicans (65.3%) was the most frequent yeast isolated followed by C. glabrata (14.5%) and C. tropicalis (7.3%). Fungemia was documented in 15.3% of the episodes.
An echinocandin was used in 71% of all IAC and an azole in the remaining 29%. Median duration of AF therapy was 14 days (IQR 7.75–23.25) and it was changed in 17.8% of the cases.
In logistic regression analysis, the only variable independently associated with echinocandins use was previous use of antibiotics (OR 0.030). There was also a trend to higher use of this class of AF in patients under renal replacement therapy (OR 0.124; 95%CI 0.015–1.017).
Among all IAC, the variables independently associated with ICU mortality were age (OR 1.055), immunosuppression (OR 9.905), ICU-acquired IAC (OR 7.407). Age (OR 1.048), immunosuppression (5.589), hospital-acquired (OR 4.362) and ICU-acquired IAC (OR 8.559) were independently associated with hospital mortality.
In logistic regression analysis, empiric first-line use of an azole was independently associated with lower ICU (OR 0.189) and hospital (OR 0.196) mortality compared with echinocandins, but a significantly longer hospital LOS (40 vs. 32 days; $p = 0.041$).
Conclusions: IAC is associated with a significant ICU and hospital mortality and prolonged LOS, in both ICU and hospital. Age, immunosuppression and nosocomial acquisition of IAC were independent risk factors for mortality. Previous use of antibiotics was independently associated with empiric use of an echinocandin. Although its use is associated with a longer hospital LOS, empiric first-line use of an azole was independently associated with lower ICU and hospital mortality in this population.

Topic: Infections and prevention

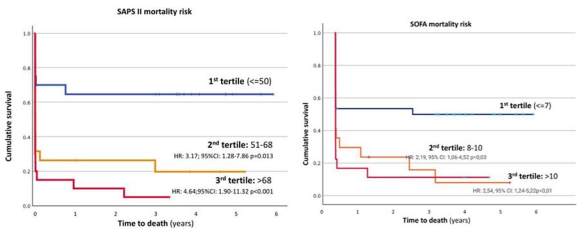
001342

Beyond the arrest: assessing survival with SOFA and SAPS II scores in OHCA patients

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Introduction: Out-of-hospital cardiac arrest (OHCA) is a global health concern with millions of cases yearly. Survival depends on factors like witnessed events, timely cardiopulmonary resuscitation, and initial shockable rhythms. Despite typically being admitted to intensive care units (ICUs), validated scores for post-admission survival prediction are lacking. Widely used ICU tools such as the Sequential Organ Failure

Assessment (SOFA) and the Simplified Acute Physiology Score II (SAPS II) to forecast clinical outcomes lack validation for predicting overall mortality in OHCA patients.
Methods: Retrospective, observational, single-center study conducted on patients admitted to a polyvalent ICU unit of a tertiary hospital following OHCA between 2017 and 2019. SOFA and SAPS II scores calculated in the first 24 h of admission were divided into tertile groups to determine whether a correlation between these scores and time to death could be identified. Kaplan–Meier survival analysis was performed.
Results: The study included 79 OHCA patients, with 32.9% being female. 84,8% of the cardiac arrests were witnessed, and 39.2% occurred at home. Sixty patients (75,9%) died during follow-up (FUP). Mean FUP time for surviving patients was 3,9 years. All patients had SOFA and SAPS II scores calculated within the first 24 h post-arrest.
SAPS II score first tertile was 50 and second tertile was 68. Patients with SAPS II score from 51 to 68 had a greater risk of mortality (HR: 3.17; 95% CI 1.28–7.86, $p = 0.013$) relative to patients under or equal to 50 and patients with SAPS II score greater than 68 had around 4,6 times the risk of mortality when compared to patients under 51 (HR: 4.64;95% CI 1.90–11.32, $p < 0.001$).
SOFA score within the first tertile was under or equal to 7. The second tertile was 10.
Patients within the second tertile (SOFA score from 8 to 10) had a greater risk of mortality relative to patients with a SOFA score under or equal 7 (HR: 2,19, 95% CI 1,06–4,52, $p = 0,03$) and patients with SOFA score greater than 10 had 2,5 times the risk (HR: 2,54, 95% CI 1,24–5,22, $p = 0,01$) of mortality when compared to patients within the first tertile (under or equal to 7). There was not a statistically significant difference in the risk of mortality in patients with SOFA score from 8 to 10 and patients with SOFA score greater than 10.
Conclusions: SOFA and SAPS II scores calculated within the first 24 h can be applied to estimate mortality risk in OHCA patients admitted to an ICU.



Cumulative survival in OHCA patients, according to SAPS II (left) and SOFA (right) risk scores.

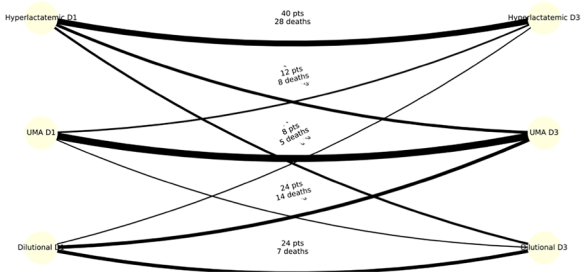
Topic: Cardiac arrest.

001343

Trajectory of acid–base phenotypes during CVVHDF and their association with ICU mortality in critically ill patients

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Introduction: The correction of metabolic acidosis is a key goal during continuous venovenous hemodiafiltration (CVVHDF) in critically ill patients (1). However, acid–base disturbances may result from distinct underlying mechanisms, such as hyperlactatemia or accumulation of unmeasured anions (UMAs)—which may influence treatment response and outcome (2). We hypothesized that the evolution of acid–base phenotypes during CVVHDF is heterogeneous and associated with ICU mortality.
Methods: In this retrospective study of 200 ICU patients on CVVHDF, we classified acid–base phenotypes at initiation (day 1) and after 72 h (day 3) based on lactate, standard base excess (SBE), strong ion difference (SIDa), and its inorganic component (SIDa-inorg). Three phenotypes were defined: (1) hyperlactatemic acidosis (lactate > 2.5 mmol/L), (2) unmeasured anion acidosis (SIDa-inorg > 3 mmol/L with normal lactate), and (3) dilutional/hypochloremic acidosis (SIDa > 38 mmol/L, lactate ≤ 2.5, and SIDa-inorg ≤ 3). Phenotype trajectories were categorized as: improvement (shift to a less severe phenotype), stability (same phenotype), or deterioration (shift to a more severe phenotype, particularly toward lactate or UMA-driven acidosis). ICU mortality was compared across trajectory groups.
Results: At baseline, 38% of patients had hyperlactatemic acidosis, 34% UMA-driven acidosis, and 28% a dilutional pattern. After 72 h of CVVHDF, 32% of patients improved their phenotype, 46% remained unchanged, and 22% deteriorated—mostly transitioning from dilutional to UMA or lactate-driven profiles. ICU mortality was 28% among improvers, 58% among stable patients, and 74% among those who deteriorated (Fig. 1). Patients with phenotype deterioration had persistently low SBE, elevated SIDa-inorg, and rising lactate. In multivariable analysis, phenotype deterioration was independently associated with ICU mortality (OR 3.1; 95% CI 1.5–6.3; $P < 0.01$).
Conclusions: The trajectory of acid–base phenotypes during CVVHDF is highly variable and strongly associated with outcome. Deterioration to more severe forms of acidosis, marked by increased lactate or accumulation of unmeasured anions, identifies patients at the highest risk of death despite renal support. Monitoring phenotype evolution provides a novel and clinically relevant framework to guide prognostication and metabolic management in critically ill patients.



Phenotype Trajectories D1 D3 with Estimated Mortality Reference = Dilutional | ORs: Hyperlactatemic = 5.67 (95% CI 2.47–13.02), UMA = 3.45 (95% CI 1.63–7.29).

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Topic: Acute Kidney Injury and haemofiltration.

001344

Electrolyte and acid–base equilibrium during continuous renal replacement therapy: differences between hemofiltration and hemodialysis

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Introduction: During continuous renal replacement therapy (CRRT), large volumes of fluids and electrolytes are exchanged between the machine and the patient (1). It is conceivable that the effects on plasma electrolytes and acid–base variables depend upon the employed dialysis fluid bags and the chosen dialytic modality, i.e., hemofiltration (CVVH) and/or hemodialysis (CVVHD) (2, 3). The aim of this study was to describe the trends in plasma electrolytes and acid–base equilibrium in critically ill patients undergoing CVVH or CVVHD.
Methods: Critically ill patients treated with CRRT (PrismaMax and Baxter) were enrolled. Regional anticoagulation was performed using diluted citrate [Regiocit, Baxter, and theoretical strong ion difference (SID) = 54 mmol/L]. Biphozyl (Baxter and theoretical SID = 23 mmol/L) was employed as dialysate during CVVHD treatment, while phoxilium (Baxter and theoretical SID = 30 mmol/L) or Multibic K2 (Fresenius, theoretical SID = 33 mmol/L) was used as replacement solutions in post-dilution during CVVH. Blood gas analysis was performed at 0, 24, 48, and 72 h (RAPIDPoint 500 Blood Gas System, Siemens). Electrolytes, Standard Base Excess (SBE), and the SID were analyzed (4).
Results: Twenty-seven patients were treated using CVVH and 11 with CVVHD. Demographics is reported in Table 1. After 72 h of treatment, both techniques led to a similar sodium concentration (135 ± 3 vs. 135 ± 3 mmol/L, $p = 0.76$), while chloride concentration was significantly higher in CVVHD (98 ± 2 vs. 103 ± 2 mmol/L, $p = 0.003$), leading to a lower SID in this CRRT modality (42 ± 3 vs. 36 ± 4 mEq/L, $p = 0.002$) (Fig. 1). Similarly, SBE was markedly lower in patients treated with CVVHD after 72 h (5 ± 4 vs. -2 ± 3 mmol/L, $p < 0.001$).

Table 1 Data are shown as mean and standard deviation or frequency (percentage).

	Overall (*N* = 38)	CVVH (*N* = 27)	CVVHD (*N* = 11)	*p* value
Age, year	64 ± 13	62 ± 15	68 ± 10	0.25
Gender male, *n* (%)	28 (74)	22 (82)	6 (55)	0.10
Weight, kg	87 ± 17	90 ± 15	82 ± 18	0.20

Conclusions: The choice of different dialytic fluid bags and modalities has a relevant impact on the electrolyte and acid–base equilibrium of critically ill patients. Understanding the implications of different CRRT approaches on acid–base equilibrium might help in the differential diagnosis of new onset metabolic disorders in critically ill patients.

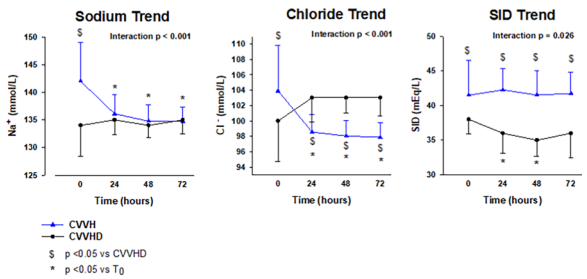


Figure 1 .

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Topic: Acute Kidney Injury and haemofiltration.

001345

Intraventricular thrombolysis use in intraventricular haemorrhage: a 5-year review

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Introduction: Intraventricular thrombolysis is an adjunct therapeutic option for patients with external ventricular drainage (EVD) in the context of intraventricular haemorrhage, aiming to reduce the obstructive component of hydrocephalus1,3. This strategy may reduce morbidity associated with EVD use by shortening the duration of its application2. Although controversial, it may be associated with reduced mortality and improved long-term functional outcomes.1
Objectives: The purpose of this study is to review our experience with intraventricular thrombolysis as an adjunctive therapy in obstructive hydrocephalus and evaluate its safety and its impact in mortality and long-term disability for survivors.
Methods: A 5-year retrospective study was conducted using records of all patients who received intraventricular alteplase between the periods of January 2020 and March 2025 at the Intensive Care Unit of the Local Health Unit of São João. Missing data were obtained through direct contact with the patient and/or family. In addition to demographic data, information regarding severity of disease, fibrinolytic administration, hemorrhagic and infectious complications, mortality, and functional status at 6 and 12 months was collected.
Results: During the evaluated period, a total of 34 patients underwent intraventricular thrombolysis (Table 1). The number of intrathecal alteplase administrations was determined according to clinical and imaging evolution, with a three-dose regimen being the most prevalent (41%). Time from hospital admission to first administration was also variable, with a median of 14 h. In two patients (5.9%), the worsening of intracranial haemorrhage potentially associated with the fibrinolytic agent was identified. No systemic haemorrhagic events were observed. There were a total of 11 EVD-associated infections (32%), with an average of 24 days under EVD. In-hospital mortality was 35%, rising to 46% at 6-month post-discharge. The assessment of functional status and long-term morbidity was performed by comparing tools, such as the Clinical Frailty Scale (CFS) and Modified Rankin Scale (mRS). At 6-month post-discharge, survivors had a median CFS of 6 and mRS of 3, while at 12 months, the median CFS was 5 and mRS remained at 3. Comparing both scales with pre-hospitalization functionality, an average increase of 2.5 points on the CFS and 2.8 points on the mRS was observed (Table 2 and Graph 1).
Conclusions: This population of patients with intraventricular haemorrhage with obstructive hydrocephalus treated with intraventricular thrombolysis showed a slightly lower mortality rate than the one reported in the literature. However, the long-term neurological and functional impact is relevant, with around half of patients not able to return to independent lifestyles. A longer follow-up and better scales of patient's and/or family's perception of quality of life are needed.

Table 1 Demographic and baseline patient characteristics and treatment variables

	Intraventricular thrombolysis (n=34)
Patient Characteristics	
Age (years)	61 (14,9)
Women	52,9%
Baseline CFS (mean ± SD)	3,0 ± 1,0
Baseline mRS (median ± IQR)	0 ± 1,0
Patient Severity	
Total GCS (mean ± SD)	7,6 ± 2,9
Maximum ICP in first 24 hours (median ± IQR)	15 ± 19
ICH	85,3%
Primary IVH	2,9%
Subarachnoid haemorrhage	8,8%
Treatment variables	
Total number of doses (mean ± SD)	2,5 ± 1,2
Time to first dose, hours (median ± IQR)	14 ± 20,5
Local haemorrhagic events	2
Systemic haemorrhagic events	0
Ventriculitis associated with EVD (per 1,000 EVD days)	13,7
Days in ICU (mean ± SD)	34,6 ± 18,6
Days in hospital (median ± IQR)	63 ± 56
Hospital mortality	35,5%
6 months mortality	46,4%

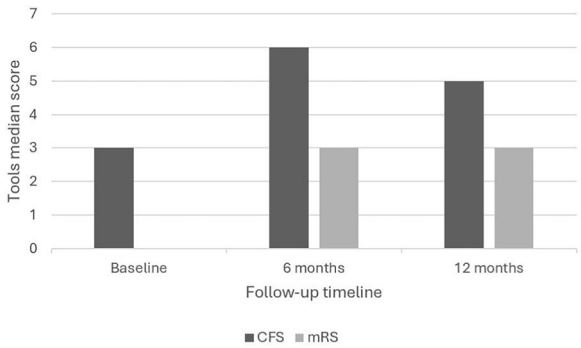
Data shown are mean (SD) or median (IQR). CFS, Clinical Frailty Scale; EVD, External Ventricular Drainage; GCS, Glasgow Coma Scale; ICH, intracerebral haemorrhage; ICP, intracranial pressure; ICU, Intensive Care Unit; IQR, interquartile range; IVH, intraventricular haemorrhage; mRS, modified rankin scale; SD, standard deviation.

Table 2 Survivors functional status follow-up

	Survivors
6-month follow-up	
CFS (1-4)	23,1%
CFS (5-9)	76,9%
mRS (0-3)	53,9%
mRS (4-5)	46,1%
12-month follow-up	
CFS (1-4)	41,7%
CFS (5-9)	58,3%
mRS (0-3)	58,4%
mRS (4-5)	41,6%
CFS variation (mean ± SD)	+2,5 ± 1,9
mRS variation (mean ± SD)	+2,8 ± 1,6

CFS, Clinical Frailty Scale; mRS, modified rankin scale; SD, standard deviation. CFS and mRS variation is based on 12-month follow-up.

Graph 1 - Functional State Follow-up



Graph 1—Functional state follow-up

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Topic: Neurointensive care.

001346

Transcranial Doppler ultrasound findings in neurocritical patients and their association with functional outcomes at ICU discharge assessed by the modified Rankin scale

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Introduction: Central nervous system diseases requiring ICU admission carry a high risk of complications and demand continuous neurological monitoring. Transcranial Doppler ultrasound is a noninvasive, bedside tool that enables the early detection of cerebral hemodynamic changes, supporting timely clinical decision-making. This study aims to evaluate the relationship between transcranial Doppler findings during ICU stay and functional status at discharge, to assess its potential as a prognostic tool in neurocritical care.
Objectives: To describe the association between transcranial Doppler ultrasound findings in neurocritical patients and their functional status at ICU discharge, assessed using the Rankin scale. In addition, to determine whether sedation duration is related to the progression and functional outcomes in patients with neurological conditions.
Methods: This was a prospective, descriptive, and longitudinal study with a 28-day follow-up. The Kruskal–Wallis test was used to assess the association between Doppler flow patterns, functional scores, and sedation time.

Results: In a cohort of 35 neurocritical ICU patients, transcranial Doppler measurements at discharge, particularly in the right middle cerebral artery (diastolic velocity 28.93 ± 12.07 cm/s, $p = 0.007$; pulsatility index 2.70 ± 8.26, $p = 0.011$; and resistance index 1.70 ± 5.67, $p = 0.037$), were significantly associated with poorer functional outcomes, as measured by the modified Rankin Scale. At discharge, 45.7% of patients had a Rankin score of 5, and 40% reached a Rankin score of 6 at 30-day follow-up. Discharge measurements demonstrated greater prognostic value than those obtained at admission or at 24 h. In addition, a significant correlation was identified between prolonged sedation duration and worse functional status at discharge ($p = 0.008$), although this association was not sustained at 30 days (Table III).

Conclusions: Cerebral flow impairment at ICU discharge is strongly associated with poor functional outcomes, particularly in cases with a Rankin score of 5 or 6. In addition, a longer duration of sedation correlates with worse functionality, indicating that more critically ill patients requiring prolonged sedation are at higher risk of poor outcomes.

Variables	ACM Right	Value *p*	ACM Left	Value *p*
Income				
SV cm/s (SD)	77.15 cm/s(18.4)	0.248	76.54cm/s (19.71)	0.302
DV cm/s (SD)	32.45 cm/s (10.75)	0.217	30.20 cm/s(9.59)	0.252
MV cm/s (SD)	46.64 cm/s (12.041)	0.237	45.69 cm/s(12.30)	0.204
PI (SD)	0.95 (0.213)	0.617	1.0 (0.275)	0.671
RI (SD)	0.70 (0.775)	0.606	0.57 (0.088)	0.671
ICP (SD)	9.26(2.15)	0.315	9.90 (2.73)	0.424
CPP mm Hg (SD)	70.56 mm Hg(12.49)	0.368	69.17 mm Hg(13.41)	0.455
24 h				
SV cm/s (SD)	84.50cm/s(19.662)	0.685	77.04 cm/s(22.90)	0.697
DV cm/s (SD)	37.75 cm/s(15.20)	0.611	31.42 cm/s (8.14)	0.502
MV cm/s (SD)	50.63 cm/s(12.41)	0.711	46.35 cm/s (10.80)	0.471
PI (SD)	0.94 (0.235)	0.337	0.98 (0.240)	0.106
RI (SD)	0.56 (0.091)	0.238	0.59 (0.073)	0.314
ICP (SD)	9.26 (2.50)	0.69	9.58 (2.51)	0.313
CPP mm Hg (SD)	71.09 mm Hg(9.25)	0.048	70.63 mm Hg(9.76)	0.033
48 h				
SV cm/s (SD)	81.86.cm/s (25.33)	0.675	83.18 cm/s (21.17)	0.882
DV cm/s (SD)	31.95cm/s (10.064)	0.725	32.05 cm/s (9.57)	0.674
MD cm/s (SD)	48.30cm/s (14.21)	0.855	49.20cm/s (12.74)	0.777
PI (SD)	1.0 (0.250)	0.77	1.02 (0.230)	0.25
RI (SD)	0.59(0.076)	0.811	0.60 (0.078)	0.254
ICP (SD)	9.59 (2.261)	0.746	9.80 (2.45)	0.29
CPP mm Hg (SD)	70.57 mm Hg(11.64)	0.986	70.36 mm Hg(11.56)	0.99
Egress				
SV cm/s (SD)	84.19 cm/s (20.814)	0.624	85.22 cm/s (27.49)	0.905
DV cm/s (SD)	28.93 cm/s(12.076)	0.007	29.11 cm/s (11.71)	0.022
MV cm/s (SD)	47.06 cm/s (9.97)	0.035	47.76 cm/s (9.63)	0.159
PI (SD)	2.70 (8.26)	0.011	1.14 (0.58)	0.22
RI (SD)	1.70 (5.67)	0.037	0.59 (0.157)	0.147
ICP (SD)	10.64 (4.78)	0.056	11.12 (6.41)	0.431
CPP mm Hg (SD)	65.07 mm Hg(8.80)	0.128	63mm Hg (14.90)	0.097

Note: Systolic Velocity (SV), Diastolic Velocity (DV), Medial Velocity (MV), Pulsatility Index (PI), Resistence Index (RI), Intracraneal Pressure (ICP), Cerebral Perfusion Pressure (CPP).

Table 1 Functional scale upon discharge and 30 days, as well as etiologies.

General	Value
Egress Rankin – no (%)	
• 0- Asymptomatic	1 (2.9)
• 1- No significant disability despite symptoms	4 (11.4)
• 2- Mild Disability	7 (20)
• 3- Moderate Disability	4 (11.4)
• 4- Moderately severe disability	16 (45.7)
• 5- Severe Disability	3 (8.6)
• 6- Death	
Rankin Egreso – no (%)	
• 0- Asymptomatic	2 (5.7)
• 1- No significant disability despite symptoms	9 (25.7)
• 2- Mild Disability	2 (5.7)
• 3- Moderate Disability	3 (8.6)
• 4- Moderately severe disability	4 (11.4)
• 5- Severe Disability	1 (2.9)
• 6- Death	14 (40)
Etiology, n (%)	
• Trauma	4 (11.4)
• Ischemic stroke	9 (25.7)
• Hemorrhagic Stroke	7 (20)
• Tumor	10 (28.6)
• Infectious	4 (11.4)

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5. To my professors for their teaching, guide and support to make this proyect. Acknowledgments for my parents and fmy wife for their patience and accompainment during my academic career.

Topic: Neurointensive care.

001347

Liberal vs. restrictive transfusion strategies in the neurocritical care patient with acute brain injury: a systematic review, meta-analysis, and trial sequential analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001347

Introduction: Anemia is common in the critically ill patient with acute brain injury. Cerebral ischemia is an important cause of secondary brain injury among patients who have suffered a primary neurologic insult. The development of cerebral ischemia is dependent on multiple factors, including brain tissue oxygenation. Higher hemoglobin levels increase the oxygen-carrying capacity and improve brain tissue

oxygenation though not necessarily in a dose-dependent manner, which could reduce cerebral ischemia. However, there are limited data to inform red blood cell transfusion thresholds for critically ill patients with acute brain injury.
Objectives: Given the uncertainty regarding the optimal red blood cell transfusion threshold for critically ill adult patients with traumatic brain injury (TBI), subarachnoid hemorrhage (SAH), and intra-cranial hemorrhage (ICH), we conducted a systematic review and meta-analysis to compare liberal transfusion strategy (LTS) vs. restrictive transfusion strategy (RTS) to summarize the relative benefits in the neurocritical care patient with acute brain injury.
Methods: We searched MEDLINE, PubMed, Embase, Cochrane Library, as well as unpublished sources, from inception to December 15, 2024. We included randomized controlled trials (RCTs) of critically ill patients with acute brain injury randomized to LTS compared with RTS. Reviewers screened abstracts, full texts, and extracted data independently and in duplicate. Data were pooled using a random-effects model, risk of bias assessed using the modified Cochrane Risk of Bias 2 tool, and certainty of evidence using the Grading Recommendations Assessment, Development, and Evaluation approach. Trial sequential analysis for the outcome of favourable neurologic outcome (FNO) was performed using a random-effects model with model variance-based heterogeneity correction. We pre-registered the protocol on PROSPERO (CRD42024627556).
Results: We included seven RCTs (n = 2648 patients). RTS threshold was between 7 and 8 g/dL, and LTS threshold was between 9 and 10 g/dL. Compared with RTS, LTS may increase the rate of FNO (relative risk [RR] 1.13; 95% CI 0.97–1.32; low certainty). However, LTS probably has no effect on mortality (RR 1.98; 95% CI 0.85–1.12; moderate certainty) as compared to RTS. LTS probably results in higher rates of transfusion (mean difference [MD] 2.34 units more; 95% CI 2.76–3.24; low certainty). LTS had no effect on most adverse events as compared to RTS.
Conclusions: For critically ill patients with acute brain injury and anemia, the use of LTS, compared with RTS, may lead to higher rates of FNO but probably with no effect on mortality or most adverse events.

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Topic: Neurointensive care.

001348

Effect of regulating FUNDC1 mitophagy-mediated cGAS/STING pathway in oleic acid-induced acute lung injury model

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Intensive Care Medicine Experimental 2025,* 13(1)*:001348

Introduction: Acute lung injury (ALI) involves inflammatory cytokines and chemokines, resulting in lung and multiple organ injuries. This study explored the mechanism of mitophagy and cGAS/STING pathway in oleic acid (OA)-induced ALI.
Methods: Mice and pulmonary microvascular endothelial cells were divided into four groups: control, ALI, FUNDC1-control, and FUNDC1-ALI. After 24 h of modeling, proceed with tissue collection. Lung tissues were stained using hematoxylin–eosin. Autophagosomes were observed by electron microscope, and mtDNA was detected by qPCR. Western blot was used to analyze the protein expression of pathways cGAS, STING, pTBK1, pIRF3, and pNF-κB. Serum IFN-β expression was detected by ELISA. Cellular morphological changes were observed using microscopy. LDH level, cGAS, and STING in endothelial cells were observed.
Results: Compared with control, ALI group pathological changes were significantly aggravated. Expressions of serum IFN-β, cGAS, STING, pTBK1, pIRF3, and pNF-κB in lung tissues of ALI mice were significantly higher than control. After OA, the morphology of lung microvascular endothelial cells changed and LDH expression increased. After FUNDC1 gene was knocked out to inhibit mitochondrial autophagy, autophagosomes were significantly reduced and mtDNA increased. Expressions of pathway proteins in lung tissues and cells of FUNDC1-ALI group were higher than those of wild-type ALI group. Serum IFN-β expression also increased.
Conclusions: Silencing FUNDC1 inhibits mitophagy. Subsequently, accumulated mtDNA activates cGAS/STING pathway, aggravating ALI pathological damage and inflammation, suggesting that mitophagy may provide protection in OA-induced ALI through cGAS/STING pathway. Silencing FUNDC1 inhibits mitophagy. Subsequently, accumulated mtDNA activates cGAS/STING pathway, aggravating ALI pathological damage and inflammation, suggesting that mitophagy may provide protection in OA-induced ALI through cGAS/STING pathway.

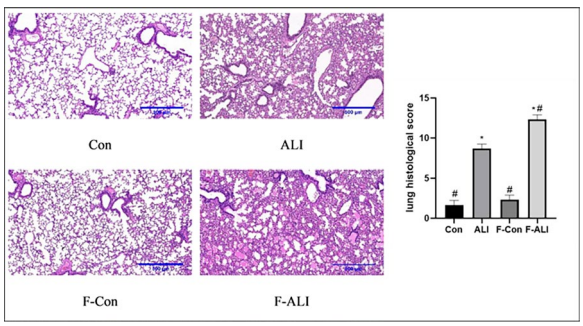


Figure 1 Histopathological assessment and quantitative evaluation of murine pulmonary tissue. After 24 h following tail vein injection of oleic acid, lung tissue was harvested and subjected to hematoxylin and eosin (H&E) staining. It was observed that the histopathological lung injury was more severe post-oleic acid administration. The group with FUNDC1 knockout exhibited more severe lung injury compared to the wild-type control group, with statistically significant differences in the histopathological scoring. The above figure presents representative images from each group. Con, control group; ALI, acute lung injury group; F-Con, the FUNDC1-control group; F-ALI, FUNDC1-acute lung injury group. * $p < 0.05$, compared with Con group; # $p < 0.05$, compared with ALI group.

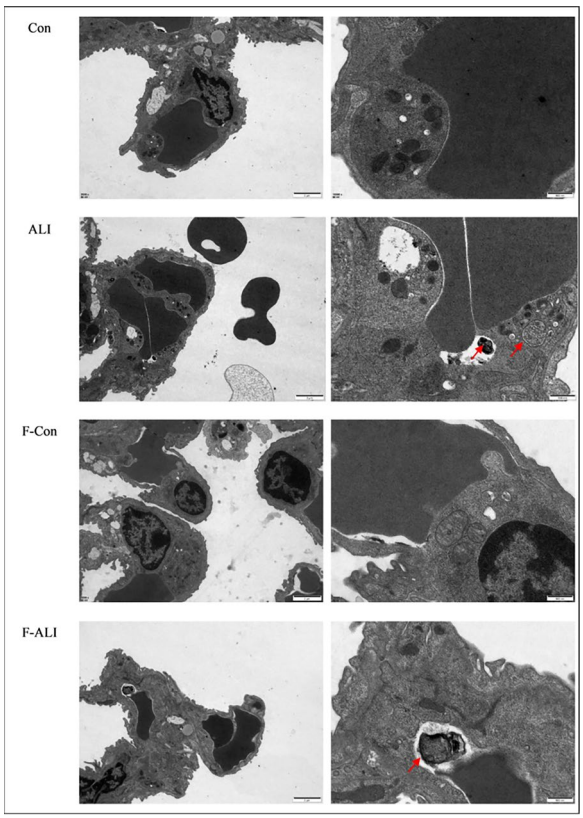


Figure 2 . Electron microscopic manifestations of mouse lung tissue. The picture shows the electron microscopic results of lung tissue of mice in Con group, ALI group, *F*-Con group, and *F*-ALI group. There were many autophagy bodies in the cytoplasm of endothelial cells (red arrow) in ALI group; autophagy bodies were seen in endothelial cells of *F*-ALI group, which were less than those of wild-type ALI group. No autophagy bodies were observed in the lung tissues of the normal groups of two kinds of mice. Con, control group; ALI, acute lung injury group; *F*-Con, the FUNDC1-control group; *F*-ALI, FUNDC1-acute lung injury group.

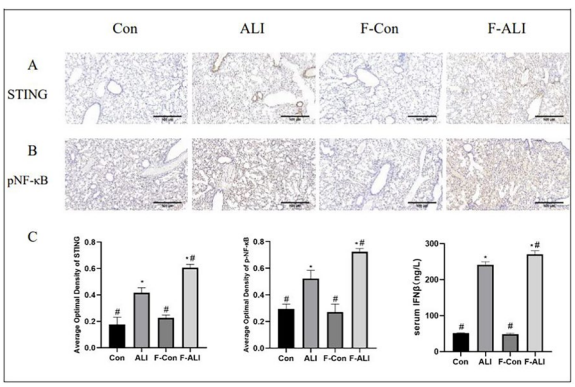


Figure 3 Immunohistochemical method was used to determine the expression of STING, pNF-κB protein in lung tissue, and serum IFN-β level in mice. Con, control group; ALI, acute lung injury group; *F*-Con, the FUNDC1-control group; *F*-ALI, FUNDC1-acute lung injury group. cSTING, Stimulator of Interferon Genes; pNF-κB, phosphorylated nuclear factor-κB.* $p < 0.05$, compared with Con group; # $p < 0.05$, compared with ALI group.

Topic: Acute respiratory failure and mechanical ventilation.

001349

The role of CXCR4hi neutrophils with enhanced ferroptosis in facilitating the development of pulmonary fibrosis in acute respiratory distress syndrome

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Intensive Care Medicine Experimental 2025,* 13(1)*:001349

Introduction: Acute respiratory distress syndrome (ARDS) remains a significant medical challenge. Although most patients survive the acute phase, some ARDS survivors develop severe fibroproliferative responses. ARDS-induced pulmonary fibrosis (ARDS-PF) can persist after hospitalization, leading to decreased long-term quality of life and increased mortality. The role of neutrophils in this process is poorly understood.
Methods: This study is a single-center prospective investigation in which we collected bronchoalveolar lavage fluid (BALF) samples from 11 ARDS patients at the time of admission to the ICU. Patients were divided into non-pulmonary fibrosis (NPF, $N = 5$) and pulmonary fibrosis groups (PF, $N = 6$). BALF single-cell sequencing was used to explore early immune cell characteristics associated with ARDS-PF.
Results: We found that compared to the NPF group, C–X–C motif chemokine receptor 4 (CXCR4) neutrophils in the BALF of PF group were significantly increased. Within these CXCR4hi neutrophils, we detected upregulation of the ferroptosis metabolic pathway, involving key iron homeostasis regulatory genes, such as heme oxygenase 1 (HMOX1) and divalent metal transporter 1 (DMT1). This upregulation led to intracellular iron accumulation and disrupted iron metabolism, increasing the susceptibility of CXCR4hi neutrophils to ferroptosis. In addition, significant intercellular communication was observed between CXCR4hi neutrophils and macrophages. By releasing reactive oxygen species (ROS), CXCR4hi neutrophils can promote the transformation of macrophages into an anti-inflammatory and pro-repair phenotype characterized by CD163 and MRC1 expression, thereby promoting PF.
Conclusions: CXCR4hi neutrophils may play an important role in the early pathogenesis of ARDS-PF, promoting the progression of PF by facilitating the transformation of macrophages into a pro-repair phenotype.

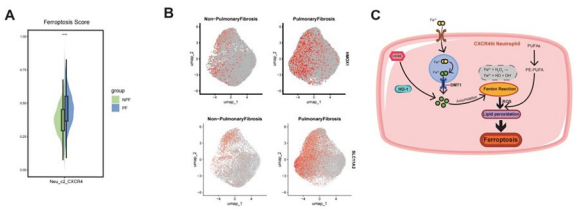


Figure 1 Subgroup of neutrophils with active ferroptosis was found in the PF group. **A** UMAP visualization of all single cells in BALF. **B** Changes in cell-type proportions between the PF and NPF groups. **C** Comparison of the neutrophil spectrum in BALF between the PF and NPF groups. **D** Comparison of changes in the proportions of neutrophil subpopulations between the PF and NPF groups. **E** Expression profiles of CXCR4 and CXCR2 in neutrophils. **F** Volcano plot of differentially expressed genes in eight neutrophil subpopulations. **G** Trajectory analysis roadmap of neutrophils. The time sequence is from right to left, with the right side as the starting point. **H** Heatmap of regulator activities of eight neutrophil subpopulations. **I** KEGG enrichment analysis of upregulated and downregulated pathways in Cluster 2 neutrophils.

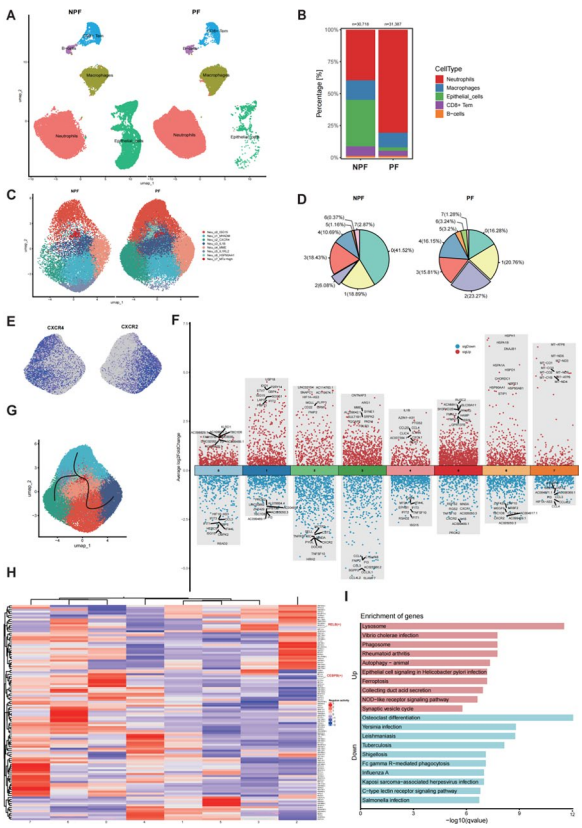


Figure 2 Reveal the ferroptosis pathway of CXCR4hi neutrophils. **A** Comparison of ferroptosis genes set scores between Cluster2 neutrophils in the PF and NPF groups. Result for measurement was mean.**** $p < 0.0001$. **B** Expression of HMOX1 and SLC11A2 genes in neutrophils. **C** Schematic diagram of CXCR4hi neutrophils highly expressing HO-1 and DMT1 genes promoting the mechanism of ferroptosis in PF.

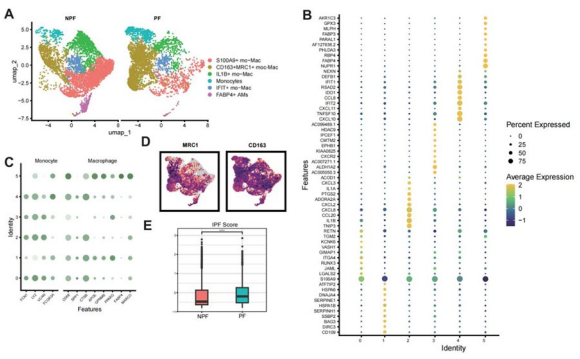


Figure 3 Changes of macrophages landscape in NPF and PF groups. **A** Comparison of macrophage profiles in BALF between PF and NPF groups. **B** Differential gene expression analysis of macrophages. **C** Expression of monocyte and macrophage marker genes. **D** Gene expression profiles of MRC1 and CD163 in macrophages. **E** Gene set scores of IPF signature genes in macrophages between NPF and PF groups. Result for measurement was mean.**** $p < 0.0001$.

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Topic: Acute respiratory failure and mechanical ventilation.

001350

Population pharmacokinetics of intravenous infusion of hydromorphone in critically ill patients supported by extracorporeal membrane oxygenation

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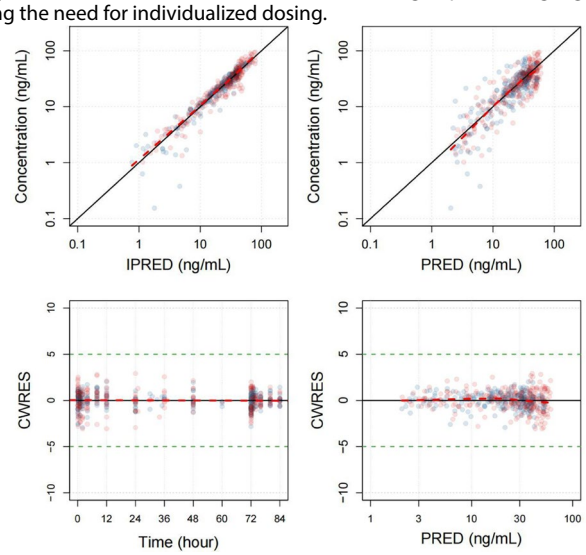
Intensive Care Medicine Experimental 2025,* 13(1)*:001350

Introduction: Extracorporeal membrane oxygenation (ECMO) is a life-saving strategy for critically ill patients suffering from severe cardiac and respiratory failure caused by a potentially reversible condition [1, 2]. Analgesia is necessary to enhance patient tolerance and reduce stress responses in critically ill patients on ECMO support, and opioids are the first-line analgesics in clinical practice [3, 4]. However, traditional opioid analgesics, such as fentanyl and sufentanil, are heavily absorbed by the ECMO circuit due to their high protein-binding and lipophilicity, as demonstrated in ex vivo ECMO studies [5, 6]. Therefore, patients on ECMO support commonly receive higher doses of analgesics compare to patients with comparable disease severity who are not on ECMO support.

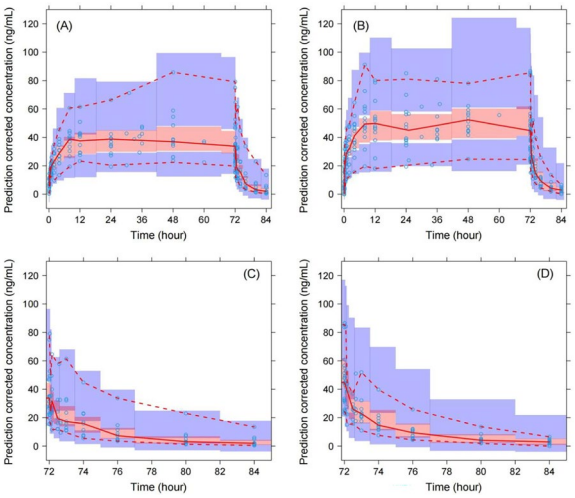
Hydromorphone is a potent analgesic synthesized from opiate drugs, with modifications made to groups at positions 6, 7, and 8 on the mother nucleus, adding a hydrogenated double bond and a keto group [7]. Its basic physicochemical properties are similar to those of morphine, but its potency is 5–10 times higher than that of morphine [8]. Hydromorphone is less lipophilic and protein-bound, which may limit its absorption in ECMO circuit [9]. These properties make hydromorphone a potentially superior option for ECMO patients compared to other analgesics. It has been reported that hydromorphone has good stability and a high drug recycling rate in polyvinyl chloride (PVC) infusion sets [10]. However, due to the large surface area of the ECMO circuit and the blood flowing through the membrane oxygenator, the stability of hydromorphone in ECMO remains uncertain. Currently, limited research on the pharmacokinetic (PK) changes of hydromorphone in ECMO.

A large variability in hydromorphone pharmacokinetics (PK) is anticipated in patients receiving ECMO support, due to the complex interplay between the extracorporeal circuit, the physicochemical properties of the drug, and critical illness-related physiological changes. This study aimed to characterize the PK of hydromorphone in critically ill patients undergoing veno-venous (V–V) and veno-arterial (V–A) ECMO using a population PK modeling approach. In addition, the study sought to explore the influence of clinically relevant covariates on hydromorphone PK.

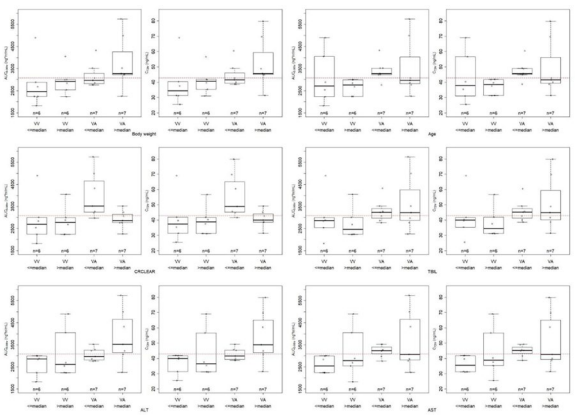
Objectives: The pharmacological properties of hydromorphone, including lower lipophilicity and reduced protein binding, suggest that it may have less sequestration in the circuit with more predictable pharmacokinetics (PK) during extracorporeal membrane oxygenation (ECMO) compare to traditional analgesic. However, reports on its PK in ECMO patients are limited. This study aimed to develop a population PK model of hydromorphone in ECMO patients.
Methods: 12 veno–venous ECMO (V–V ECMO) patients and 14 veno–arterial ECMO (V–A ECMO) patients received hydromorphone infusion (0.03 mg · kg-1 · h-1) for 72 h. Blood samples were collected during infusion and after cessation of hydromorphone. Pharmacokinetics of hydromorphone was determined from arterial plasma concentrations. Using a non-linear mixed-effects, modeling approach analyzed the hydromorphone concentration vs. time data.
Results: A three-compartment model with first-order linear elimination in the central compartment best described hydromorphone PK in patients on ECMO. In V–V ECMO, estimates of a central compartment clearance and a central compartment volume of distribution were 0.955 L/min and 23.6 L, respectively, while in V–A ECMO, these values were lower (0.657 L/min and 16.3 L, respectively). Patients with high alanine aminotransferase and aspartate aminotransferase showed higher exposure in both V–V and V–A ECMO mode.
Conclusions: In our final model, increased volume of distribution and decreased values for clearance were reported compared with previous PK data from non-ECMO patients. Patients on V-A ECMO may have a lower demand for hydromorphone than those on V–V ECMO. Hepatic dysfunction was associated with increased drug exposure, highlighting the need for individualized dosing.



Diagnosis plot final hydromorphone model. Top-left panel: observed hydromorphone concentrations vs. individual predicted hydromorphone concentrations (IPRED). Top-right panel: observed hydromorphone concentrations vs. population predicted hydromorphone concentrations (PRED). Bottom-left panel: conditional weighted residuals (CWRES) vs. time. Bottom-right panel: conditional weighted residuals (CWRES) vs. population prediction. Points are the individual data. Black solid lines represent the line of unity (top panel) or line at zero (bottom penal). Green dashed lines represent the |CWRES|= 5. Red dashed lines represent the lowess smooth fit. The blue and pink represent the data from patients supported with V–V and V–A modes, respectively.



Prediction-corrected visual predictive check (pcVPC) of hydromorphone concentration–time profiles for V–V ECMO (A and C) and V–A ECMO (B and D). The final model parameter estimates and demographic information of subjects were utilized to simulate 1000 new virtual clinical trials. The observed concentrations are represented by points, with the solid line indicating the median observed value. The dashed lines represent the 2.5th and 97.5th percentiles of the observed values. The upper and lower shaded areas represent the 95% confidence interval (CI) spread of the 2.5th to 97.5th percentiles of predicted values, while the middle shaded areas represent the 95% CI spread of medium predicted values.



Impact of covariates of interest on hydromorphone steady-state exposure. Circles are the simulated hydromorphone exposure (AUC0-96h and C72hr) in individual subjects with 0.03 mg/kg/h based on post hoc pharmacokinetic parameters. The boxes represent the 25th to 75th percentiles (the interquartile range). The solid black horizontal line in the middle of each box represents the median. The bars extend to the most extreme data point which is no more than 1.5 × IQR from the box.

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11. This research was funded by 2021-N-15 project of China International Medical Foundation.

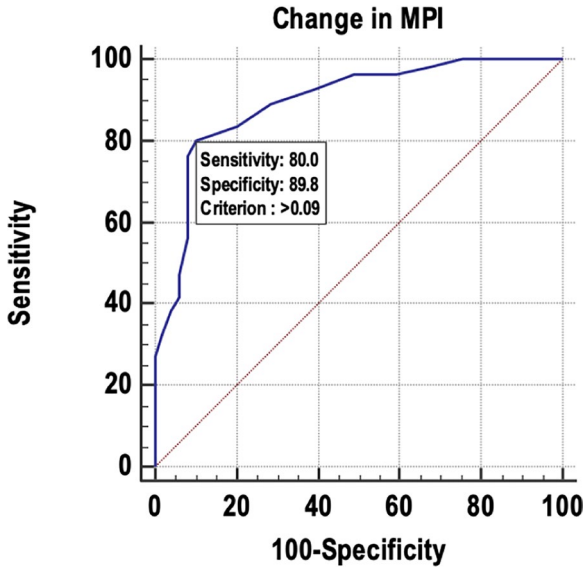
Topic: Sedation, analgesia and delirium.

001351

Myocardial performance index for prediction of an outcome in septic shock patients: a prospective observational cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001351

Introduction: Septic cardiomyopathy is a well-known consequence of sepsis and is associated with increased sepsis-related mortality. Several echocardiographic parameters have been studied in sepsis patients for early detection of septic cardiomyopathy; however, none of them could independently predict outcomes. Myocardial performance index (MPI), a tissue Doppler-derived global cardiac function index (assess both systolic and diastolic functions), has never been used for this purpose.
Objectives: This study was planned to investigate the predictive value of in MPI for 28-day ICU mortality in septic shock patients. The correlation of MPI with other laboratory parameters (Trop-I and NT-proBNP) and clinical outcomes (length of hospital and ICU stay, and duration of mechanical ventilation) was also investigated.
Methods: This prospective observational cohort study was conducted in 104 patients (> 18 years, septic shock as per Sepsis-3). All patients underwent transthoracic echocardiography at baseline and 24 h later. Tissue Doppler was used to calculate, isovolumetric contraction time (IVCT), isovolumetric relaxation time (IVRT), ejection time (ET), and MPI. Serum levels of NTproBNP and Trop-I were also measured at baseline and 24 h later. Patients were followed up for prognostic outcomes.
Results: The 28-day mortality in this study was 52.88% (55 non-survivors/49 survivors). Non-survivors demonstrated a significantly greater median change in MPI (0.13 [IQR: 0.11–0.18]) compared to survivors (0.05 [IQR: 0.03–0.08], $p < 0.0001$). There was a significant positive correlation ($r = 0.303$) between change in MPI and change in Trop I, and change in NTproBNP ($r = 0.528$). Changes in MPI and its components correlated with increased mortality, longer ICU stays, and duration of mechanical ventilation. (Fig. 1).
Conclusions: Among patients admitted to the intensive care unit with septic shock, a worsening of MPI within the initial 24 h following was associated with increased 28-day mortality. MPI values also corelate with change in Trop-I and NT-proBNP levels.



ROC Curve of Change in MPI for predicting mortality.

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Topic: Cardiovascular issues in ICU.

001352

Effects and mechanisms of myoferlin in sepsis-induced acute lung injury

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Intensive Care Medicine Experimental 2025,* 13(1)*:001352

Introduction: The lungs are particularly vulnerable in sepsis, often developing sepsis-associated ARDS. Alveolar epithelial cell death plays

a pivotal role in ARDS pathogenesis by disrupting pulmonary fluid balance and causing alveolar edema, making its prevention a promising therapeutic strategy. Pyroptosis, a programmed cell death mechanism in ARDS, occurs when PRRs detect PAMPs/DAMPs, triggering inflammasome formation and caspase-1/4/5/11 activation. These caspases cleave GSDMD, generating GSDMD-NT fragments that form membrane pores—a hallmark of pyroptosis along with phosphatidylserine (PS) externalization.

Myoferlin (MYOF), a seven-C2-domain transmembrane protein, is crucial for membrane integrity maintenance due to its strong PS-binding capacity. While MYOF's role as an exosomal protein is established, its potential to mitigate GSDMD cleavage and PS externalization during alveolar epithelial pyroptosis in sepsis-associated ARDS remains unexplored. Using gene knockout, immunofluorescence, flow cytometry, and co-IP techniques, we investigated MYOF's protective mechanisms against pyroptosis in this context.

Objectives: The purpose of this study was to investigate the mechanism of myoferlin and alveolar epithelial cell pyroptosis on sepsis-associated ARDS.

Methods: This study employed CLP mouse models, clinical samples, and A549 cells to investigate MYOF's role in sepsis-induced lung injury. We first analyzed MYOF expression in septic mice and LPS-stimulated human alveolar epithelial cells. Using MYOF-knockdown and overexpression A549 lines, we assessed LPS-induced cell permeability, PS externalization, and pyroptosis via immunofluorescence, flow cytometry, and western blot. Protein interactions between MYOF and GSDMD were examined by co-IP and confocal imaging. We further explored MYOF regulation by measuring m6A modifications and validating METTL3–MYOF mRNA interactions through RNA pull-down assays. To evaluate therapeutic potential, we generated MYOF-overexpressing exosomes from transfected 293 T and NIH-3T3 cells. These exosomes were tested on LPS-treated A549 cells and CLP mice, with outcomes measured by flow cytometry, western blot, H&E staining, and lung injury scoring.

Results: The expression of MYOF protein was downregulated in the lungs of septic mice, as well as in human primary type II alveolar epithelial cells and A549 alveolar epithelial cells following LPS stimulation. Flow cytometry, immunofluorescence, and western blotting results demonstrated that, compared to the control group, MYOF-knockdown A549 cells exhibited increased cell permeability, elevated phosphatidylserine (PS) externalization, and enhanced pyroptosis levels under LPS stimulation. In contrast, MYOF-overexpressing alveolar epithelial cells showed reduced cell permeability, decreased PS externalization, and lower pyroptosis levels upon LPS stimulation compared to the control group. Co-immunoprecipitation and confocal immunofluorescence confirmed the interaction between MYOF and gasdermin D (GSDMD). RNA immunoprecipitation (RIP) and RNA pull-down assays revealed an interaction between METTL3 protein and MYOF mRNA. Flow cytometry and western blotting demonstrated that MYOF-overexpressing exosomes reduced PS externalization and pyroptosis levels in LPS-treated A549 cells.

Conclusions: LPS suppresses METTL3 expression in A549 alveolar epithelial cells, leading to a downregulation of m6A modification levels on MYOF mRNA, which impairs MYOF protein expression. This results in increased phosphatidylserine (PS) externalization and enhanced pyroptosis. MYOF-overexpressing exosomes mitigate the LPS-induced damage in A549 cells.

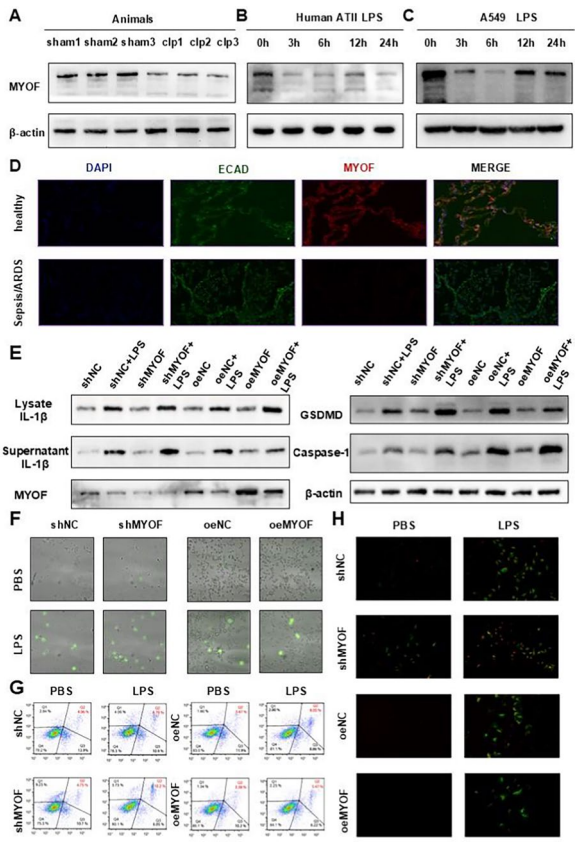


Figure 1 **A** Western blotting results demonstrated that the protein level of MYOF in the lung tissues of CLP group mice was downregulated compared to the sham group. **B** Western blotting results revealed that the protein level of MYOF in human primary type II alveolar epithelial cells was downregulated upon LPS stimulation. **C** Western blotting results indicated that the protein level of MYOF in the A549 alveolar epithelial cell line was downregulated following LPS stimulation. **D** Immunofluorescence analysis of clinical lung tissue samples showed that MYOF was downregulated in alveolar epithelial cells of sepsis patients. **E** Western blotting results showed that IL1B release in the supernatant of MYOF-knockdown A549 cells was increased compared to the control group upon LPS stimulation, while IL1B release was decreased in MYOF-overexpressing A549 cells compared to the control group. **F** SYTOX immunofluorescence results demonstrated that cell permeability was increased in MYOF-knockdown A549 cells compared to the control group upon LPS stimulation, whereas cell permeability was reduced in MYOF-overexpressing A549 cells compared to the control group. **G** Flow cytometry analysis of Annexin-V (FITC) and PI (PE) staining revealed that phosphatidylserine exposure on the cell membrane was increased in MYOF-knockdown A549 cells compared to the control group upon LPS stimulation, while it was decreased in MYOF-overexpressing A549 cells compared to the control group. **H** Immunofluorescence detection of Annexin-V (FITC) and PI (APC) staining showed that phosphatidylserine exposure on the cell membrane was increased in MYOF-knockdown A549 cells compared to the control group upon LPS stimulation, whereas it was decreased in MYOF-overexpressing A549 cells compared to the control group.

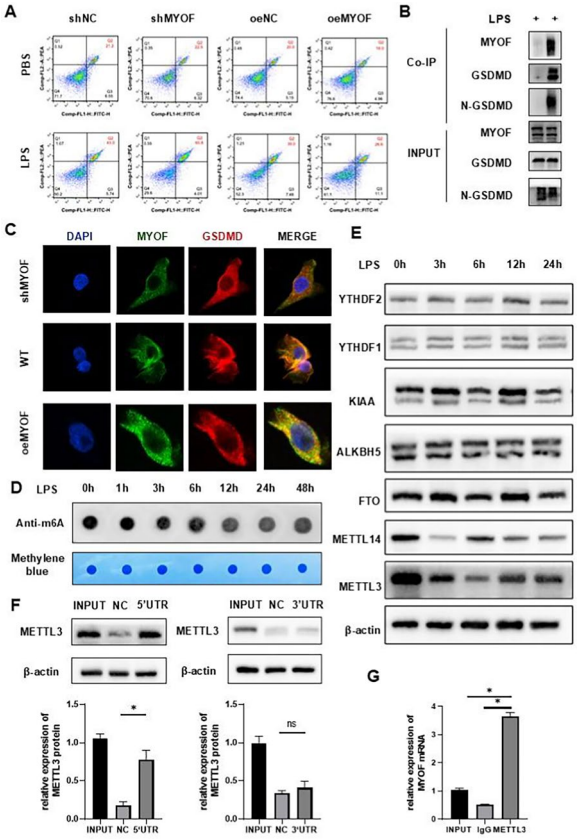


Figure 2 **A** Flow cytometry analysis of Annexin-V (caspase1) and PI (PE) staining demonstrated that pyroptosis levels were increased in MYOF-knockdown A549 cells compared to the control group upon LPS stimulation, while pyroptosis levels were decreased in MYOF-overexpressing A549 cells compared to the control group. **B** Co-immunoprecipitation results revealed that MYOF interacts with GSDMD and N-GSDMD in A549 cells upon LPS stimulation. **C** Confocal immunofluorescence results showed that MYOF co-localizes with GSDMD in A549 cells following LPS stimulation. **D** m6A dot blot assay results indicated that m6A modification was downregulated in A549 cells upon LPS stimulation. **E** Western blotting results demonstrated that METTL3 expression was reduced in A549 cells following LPS stimulation. **F** RNA pull-down assay results showed that MYOF 5'UTR mRNA could pull down METTL3 protein. **G** RNA immunoprecipitation (RIP) results revealed that METTL3 protein interacts with MYOF mRNA.

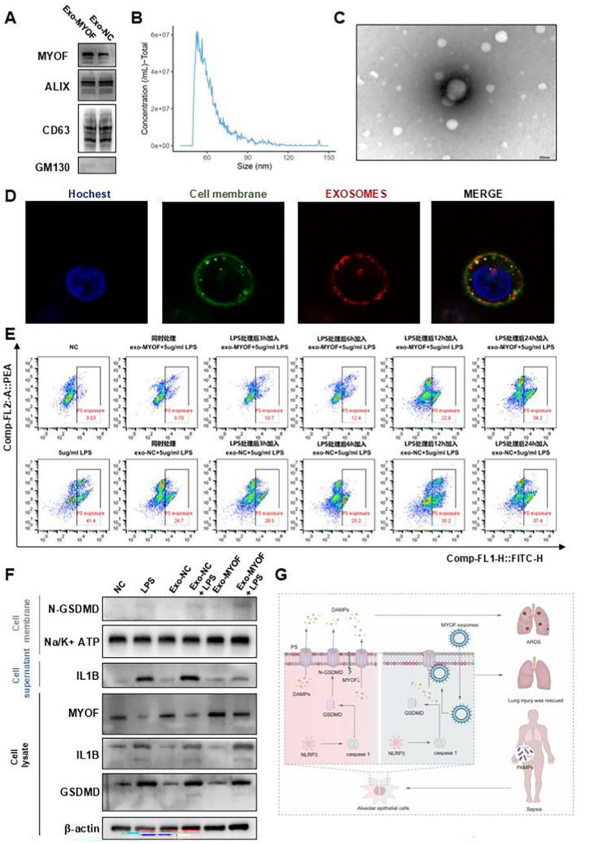


Figure 3 **A** Western blotting identification of MYOF-overexpressing exosomes. **B** Nanoparticle size characterization of MYOF-overexpressing exosomes. **C** Electron microscopy identification of MYOF-overexpressing exosomes. **D** Confocal immunofluorescence results demonstrated that MYOF-overexpressing exosomes were taken up by A549 cells and localized to the cell membrane upon LPS stimulation. **E** Flow cytometry analysis of Annexin-V (FITC) and PI (PE) staining revealed that phosphatidylserine exposure on the cell membrane was reduced in MYOF-overexpressing A549 cells compared to the control group upon LPS stimulation. **F** Western blotting results showed that IL1B release in the supernatant of A549 cells treated with MYOF-overexpressing exosomes was increased compared to the control group upon LPS stimulation. **G** Schematic diagram

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25 The work in this study was completed under the guidance of Professor You Shang and Dr. Jiqian Xu. Thanks Professor Shang You and Dr. Xu Jiqian for their invaluable assistance in my academic and research endeavors, as well as their patient guidance in the design and implementation of this study.

Topic: Sepsis.

001356

Comparison of effects of sevoflurane, isoflurane, and desflurane on middle cerebral artery velocities in patients undergoing surgery for supratentorial lesions under general anaesthesia

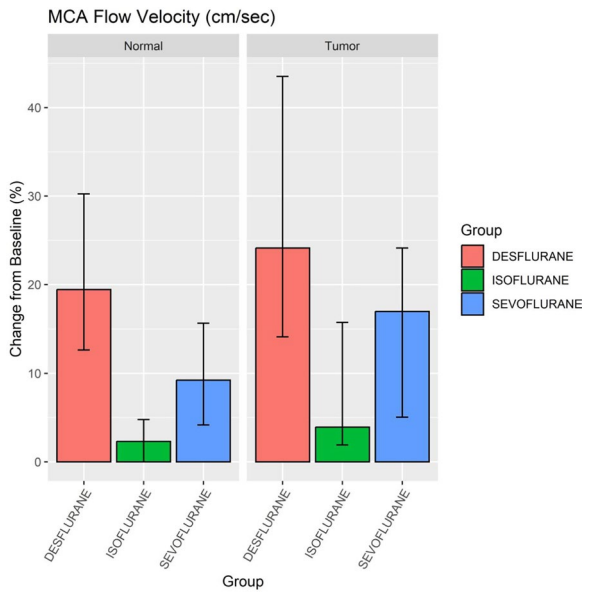
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Introduction: Volatile anaesthetics have a direct vasodilatory effect on cerebral vasculature with increasing concentration, leading to increased cerebral blood flow and brain volume. An increase in cerebral blood volume will result in an increase in brain bulk and eventually makes surgical access difficult. This study aimed at comparing cerebral vasodilatory effects of isoflurane, sevoflurane, and desflurane in supratentorial lesions. Transcranial Doppler (TCD) provides an indirect measure of CBF by measuring blood flow velocity in middle cerebral artery, if the angle of insonation and vessel diameter remain constant. Although middle cerebral artery flow velocity (FVMCA) does not reflect absolute cerebral blood flow (CBF), change in MCA flow velocity is directly proportional to change in CBF. NIRS has been used to monitor regional cerebral oxygen saturation (rSO2), based on the assumption that the brain's oxygen content is positively related to cerebral blood flow.

Objectives: Primary objective
To compare change in mean blood flow velocity in middle cerebral artery (ΔFVMCA) from baseline to 1 MAC among the 3 inhalational agents.

Secondary objective
1. To compare Pulsatality Index at 1 MAC among the three inhalational agents.
2. To compare regional oxygen saturation (rSO2) at 1 MAC among the three inhalational agents.
3. To compare the effects 1 MAC of isoflurane, sevoflurane and desflurane on middle cerebral artery (MCA) flow velocities between the cerebral hemisphere with tumour and normal side.
Methods: In this prospective randomised study, 123 patients aged 18–60 years, with unilateral supratentorial lesion and ASA physical Grade 1 or 2, were selected and randomly divided into 3 groups of 41 patients each to receive isoflurane, sevoflurane or desflurane to achieve 1 MAC. Carotid artery Doppler was done the day before surgery to rule out presence of plaques/stenosis in the carotid artery. FVMCA, Pulsatility Index (PI) and rSO2 were measured bilaterally (tumour and normal side) at time intervals of pre-induction and 15 min after 1 MAC.
Results: On the normal side, all the three inhalational agents caused statistically significant increase in FVMCA and rSO2 (p value < 0.001). Increase in PI was statistically significant in desflurane ($p < 0.001$) and sevoflurane groups ($p = 0.031$), but trending toward significance in isoflurane group ($p = 0.057$). On the tumour side, all three inhalational agents caused statistically significant increase in FVMCA and rSO2 ($p < 0.001$). Increase in PI was statistically significant in isoflurane group ($p = 0.005$) and trending toward significance in sevoflurane group ($p = 0.09$).
While comparing the inhalational agents, desflurane caused significantly more increase in FVMCA and rSO2 than sevoflurane and isoflurane ($p < 0.001$) on the normal side. Increase in PI was trending toward significance while comparing desflurane and isoflurane ($p = 0.051$) on the normal side. Sevoflurane caused significantly more increase in FVMCA ($p < 0.001$) and rSO2 ($p = 0.042$) than isoflurane on normal side. On the tumour side, desflurane caused significantly more increase in FVMCA and rSO2 than isoflurane ($p < 0.001$). On comparing desflurane and sevoflurane on tumour side, increase in FVMCA was statistically significant ($p = 0.003$), while increase in rSO2 was trending toward significance ($p = 0.08$). On the tumour side, sevoflurane also caused significantly more increase in FVMCA ($p = 0.024$) and rSO2 ($p = 0.028$) than isoflurane.
Conclusions: All the three inhalational agents increase cerebral blood flow at 1 MAC on both tumour and normal sides. Desflurane causes maximum increase in cerebral blood flow, followed by sevoflurane and isoflurane. Thus, isoflurane may be the most suitable inhalational

agent in surgery for supratentorial lesions due to minimum cerebral haemodynamic effects as compared to sevoflurane and desflurane.



Comparison of MCA flow velocities on normal and tumor side.

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5. No Grants obtained for this study

Topic: Perioperative care.

001358

Predictors and outcomes of failed extubation in neuro-intensive care unit

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Introduction: Failed extubation in the neuro-intensive care unit (NICU) is likely and can affect outcomes. Currently, there is a paucity of data on failed extubation in the Indian NICUs, though India accounts for 1/5 of the world's population. Knowing the predictors will facilitate attempts to reduce failed extubation and the associated adverse outcomes.

Objectives: Our objectives were to assess the predictors and outcomes of failed extubation in one of the India's largest NICU.
Methods: This prospective observational study was conducted between March 2023 and November 2024 at our hospital's NICUs after ethics approval and registration with the Clinical Trials Registry–India. We included patients with neurological and neurosurgical illnesses of all etiologies admitted to the NICU. We excluded patients with pre-existing tracheostomy or absence of consent.
Results: We screened 1202 patients, of whom 523 were excluded from analysis, as they did not undergo extubation (direct tracheostomy, discharged with a tube in situ or death in NICU on the tube). The incidence of failed extubation was 24.9% (169/679) among the patients who underwent extubation**.** On univariate analysis, type of extubation, timing, the status of restraint, cough and gag reflex, secretion quantity, fluid balance, pre-extubation respiratory events, vasopressor and sedation use, APACHE2 score, ventilation duration, GCS, RASS, hemoglobin, and creatinine values were associated with failed extubation. On multivariate analysis, cardiac dysfunction in NICU ($p = 0.003$), positive fluid balance ($p < 0.001$), absent cough reflex ($p < 0.001$), increased purulence of secretion ($p < 0.001$), respiratory events in NICU ($p < 0.001$), higher APACHE 2 scores at NICU admission ($p = 0.037$), pre-extubation higher FiO2 requirement ($p = 0.017$), and pre-extubation lower haemoglobin ($p = 0.018$) were predictors of failed extubation. Failed extubation increased the rates of tracheostomy, pneumonia, neurological deficits, deaths, NICU, and hospital stay and lowered discharge GCS.
Conclusions: We observed a very high incidence of failed extubation in our NICU. Based on the significant predictors in this study, measures should be undertaken to minimize the occurrence of failed extubation and improve outcomes.

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2. Nil

Topic: Neurointensive care.

001359

Characteristics of adult intensive care units and admissions in türkiye between 2018 and 2023: a nationwide cohort study

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Introduction: Despite the long history of intensive care units (ICUs) and intensive care medicine (ICM) being a recognized specialty for over 50 years, there is still a significant gap in large-scale epidemiological studies, especially from low- and middle-income countries (LMICs). This gap makes it difficult to fully understand and assess the global burden and trends of ICU admissions. Most of the available data come from high-income countries, even though LMICs are believed to bear the heaviest burden of critical illness (1.2). Türkiye, with one of

the highest ICU bed capacities globally, offers a unique opportunity to evaluate critical care utilization in a middle-income country.

Objectives: Despite the critical importance of understanding the burden of intensive care, the lack of comprehensive national epidemiological data and analyses on ICU admissions in Türkiye leaves its characteristics, outcomes, and largely unexplored. The aim of the study is to reveal characteristics of all ICUs and critically ill patients admitted to ICUs emphasizing on ICU mortality and readmission rates across the country with temporal trends over the past 6 years.

Methods: Data were retrospectively retrieved from the Turkish Ministry of Health National Electronic Database. Adult ICU admissions across all levels and types over 6 years were analyzed. Demographics, comorbidities, admission diagnoses, clinical interventions, and ICU outcomes were documented.

Results: A total of 3,362,539 ICU admissions were recorded. Among 22 ICU types, mixed ICUs accounted for the highest proportion of admissions (31.4%), followed by coronary (23.7%), anesthesiology (14.3%), medical (6.1%), and surgical (6.0%) ICUs. The proportion of mixed ICU beds decreased from 44% in 2018 to 25.1% in 2023. Most ICU beds were in state hospitals (50.8%), followed by private hospitals (34.8%). The number of ICU beds increased from 2019, with a notable rise in state hospitals after 2020. ICU admission per 100,000 population was 57.1, with regional differences. ICU mortality was 15.5%, and the median patient age was 65 years (IQR: 39–91). The leading admission diagnoses were respiratory failure (10.1%), cerebrovascular disease (7.1%), and acute kidney injury (5.2%). Hypertension (67.5%) and coronary artery disease (44.8%) were common comorbidities, particularly in non-survivors. The 7-day ICU readmission rate was 3.0%.

Conclusions: This study provides the first nationwide epidemiological analysis of ICU admissions and resource in Türkiye, shedding light on critical trends and disparities. Our findings highlight a significant increase in ICU admissions and bed capacity between 2018 and 2023, with a notable transition from mixed ICUs to specialized units. The predominance of state hospitals in ICU admissions underscores their essential role in critical care delivery. The male predominance in ICU admissions and higher mortality among men suggests potential biological and healthcare access-related differences, while the high burden of chronic diseases such as hypertension, coronary artery disease, and diabetes underscores the need for integrated chronic disease management strategies. The unexpectedly low reported sepsis prevalence points to potential coding inaccuracies or underdiagnosis, emphasizing the necessity of improving clinical documentation and epidemiological surveillance. In addition, the lower-than-expected ICU readmission rate raises important questions regarding discharge practices and post-ICU follow-up, warranting further research to ensure that patients receive appropriate continuity of care.

Table 1 General characteristics of intensive care units according to admission year

Year n (%)	2018 379161 (100)	2019 444374 (100)	2020 463243 (100)	2021 628963 (100)	2022 733151 (100)	2023 713647 (100)	Total 3362539 (100)
ICU Type							
Mixed	166976 (44.0)	164038 (36.9)	173869 (37.5)	187654 (29.8)	184802 (25.2)	179394 (25.1)	**1056733 (31.4)**
Coronary	71265 (18.8)	97627 (22.0)	99134 (21.4)	148197 (23.6)	190723 (26.0)	191418 (26.8)	**798364 (23.7)**
Anesthesiology	35338 (9.3)	50856 (11.4)	61204 (13.2)	110361 (17.6)	115278 (15.7)	110175 (15.4)	**483212(14.3)**
Medical	25487 (6.7)	26813 (6.0)	26045 (5.6)	37078 (5.9)	48404 (6.6)	41545 (5.8)	**205372 (6.1)**
Surgical	16899 (4.5)	28803(6.5)	24304 (5.3)	32784 (5.2)	49165 (6.7)	50488 (7.1)	**202442 (6.0)**
Obstetric	27175 (7.2)	29068 (6.5)	26590 (5.7)	27779 (4.4)	32218 (4.4)	31631 (4.4)	**174461 (5.2)**
Cardiovascular Surgery	6319 (1.7)	12935 (2.9)	17605 (3.8)	28726 (4.6)	36943 (5.0)	36044 (5.1)	**138572 (4.1)**
Neurology	4906 (1.3)	9026 (2.0)	11346 (2.5)	16424 (2.6)	21000 (2.9)	18685 (2.6)	**81387 (2.4)**
Pulmonary	9510 (2.5)	7824 (1.8)	8249 (1.8)	11539 (1.8)	11875 (1.6)	11865 (1.6)	**60862 (1.8)**
Neurosurgical	4588 (1.2)	5534 (1.3)	4689 (1.0)	8961 (1.4)	15414 (2.1)	15541 (2.2)	**54727 (1.6)**
Thoracic Surgery	3548 (0.9)	3205 (0.7)	2653 (0.6)	3677 (0.6)	8194 (1.1)	8954 (1.3)	**30231 (0.9)**
Burn	2830 (0.8)	3666 (0.8)	2238 (0.5)	2513 (0.4)	3409 (0.5)	4244 (0.6)	**18900 (0.6)**
Postoperative	928 (0.2)	938 (0.2)	358 (0.1)	2358 (0.4)	4333 (0.6)	5025 (0.7)	**13940 (0.4)**
Transplantation	204 (0.0)	865 (0.2)	946 (0.2)	1474 (0.2)	2623 (0.4)	1977 (0.3)	**8089 (0.2)**
Infectious Diseases	190 (0.0)	780 (0.2)	1557 (0.3)	2866 (0.5)	1203 (0.2)	728 (0.1)	**7324 (0.2)**
Oncology	1594 (0.4)	780 (0.2)	418 (0.1)	1557(0.3)	1211 (0.2)	717 (0.1)	**6277 (0.2)**
Gastroenterology	118 (0.0)	291 (0.1)	464 (0.1)	1213 (0.2)	2184 (0.3)	1436 (0.2)	**5706 (0.2)**
Orthopedic	675 (0.1)	441 (0.1)	485 (0.1)	807 (0.1)	1519 (0.2)	1643 (0.2)	**5570 (0.2)**
Urology	183 (0.1)	340 (0.1)	265 (0.1)	1860 (0.3)	1042 (0.1)	751 (0.1)	**4441 (0.1)**
Nephrology	123 (0.0)	109 (0.0)	362 (0.1)	764 (0.1)	913 (0.1)	795 (0.1)	**3066 (0.1)**
Hematology	215 (0.1)	115 (0.0)	215 (0.1)	268 (0.0)	532 (0.1)	443 (0.1)	**1788 (0.1)**
Endocrinology	91 (0.0)	320 (0.1)	247 (0.1)	103 (0.0)	166 (0.0)	148 (0.0)	**1075 (0.0)**

Table 2 Patient characteristics in ICU survivors and non-survivors

	Total (n=3362539, 100%)	Survivors (n=2842204, 84.5%)	Non-survivors (n=520335, 15.5%)	P value
Male gender, n (%)	1.791.343 (53.2)	1509243 (53.1)	282100 (54.2)	**<0.01**
Age *	65 [39-91]	63 [37-89]	75 [56-94]	**<0.01**
Admission Diagnosis, n (%)				
Respiratory failure	339449 (10.1)	191719 (6.8)	147730 (28.4)	**<0.01**
CVD	240708 (7.1)	161474 (5.7)	79234 (15.2)	**<0.01**
AKI	173474 (5.2)	81313 (2.8)	92161 (17.7)	**<0.01**
Sepsis	172088 (5.1)	77246 (2.7)	94842 (18.2)	**<0.01**
AMI	82913 (2.7)	77056 (2.7)	5857 (1.1)	**<0.01**
GIH	41011 (1.2)	31308 (1.1)	9703 (1.9)	**<0.01**
Intoxication	33262 (1.0)	32420 (1.1)	842 (0.2)	**<0.01**
Pulmonary embolism	31735 (0.9)	23882 (0.8)	7853 (1.5)	**<0.01**
Pancreatitis	12787 (0.4)	11015 (0.4)	1772 (0.3)	**<0.01**
Liver failure	9655 (0.3)	3896 (0.1)	5759 (1.1)	**<0.01**
Diabetic ketoacidosis	10050 (0.3)	8466 (0.3)	1584 (0.3)	0,10
Comorbidities, n (%)				
Hypertension	2271107 (67.5)	1850778 (65.1)	420329 (80.1)	**<0.01**
CAD	1507264 (44.8)	1232381 (43.3)	274883 (52.8)	**<0.01**
CVD	903121 (26.9)	682201 (24.0)	220920 (42.5)	**<0.01**
COPD	890356 (26.4)	695711 (24.5)	194645 (37.4)	**<0.01**
Diabetes mellitus	830666 (24.7)	678887 (23.9)	151779 (29.2)	**<0.01**
Heart failure	683738 (20.3)	526605 (18.5)	157133 (30.2)	**<0.01**
Malignancy	510404 (15.2)	370994 (13.1)	139410 (26.8)	**<0.01**
CKD	307044 (9.1)	225492 (7.9)	81552 (15.7)	**<0.01**
APACHE II score*	10 [7-21]	8 [6-18]	22 [9-28]	**<0.01**
Duration of ICU stay, days*	2 [1-7]	2 [1-7]	2 [1-5]	**<0.01**

* median [IQR], CVD:cerebrovascular disease, AKI:acute kidney injury, AMI:acute myocardial infarction, GIH:gastrointestinal hemorrhage, CAD:coronary artery disease, COPD:chronic obstructive pulmonary disease, CKD:chronic kidney disease, ICU:intensive care unit, APACHE:acute physiology and chronic health evaluation

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Topic: Health Services Research and Outcome.

001360

SiRNA-NR1D1-loaded biomimetic nanoparticles (CLOCK-Lipo): a circadian-based therapeutic strategy for sepsis-induced immunosuppression

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Introduction: Severe sepsis patients exhibit significant circadian rhythm disruption, with loss of diurnal patterns in serum melatonin and core rhythm genes [1]. In our LPS-induced macrophage tolerant model, NR1D1 expression was continuously upregulated with complete loss of rhythmic oscillation after 24–48 h. Based on our previous findings, we engineered biomimetic lipid nanoparticles for treating sepsis-induced immunosuppression through targeted regulation of macrophage circadian rhythm pathways [2].

Methods: Using single-cell sequencing from sepsis patients (GSE167363), we identified monocytes/macrophages as the most interconnected cell type. We established four murine groups (sham, mild CLP, moderate CLP, and moderate CLP with Imipenem) and monitored circadian rhythms via Comprehensive Lab Animal Monitoring System (CLAMS). Time-series RNA-seq revealed persistently upregulated NR1D1 under LPS stimulation, with siRNA knockdown effects verified by Lumicycle assay. Multi-omics analyses identified IGF2BP2 as a direct NR1D1 target. For in vivo applications, we synthesized CLOCK-Lipo using co-extrusion and DNA zipper-mediated membrane fusion.

Results: Cell interaction analysis identified monocytes/macrophages as the most interconnected cell type in sepsis patients (Fig. 1a). Sham and mild CLP groups restored diurnal patterns of oxygen consumption (VO_2) by postoperative day 1, while moderate CLP groups failed to recover rhythmicity within 5-day post-surgery whether treated with Imipenem or not, with similar patterns in activity measurements (Fig. 1b, c). Time-series RNA-seq identified NR1D1 as persistently upregulated following LPS stimulation (Fig. 2a). siRNA-mediated NR1D1 knockdown modulated BMAL1 expression (Fig. 2b). RNA-seq and proteomics revealed NR1D1 significantly suppressed IGF2BP2, with ChIP-seq and molecular docking confirming IGF2BP2 as a direct NR1D1 target (Fig. 2c, d). IGF2BP2, an RNA-binding protein critical for immune cell activation and cytokine production, regulates macrophage polarization and inflammatory responses, suggesting that its suppression contributes to immune dysfunction in sepsis [3].
We developed CLOCK-Lipo (Fig. 3a) by extracting cell membranes from LPS-stimulated macrophages (LM) and erythrocytes (RM), co-extruding them with siRNA-NR1D1 to form vesicles (HybridM@siNR1D1). Separately, we prepared cardiolipin-enriched vesicles (CCL@siNR1D1) for GSDMD-mediated release in pyroptotic macrophages (Fig. 3c) [4]. These vesicles were fused using DNA zippers [5], confirmed by FRET and electron microscopy (Fig. 3b). This method demonstrated superior drug loading efficiency. The incorporation of LPS-stimulated macrophage membranes enhanced lung targeting capability (Fig. 3d), suggesting that CLOCK-Lipo could modulate circadian rhythms while improving survival rates.
Conclusions: Our findings demonstrate that sepsis-induced immunosuppression is associated with disrupted circadian rhythms through NR1D1 upregulation in macrophages. The CLOCK-Lipo nanoparticle system effectively delivers siRNA–NR1D1 to target tissues, restoring circadian function and potentially improving sepsis outcomes through modulation of the NR1D1–IGF2BP2 pathway.

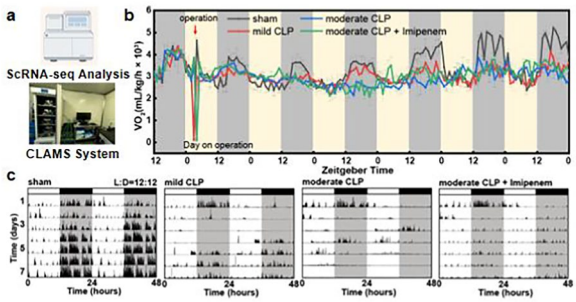


Figure 1 Cell-type interactions and circadian rhythm disruption in sepsis. **a** Bioinformatic analysis of single-cell sequencing data (GSE167363) from sepsis patients (detailed data not shown). **b** Oxygen consumption rate (VO_2) circadian patterns in four experimental groups (sham, mild CLP, moderate CLP, and moderate CLP + Imipenem) over five postoperative days. **c** Activity measurements across all four experimental groups

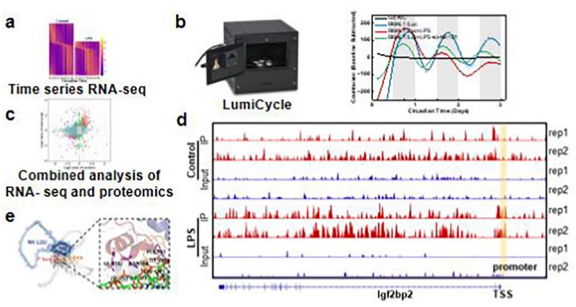


Figure 2 NR1D1 upregulation and its regulatory mechanisms in sepsis. **a** Time-series RNA-seq analysis showing persistent upregulation of NR1D1 expression following continuous LPS stimulation in RAW264.7 cells, with complete loss of rhythmic oscillation after 24–48 h (detailed results not shown). **b** Lumicycle analysis demonstrating the effects of siRNA-mediated NR1D1 knockdown on BMAL1 expression and restoration of circadian oscillation. **c** Combined RNA-seq and proteomics analysis revealing significant suppression of IGF2BP2 by NR1D1 overexpression in BMDMs. **d**, **e** ChIP-seq and molecular docking results demonstrating that NR1D1 as a transcription factor binds to the promoter region of IGF2BP2 and inhibits its transcription

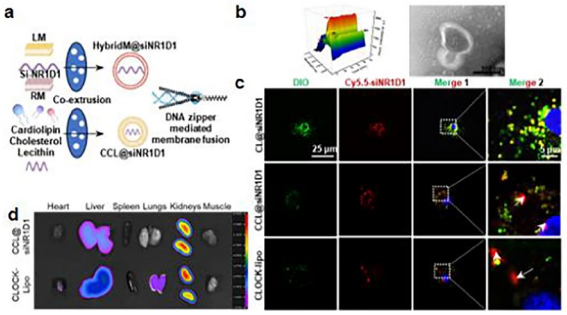


Figure 3 Design and characterization of CLOCK-Lipo. **a** Schematic illustration of the multistep process for CLOCK-Lipo fabrication, showing extraction of cell membranes from LPS-stimulated RAW264.7 macrophages (LM) and erythrocytes (RM), co-extrusion with siRNA-NR1D1 to form ~ 100 nm vesicles (HybridM@siNR1D1), preparation of cardiolipin/cholesterol/lecithin siRNA vesicles (CCL@siNR1D1), and DNA zipper-mediated fusion to obtain CLOCK-Lipo. **b** Fluorescence resonance energy transfer (FRET) and electron microscopy confirmation of successful DNA zipper-mediated fusion of HybridM@siNR1D1 and CCL@siNR1D1 vesicles to form CLOCK-Lipo. **c** Confocal microscopy verification of cardiolipin-enriched CCL@siNR1D1 vesicles designed for GSDMD-mediated release of siRNA–NR1D1 in pyroptotic macrophages during sepsis. **d** In vivo animal imaging showing enhanced lung targeting capability of CLOCK-Lipo incorporating LPS-stimulated macrophage membranes compared to CCL@siNR1D1.

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Topic: Sepsis.

001361

To minimize the occurrence of unintentional leak alarms associated with non-invasive positive pressure ventilation

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Introduction: Non-invasive positive pressure ventilation (NIPPV) is widely used for acute and chronic respiratory failure, such as pulmonary edema, pneumonia, and COPD, to improve oxygenation and gas exchange. However, leaks are a common issue.
Objectives: This study examines whether external oxygen placement and flow rate influence unintentional leaks and patient–ventilator asynchrony (PVA) to enhance NIPPV effectiveness and reduce troubleshooting time required by clinical staff.
Methods: In 2024, data were colected from a medical center in central Taiwan on patients receiving NIPPV for respiratory failure. The study analyzes the impact of external oxygen placement and flow rate on unintentional leaks and PVA.
Results: The findings indicate that placing the external oxygen connector at the rear of the ventilator and maintaining an oxygen flow rate $\leq$ 15 LPM effectively reduces the incidence of unintentional leaks and PVA. Before intervention: unintentional leak rate 7.14%. After intervention: unintentional leak rate 2.63%. Improvement rate: 63.14%
Conclusions: Conclusions proper circuit calibration, placing the external oxygen connector at the rear of the ventilator, and maintaining an oxygen flow rate $\leq$ 15 LPM effectively reduce unintentional leaks and PVA, improving NIPPV outcomes.

Topic: Acute respiratory failure and mechanical ventilation.

001362

Examination of caring behaviors attitude and cultural competence levels of intensive care nurses

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Introduction: Cultural competence forms the foundation of nursing care. Providing quality care is not possible without considering the culture, values, and health beliefs of patients, families, and communities.
Objectives: The aim of this study is to determine the caring behavior attitudes and cultural competence levels of intensive care nurses.
Methods: This study was conducted as a descriptive, cross-sectional study involving 93 intensive care nurses working at a Training and Research Hospital located in a geopolitically strategic region in southeastern Turkey, bordering Syria, and Iraq. Data were collected by the researcher using the "Nurse Introduction Form" and two validated and reliable instruments: the "Caring Behaviors Attitude Scale in Intensive Care Nurses" and the "Nurse Cultural Competence Scale," through face-to-face interviews. Descriptive statistics, independent t tests to compare the means between two independent groups, one-way ANOVA to assess differences among more than two groups for normally distributed data, and the Kruskal–Wallis test for non-normally distributed data to determine differences between groups.
Results: Among intensive care unit nurses, 54.8% were male, and 84.9% held a bachelor's degree. A significant majority (79.6%) reported providing care to patients from diverse cultural backgrounds. The three most frequently reported challenges in delivering such care were language barriers (79.6%), culture-specific expectations (53.8%), and expectations directed specifically toward nurses (33.3%). The mean score on the Nurse Cultural Competence Scale was 48.89 $\pm$ 11.91. The mean score for the Cultural Skills subscale was 29.31 $\pm$ 7.78, for the Cultural Knowledge subscale was 14.69 $\pm$ 3.56, and for the Cultural Sensitivity subscale was 4.88 $\pm$ 1.43. The mean score on the Caring Behaviors Attitude Scale in intensive care nurses was 109.54 $\pm$ 12.03. A statistically significant difference was found between nurses' cultural competence scores and their gender ($t = 3.059$, $p = 0.003$), as well as their experience in providing care to patients from diverse cultural backgrounds ($t = -2.462$, $p = 0.016$). Strikingly, intensive care nurses who were associate degree graduates, worked in pediatric intensive care units, and expressed unwillingness to care for patients from diverse cultural backgrounds had higher levels on the Nurse Cultural Competence Scale. Similarly, nurses who were high school graduates, worked in surgical intensive care units, and also expressed unwillingness to provide care to patients from diverse cultural backgrounds showed higher scores on the Caring Behaviors Attitude Scale.
Conclusions: Intensive care nurses exhibited a high level of caring behaviors and a moderate level of cultural competence. Gender and providing care to patients from different cultural backgrounds were found to influence the nurses' cultural competence levels. Intensive care nurses need to be supported with in-service training to increase their cultural competence level.

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7. The authors have submitted funding applications to their national institutions for the presentation of this study at ESICM ***2025,*** which are currently under evaluation.

Topic: Nursing care and physiotherapy.

001363

Engineered exosomes delivering CD5L restore mitochondrial energetics via lipogenesis restriction in a Bama mini-pig model of septic acute kidney injury

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Introduction: Sepsis-induced acute kidney injury (S-AKI) exhibits high mortality, with renal lipid metabolism disorders and mitochondrial dysfunction being core pathologies, yet effective targeted therapies

are lacking clinically. Extracellular vesicles (EVs) show initial promise as potential therapeutic carriers; however, their efficacy, safety in large animal models, and specific mechanisms regulating renal metabolic disorders remain unclear.
Methods: This study constructed engineered EVs targeting the kidney to deliver the key functional protein CD5L and evaluated their therapeutic potential in a preclinically relevant porcine S-AKI model. We employed a combination of biochemical assays, histopathology, multi-omics analyses (lipidomics and proteomics), molecular biology techniques, mitochondrial function assays, and a specific fatty acid oxidation (FAO) inhibitor (Etomoxir) to systematically assess the in vivo distribution, safety, efficacy, and mechanism of action of the EVs.
Results: Results showed that the engineered EVs effectively targeted injured kidneys, demonstrated good safety in the porcine S-AKI model, and significantly improved renal function, alleviated tissue damage, and restored microcirculation. Mechanistic studies revealed that EVs reduced renal lipid accumulation and acylcarnitine buildup by inhibiting fatty acid synthesis (FAS) and promoting FAO. This metabolic reprogramming further restored mitochondrial bioenergetic function (TCA cycle and ETC activity) and mitochondrial homeostasis (dynamic balance and enhanced autophagy). Critically, pharmacological inhibition experiments confirmed that the nephroprotective effect of the engineered EVs was entirely dependent on the restoration of the FAO pathway.
Conclusions: This study demonstrates for the first time in a large animal model that engineered EVs delivering CD5L can effectively ameliorate S-AKI by regulating FAO-dependent lipid metabolism reprogramming. This reveals that targeting renal lipid metabolism is a highly promising new strategy for S-AKI therapy and provides key preclinical evidence for developing related treatments.

Topic: Acute Kidney Injury and haemofiltration.

001364

Effect of alarm sounds on sleep in icu patients: a scoping review

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Intensive Care Medicine Experimental 2025,* 13(1):*001364

Introduction: The Intensive Care Unit (ICU) is a noisy environment, largely due to frequent alarm sounds generated by medical monitoring equipment [1]. Although monitoring alarms are essential for alerting health care staff to potential changes in a patient's condition, the alarm sounds may adversely affect patient's sleep, potentially worsening their recovery process [2].
Objectives: This scoping review aims to explore the impact of alarm sounds on the sleep of ICU patients, providing a comprehensive overview of the subjective and objective effects of alarms on sleep of ICU patients.
Methods: We conducted a scoping review in accordance with the PRISMA–ScR guidelines. Studies were eligible if they included adult ICU patients (≥ 18 years) and addressed the impact of audible alarms on patient sleep. Reviews, non-peer-reviewed articles, studies not set in an ICU, or those involving paediatric or healthy subjects were excluded. A systematic search was developed in collaboration with a medical librarian and conducted across PubMed, Embase, Web of Science, and Ovid Emcare. Titles and abstracts were screened independently by two reviewers using Rayyan. Eligible full-text articles were assessed based on predefined inclusion and exclusion criteria. Data extraction followed the JBI manual for scoping reviews, using a modified tool tailored to the review's objectives. Extracted data were synthesised in tables and described narratively to address the review questions.
Results: Out of 323 identified articles, 16 met the inclusion criteria. Fourteen studies assessed ICU patients' perceptions of audible alarms in relation to their sleep. Most patients reported alarms as a major cause of sleep disruption, with average disturbance scores ranging from 1.9 to 6.3 on a 0–10 scale. Between 21% and 91% of patients indicated that alarms negatively affected their sleep. In seven studies, alarms were identified as the most disruptive source of noise. Two interview studies revealed mixed perceptions, with some patients also describing alarms as reassuring. Three studies used objective measures of sleep (i.e., polysomnography) to assess alarm impact. Alarms were associated with frequent arousals, sleep fragmentation, and reduced deep sleep. Odds ratios for arousal due to alarms ranged from 4.9 to 10.9. Although patients subjectively rated alarms as highly disruptive, objective data showed that alarms accounted for only ~ 20–30% of arousals, indicating potential bias in self-reporting. No studies were identified that assessed the impact of alarm management strategies on ICU patients' sleep.
Conclusions: Audible alarms are a major contributor to sleep disruption in ICU patients, both in subjective reports and objective measurements. Despite being crucial for patient safety, alarms frequently cause arousals, fragmented sleep, and poor subjective sleep experience. Reducing alarm noise is essential to improve well-being and sleep of ICU patients. Further research is need to explore the effect of alarm reduction strategies—such as smart alarm algorithms, adaptive alarm settings, and behavioural interventions—to improve patient sleep and outcomes.

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3. BioClock Consortium (project number 1292.19.077 to LK) funded by the research program NWA-ORC by the Dutch Research Council (NWO)
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5. VENI grant (2020–09150161910128 to LK) from the Netherlands Organization for Health Research and Development (ZonMw)

Topic: Information systems and Data Science.

001366

Long-term mortality within 180 days after ICU discharge: a secondary analysis of the ERIC trial

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Introduction: Clinical trials in critical care assess mortality mostly in the ICU, hospital, or within 28 days after admission as primary or secondary outcomes [Gaudry et al. 2017]. The long-term mortality after discharge is rarely assessed, although this may have a key impact on trial design, findings, and interpretation [Iwashyna et al. 2018].
Objectives: To assess the post-ICU mortality within 180 days after ICU discharge in a large cluster-randomized ICU trial.
Methods: Secondary analysis of the large-scale stepped-wedge cluster-randomized Enhanced Recovery after Intensive Care (ERIC) trial (ClinicalTrials.gov: NCT03671447) [Spies et al. 2023, Adrion et al. 2020]. In 12 medical, surgical, and mixed ICUs in the metropolitan area of Berlin, Germany, patients with an expected ICU length of stay of ≥ 24 h, ≥ 18 years of age and statutory health insurance coverage were enrolled. The trial assessed the impact of daily telemedicine rounding (intervention) on the adherence to evidence-based quality indicators compared to usual care (control) [Kumpf et al. 2017]. This analysis included all patients discharged from the ICU alive. Patients were grouped based on tertiles of the Simplified Acute Physiology Score II (SAPS II) on admission. The post-ICU mortality within 180 days was assessed and compared between

SAPS II strata using Kaplan–Meier estimates and log-rank tests adjusted for multiple comparisons using Sidak correction. In a Cox proportional hazards model, we analyzed the association of severity of illness [first SAPS II and Sequential Organ Failure Assessment (SOFA) scores] and age with the 180-day post-ICU mortality. The model was adjusted for the study group as well as ICU cluster and included an interaction between the study group and SAPS II (i.e., that the effect of the telemedicine intervention varied based on patients' illness severity).
Results: Ten ICU clusters enrolled 1463 patients, of whom 1 patient was excluded and 158 patients died in the ICU, leaving 1304 ICU survivors that were included in this analysis. ICU survivors had a mean age of 66.9 (SD 14.8) years and a median ICU length of stay of 5 (IQR 2–11) days. Within 180 days after discharge, 242/1304 ICU survivors (19%) died. The SAPS II tertiles were 0–23, 24–39, and > 39 points. Patients in the third SAPS II tertile had a higher mortality (120/425 patients [28%]) than patients in the first (48/432 patients [11%]) and second (74/447 patients [17%]) SAPS II tertiles (both $p < 0.001$) (Fig. 1). In the Cox regression, the SAPS II (HR 1.02, 95% CI 1.01–1.04; $p = 0.001$), the SOFA (HR 1.05, 95% CI 1.01–1.09; $p = 0.02$), and age (HR 1.04, 95% CI 1.03–1.05; $p < 0.001$) were associated with an increased mortality risk (Table 1). We did not find a significant association of the intervention with 180-day post-ICU mortality or a significant interaction between the SAPS II and study group.
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Table 1 Cox proportional hazards model for mortality within 180 days after ICU discharge. ICU, intensive care unit; SAPS II, Simplified Acute Physiology Score II; SOFA, Sequential Organ Failure Assessment

Variable	HR	95% CI	*p*
Age, years	1.04	1.03–1.05	< 0.001
SAPS II at admission	1.02	1.01–1.04	0.001
SOFA at admission	1.05	1.01–1.09	0.02
Study group, telemedicine intervention	1.45	0.77–2.74	0.25
ICU cluster	0.99	0.93–1.05	0.71
Interaction between study group and SAPS II	0.99	0.98–1.01	0.21

Conclusions: In this secondary analysis of a large ICU trial, a substantial proportion of patients died within 180 days after their ICU discharge. This finding underscores the importance of analyzing long-term mortality in ICU trials.

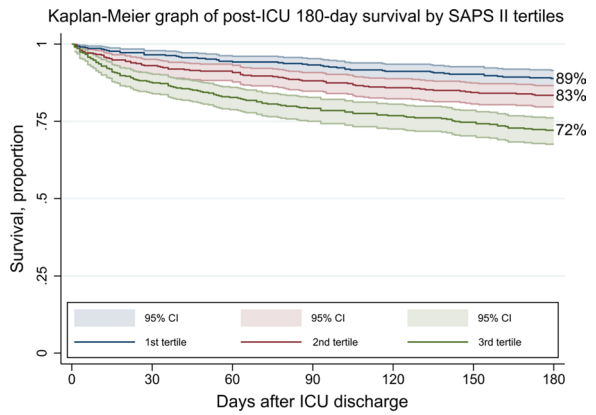


Figure 1 Kaplan–Meier estimate comparing the post-ICU survival within 180 days after discharge between SAPS II tertiles. First SAPS II tertile: 0–23 points; second SAPS II tertile: 24–39 points; and third SAPS II tertile: > 39 points

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Topic: Health Services Research and Outcome.

001367

Multidimensional approach to weaning in patients in the intensive care unit: a descriptive study

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Introduction: Weaning is a process that accounts for almost 40% of the total duration of mechanical ventilation. Multiple strategies have been used to shorten this period: reduction of sedation and neuromuscular blockade doses, and spontaneous modes. Therefore, it is important to implement a series of strategies that favor the prompt removal of ventilatory support. In the weaning process, we use multiple predictors to determine which patients will have a successful extubation.
Objectives: To describe the clinical, ultrasonographic, and ventilatory variables associated with extubation failure during the weaning process.
Methods: A prospective, observational, single-center study was conducted over a 4-month period. Extubation predictors were collected, including NIF, P0.1, Tobin index, diaphragmatic ultrasound, IWI, CROP, and ExPreS scores, as well as swallowing and gag reflexes, and the cuff-leak test. After a successful spontaneous breathing trial, patients were extubated and monitored for 72 h to identify weaning failure. Statistical analysis was performed using IBM SPSS Statistics, version 29.0.1.1, applying Fisher's exact and Pearson's tests for qualitative variables. We use Kruskal–Wallis test for non-parametric variables.
Results: A total of 35 patients were included, 57% of whom were male, with a mean age of 44.4 years (range: 19–73 years). The average scores on mortality scales were SOFA 6.2, APACHE II 11.8, and SAPS II 30.4. Weaning was successful in 30 patients, while 5 experienced failure (14.29%). The causes of weaning failure were respiratory failure ($n = 3$) and excessive upper airway secretions ($n = 2$) (Fig. 1).
No statistically significant differences were found between the successful and failed weaning groups in terms of clinical or demographic characteristics. Among the evaluated predictors, only left diaphragmatic excursion and diaphragmatic velocity showed statistically significant differences ($p = 0.022$ and $p = 0.010$, respectively), as well as their association with the Visage scale ($p = 0.02$) (Table 1).

Conclusions: The incidence of weaning failure was 14.29%, lower than that reported in the literature (26–42%), possibly due to the use of a multidimensional approach involving multiple predictors. The only predictors that reached statistical significance were left diaphragmatic excursion and velocity, and their association with the Visage scale. Studies with larger sample sizes are needed to validate other predictors.

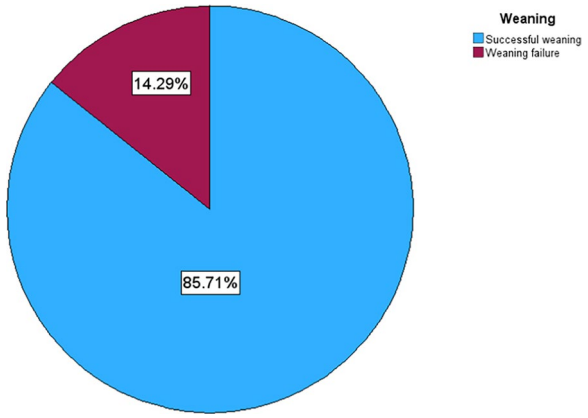


Figure 1 Incidence of weaning failure in the ICU

Table 1 Comparative table of patients with successful and failed weaning

Variable	Weaning failure (n = 5)	Successful weaning (n = 30)	*P*
Sex. *(%)*	4 (80)	16 (53.3)	0.365
Overweight. *(%)*	3 (60)	12 (40)	1.000
Obesity. *(%)*	1 (20)	11 (36.6)	0.640
Diabetes. *(%)*	1 (20)	6 (20)	1.000
Hypertension. *(%)*	2 (40)	8 (26.6)	0.610
Kidney Chronic Disease. *(%)*	1 (20)	4 (13.3)	0.561
Sepsis. *(%)*	2 (40)	22 (73.3)	0.297
Acute Kidney Injury. *(%)*	3 (60)	8 (26.6)	0.297
Gag reflex. *(%)*	4 (80)	30 (100)	0.143
Swallowing. *(%)*	5 (100)	28 (93.3)	1.000
NIF -20 to -30. *(%)*	1 (20)	11 (36.6)	0.630
P 0.1 -4 to -7. *(%)*	5 (100)	30 (100)	-
Tobin <105. *(%)*	5 (100)	30 (100)	-
Cuff-leak test >110 ml. *(%)*	5 (100)	24 (80)	-
Right diaphragmatic excursion > 1.1. *(%)*	5 (100)	25 (83.3)	1.000
Right diaphragm velocity > 1.5. *(%)*	4 (80)	22 (73.3)	0.555
Right diaphragmatic thickness > 2.2 mm. *(%)*	5 (100)	26 (86.6)	1.000
Right TFdi >35%. *(%)*	4 (80)	13 (43.3)	0.335
Left diaphragmatic excursion > 1.1. *(%)*	4 (80)	25 (83.3)	0.022
Left diaphragm velocity > 1.5. (%)	3 (60)	21 (70)	0.010
Left diaphragmatic thickness > 2.2 mm. (%)	3 (60)	23(76.6)	0.864
Left TFdi >35%. (%)	3 (60)	9 (30)	0.189
IWI. (%)	3 (60)	28 (93.3)	0.272
CROP. (%)	4 (80)	27 (90)	1.000
ExPres. (%)	2 (40)	26 (86.6)	0.099

NIF negative inspiratory force. *P 0.1* airway occlusion pressure at 100 msec. *TFdi* diaphragm thickening fraction. *IWI* integrative weaning index. *CROP* compliance rate oxygenation pressure index. *ExPres* extubation predictive score.

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Topic: Acute respiratory failure and mechanical ventilation.

001369

Impact of leadership frequency on healthcare professionals satisfaction in severe trauma management

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Introduction: The management of severe trauma patients requires effective coordination and collaboration among healthcare teams. Leadership plays a key role and may influence the satisfaction of the professionals.

Objectives: To evaluate the impact of leadership frequency during the management of severe trauma on the satisfaction of healthcare professionals.

Methods: A survey was conducted during the "III Severe Trauma Symposium: Perspectives," using the Collaboration and Satisfaction About Care Decisions in Trauma (CSACD.T) tool. The survey included nine Likert-scale items (0–7), generating a total Satisfaction Score with the total score (Satisfaction Score) ranging from 9 (minimum collaboration) to 63 (maximum collaboration). Demographic and professional aspects of the participants were assessed, categorized according to the frequency of leadership during the care of trauma patients. Categorical variables were expressed as counts and percentages and compared using the χ^2 test or Fisher's exact test. Continuous variables were expressed as median and interquartile range (IQR) and compared using the Kruskal–Wallis test or ANOVA as appropriate. A two-tailed significance level of 5% was used.

Results: A total of 194 surveys were analyzed. 41% ($n = 79$) had never taken a leadership role, 29% ($n = 56$) had led in less than 50% of cases, and 30% ($n = 59$) had done so in more than 50%. The median age was 35 years (IQR: 30–46), with higher leadership frequency observed among older professionals (42 [33–41] years; $p < 0.05$). Women accounted for 68% ($n = 131$) of respondents. Among them, 49.6% had never led a trauma case, compared to 22% of men ($p = 0.001$). Conversely, 43% of men reported leading more than 50% of the time, vs. 24% of women ($p = 0.001$). The median Satisfaction Score was 36 points (IQR: 28–43), with significantly higher scores among those who led more frequently (non-leaders: 36 [27–40] vs. < 50%: 34.5 [26–42] vs. > 50%: 38 [32–49]; $p = 0.029$). The highest satisfaction quartile was more commonly reached by professionals who led in > 50% of their cases (15% vs. 31% vs. 39%; $p = 0.023$). Among those who had ever assumed leadership, men reported higher Satisfaction Scores (42 [34–52]) than women (32 [26–40]; $p < 0.001$). Regarding specialty, professionals in Critical Care had lower satisfaction levels compared to those working in Emergency Medicine or prehospital settings (ICU: 35 [28–42] vs. emergency: 50 [29–57] vs. prehospital: 48 [42–53]; $p < 0.001$). Table 1 summarizes the responses to each item in the survey.

Conclusions: The frequency of assuming leadership during the care of patients with severe trauma may influence healthcare professionals' satisfaction. Male professionals and those working in Emergency and Prehospital care reported higher satisfaction. Although overall levels of collaboration and communication were high, targeted strategies

may be needed to improve performance and integration within multidisciplinary teams, regardless of individual roles in trauma care.

Table 1 Responses to CSACD.T items according to leadership frequency.

CSACD.T Items	No Leadership n = 79	<50% Leadership n = 56	>50% Leadership n = 59	Total n = 194	p-value
Do nursing and medical staff jointly plan decisions regarding the initial care of patients? (Median [IQR])	4 (3–6)	4 (2.5–6)	4 (2–5)	4 (2–5)	0.028
Is there open communication between nursing and medical staff during patient care decisions?	4 (3–5)	4 (3–6)	5 (4–6)	4 (3–6)	0.095
Do nursing and medical staff share responsibility for patient care decisions?	3 (2–4)	3 (2–4)	3 (2–4)	3 (2–4)	0.926
Do medical and nursing staff cooperate in decision-making for patient care?	4 (2–4)	4 (3–5)	4 (3–5)	4 (3–5)	0.029
Are both nursing and medical concerns considered when making decisions about patient needs?	4 (3–5)	4 (3–5)	5 (3–6)	4 (3–5)	0,048
Are care decisions for patients coordinated between medical and nursing teams?	4 (2–4)	3 (3–5)	4 (3–5)	4 (3–5)	0.003
What is the level of collaboration between nursing and medical staff in patient care decisions?	4 (2–5)	4 (3–5)	5 (3–6)	4 (3–5)	0.004
What is your level of satisfaction with overall collaboration between medical and nursing staff during initial patient care?	4 (3–5)	4 (3–5)	5 (4–6)	4 (3–5)	0.023
What is your level of satisfaction with collaboration in your usual work setting?	4 (4–5)	5 (3–6)	5 (4–6)	5 (4–6)	0.058

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Topic: Trauma.

001370

Rapid identification of pediatric sepsis using AI detection technology based on Raman spectroscopy

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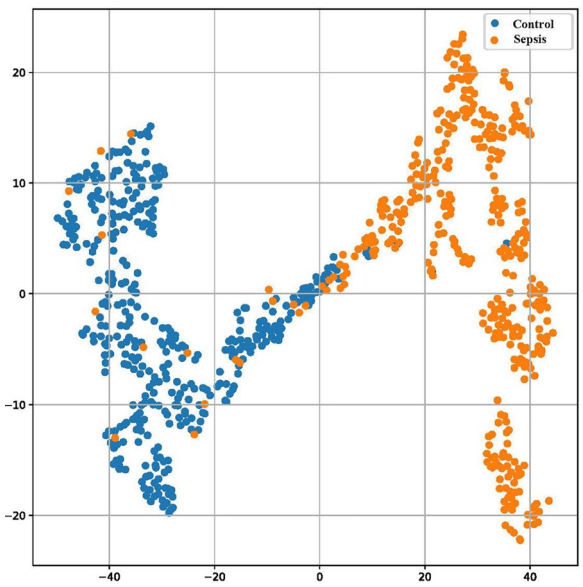
Intensive Care Medicine Experimental 2025,* 13(1)*:001370

Introduction: Sepsis is a systemic inflammatory response syndrome caused by infections from bacteria or other pathogenic micro-organisms. The mortality risk in children with sepsis escalates exponentially with each hour of delayed treatment. Rapid and accurate diagnosis of pediatric sepsis is critical for reducing its associated high mortality. The Pediatric Sequential Organ Failure Assessment (pSOFA) score is widely employed for sepsis diagnosis in pediatric populations. However, its failure to incorporate infection-specific biomarkers necessitates supplementary time-consuming analyses, contributing to diagnostic delays and under-recognized cases. This study proposes an artificial intelligence (AI)-based Raman spectroscopy technique for the rapid diagnosis of pediatric sepsis.

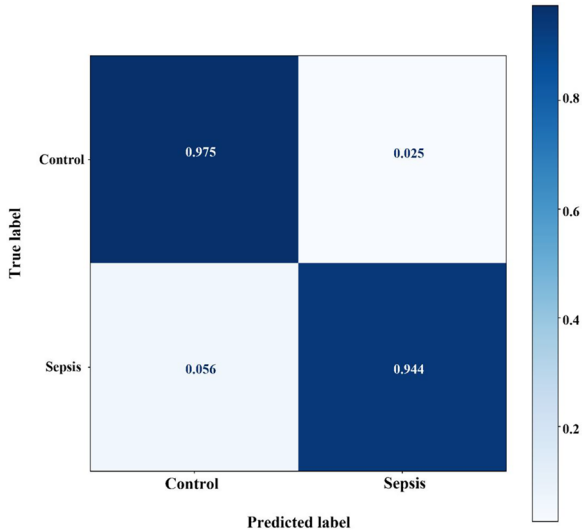
Methods: Two microliters of serum were taken from 130 healthy pediatric controls and 180 children with sepsis. Raman spectra were collected for each serum, and a comprehensive spectral database was established. The spectra underwent preprocessing through self-normalization, and data sets were split into training, validation, and test sets at a 7:1:2 ratio. Utilizing the ResNet18 residual neural network architecture as a foundation, the 2D convolution in the network was adapted to 1D convolution to accommodate Raman spectrum. Optimal parameters were ascertained via simulation experiments. The model's weights were trained on the training set, followed by the selection of optimal hyperparameters grounded in the model's performance on the validation set. The trained convolutional neural network model underwent testing with the test set to appraise its classification efficacy.

Results: Raman spectrum is the fingerprint spectrum of matter. Sepsis can lead to significant changes in serum composition, including: elevated levels of inflammatory molecules and cytokines (e.g., IL-6 and TNF-α); abnormal concentrations of acute-phase proteins (e.g., C-reactive protein and procalcitonin); markers of metabolic disorders, such as lactic acid accumulation (indicating tissue hypoxia) and lipid peroxidation products (markers of oxidative stress); and pathogen-derived components, such as bacterial endotoxins (e.g., LPS) or fungal molecules (e.g., β-glucan). Raman spectroscopy can capture these sepsis-associated alterations with high sensitivity by the detection of children's serum. In this work, AI models were successfully constructed using serum Raman spectrum database of children with sepsis. The models achieved the following classification accuracies: 95.93% for distinguishing children with sepsis fromhealthy pediatric controls (Figs. 1 and 2).

Conclusions: This novel AI-based Raman spectroscopy technology provides a label-free, rapid, accurate, and cost-effective method for identifying children with sepsis. It holds a significant promise to reduce the high mortality rate caused by sepsis.



PCA score plots of the control and sepsis group.



Confusion matrix showing the maximum accuracy of 95.93%.

Reference

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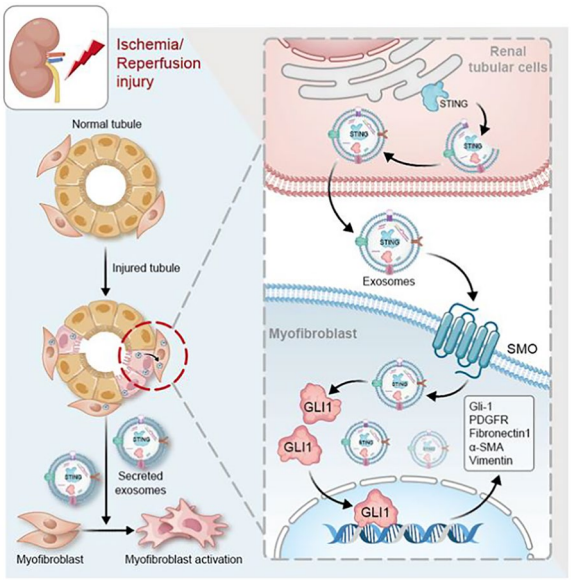
Topic: Sepsis.

001371

Exosomes derived from renal tubular cells drive the fibrotic progression from acute kidney injury to chronic kidney disease by activating the STING–Smo–Gli signaling axis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001371

Introduction: The progression from acute kidney injury (AKI) to chronic kidney disease (CKD) represents a major clinical hurdle with incompletely defined molecular underpinnings. We investigated the role of exosomes derived from injured renal tubular cells, specifically focusing on their cargo Stimulator of Interferon Genes (STING), as key mediators in this transition.
Methods: We utilized unilateral ischemia–reperfusion (UIR) mouse models, including tubule-specific STING knockout (STING–CKO) mice. Methods involved exosome isolation and characterization, fibroblast co-culture experiments, in vivo administration of exosomes and pharmacological inhibitors (GW4869 for exosome release and CPN for smoothened), histological analysis, and molecular assessments of STING and Smo/Gli pathways.
Results: STING expression was upregulated in tubular cells post-AKI and enriched within secreted exosomes. These exosomes were internalized by interstitial fibroblasts, activating the smoothened–Gli (Smo–Gli) pathway and promoting fibrosis. STING–CKO mice exhibited significantly attenuated fibrosis, senescence, and maladaptive repair after UIR. Furthermore, inhibiting either exosome secretion (GW4869) or Smo/Gli signaling (CPN) mitigated kidney injury and fibrosis in vivo. The pro-fibrotic effects of tubular STING were confirmed to be predominantly mediated via this exosomal pathway.
Conclusions: This study identifies a critical tubular cell–STING–exosome–fibroblast Smo/Gli signaling axis driving the AKI-to-CKD transition. Our findings reveal a novel mechanism of intercellular communication in renal pathology and highlight targeting exosomal STING or the Smo/Gli pathway as potential therapeutic strategies to prevent CKD development after AKI.



This study unveils a critical and previously unrecognized intercellular communication axis in the progression from AKI to CKD: renal tubular epithelial cell-derived exosomes act as nanocarriers delivering functional STING protein to interstitial fibroblasts, thereby activating the pro-fibrotic Smo–Gli signaling pathway. We provide compelling evidence, demonstrating that STING is packaged into TEC exosomes following injury, and its subsequent transfer to fibroblasts is essential for driving maladaptive repair and fibrosis; this was substantiated by findings in STING conditional knockout mice and through pharmacological inhibition of either exosome secretion (GW4869) or smoothened activity (CPN), both of which significantly attenuated renal fibrosis. Crucially, our findings pivot the understanding of STING's pro-fibrotic role from a primarily intracellular mechanism to one significantly mediated by intercellular, nanoscale vesicle transport. These insights fundamentally reshape the mechanistic understanding of post-AKI fibrosis, highlighting a novel crosstalk between the innate immune sensor STING and the developmental Hedgehog pathway orchestrated by exosomes, and pinpoint the "TEC–STING–Exosome–Fibroblast Smo/Gli" axis as a high-potential target. Consequently, strategies aimed at inhibiting the release of STING-laden exosomes or specifically blocking downstream Smo–Gli activation in fibroblasts emerge as promising avenues for therapeutic intervention to halt the progression to CKD.

Topic: Acute Kidney Injury and haemofiltration.

001372

STING promotes metabolic rewiring-induced partial EMT in renal fibrosis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001372

Introduction: Studies have shown that the incidence of acute kidney injury (AKI) in critically ill patients is up to 40%, and about 10–30% of patients with AKI will develop chronic kidney disease (CKD). Renal fibrosis is the common pathophysiological process in the development of CKD, characterised by dedifferentiation of tubular epithelial cells, loss of peritubular capillaries, inflammatory cell infiltration, and fibroblast proliferation.
Tubular epithelial cells mediate renal fibrosis through partial epithelial–mesenchymal transition (EMT) and paracrine intercellular signaling. It is reported that metabolic reprogramming plays a key role in regulating tubular cell phenotype in renal fibrosis by impairing fatty acid oxidation (FAO) and generating ATP through aerobic glycolysis, which leads to intracellular lipid deposition and maladaptive repair.
Recently, studies have reported that the activation of stimulator of interferon genes (STING), an innate immune receptor, promotes pro-inflammatory responses in cisplatin-induced acute kidney injury. Researchers found that mitochondrial dysfunction can activate STING and cause tissue damage and fibrosis, while knocking out STING can significantly improve renal fibrosis. However, the tubular-specific role of STING in renal fibrosis remains unknown. It was found that STING can regulate the phenotypic changes of macrophages by inhibiting mitochondrial oxidative phosphorylation (OXPHOS) and promoting glycolysis, which illustrates the potential role of STING in regulating energy metabolism and cell fate. Here, in this study, we speculate that STING is activated in tubular epithelial cells during renal fibrosis and is involved in partial EMT through metabolic reprogramming.
Methods: The expression of STING was evaluated in human biopsies of hydronephrosis by IHC, and the downstream signaling was further investigated in murine kidneys after unilateral ureteral obstruction (UUO) by western blotting. In vitro, to elucidate the role of STING in tubules, we treated immortalized proximal tubular epithelial cells (IM-PTECs) with transforming growth factor-β (TGFβ) to induce partial EMT. The expression of STING and the downstream signaling were determined by western blotting and qPCR. The effect of STING activation on pEMT was investigated using STING inhibitor H-151 and was further explored through RNA sequencing analysis. Metabolic reprogramming was studied by the expression of FAO key enzymes and lactate production.
Results: STING activation and co-localization with fibrotic marker α-smooth muscle actin (αSMA) were observed in human biopsies of hydronephrosis and in murine kidneys after UUO by IHC and western blotting. In vitro, TGFβ-stimulated IM-PTECs presented the increased expression of STING. Moreover, STING inhibition rescued the TGFβ-induced partial EMT in vitro and attenuated early hallmarks of fibrosis in vivo, as determined by the reduced expression of αSMA and vimentin in UUO kidneys. RNA sequencing analysis revealed that the H151-mediated rescue of pEMT in IM-PTECs resulted from ameliorated mitochondrial functions, demonstrated by relieved mtDNA stress signaling, together with upregulated mtDNA content validated by qPCR. Further bioinformatic analysis among mitochondrial genes revealed enhanced FAO metabolism with STING inhibitor, which was further confirmed by overexpressed FAO key enzymes, such as *Cpt1a* and *Acox3*, while lactate production was significantly decreased by H-151.
Conclusions: STING is activated in tubular EMT during renal fibrosis, and the inhibition of STING alleviates tubular epithelial–mesenchymal transition through enhancing fatty acid oxidation, effectively improving mitochondrial abundance and reducing UUO-induced renal fibrosis.

Topic: Metabolism, endocrinology, liver failure and nutrition.

001377

Prognostic value of diastolic blood pressure in hemodynamically stable severe trauma patients

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Introduction: Hemodynamic assessment is a cornerstone in the management of patients with severe trauma. However, the prognostic value of diastolic blood pressure (DBP) remains underexplored, particularly in patients with an initially stable hemodynamic profile.
Objectives: To evaluate the impact of DBP on clinical outcomes and resource utilization in hemodynamically stable patients with severe trauma.
Methods: A prospective cohort study including patients consecutively admitted to a Trauma and Neurocritical Care Unit between June 2023 and December 2024. We analyzed patients with severe trauma and initial hemodynamic stability, defined as a shock index (SI) < 0.9. The cohort was stratified into three groups according to DBP at the start of initial management: < 60 mmHg, 61–80 mmHg, and > 80 mmHg. Demographic variables, trauma severity, resource use, and complications were analyzed. The primary outcome was ICU mortality. Secondary outcomes included red blood cell (RBC) transfusion, activation of the massive transfusion protocol (MTP), hospital mortality, and length of stay in both ICU and hospital.
Categorical variables were expressed as counts and percentages and compared using the χ^2 test or Fisher's exact test. Continuous variables were reported as median and interquartile range (IQR) and compared using the Kruskal–Wallis test or ANOVA, as appropriate. A two-sided p value < 0.05 was considered statistically significant. Statistical analysis was performed using STATA version 13® (StataCorp LLC).
Results: A total of 391 patients were included. The median age was 54 years (IQR 33–71), and 77% (n = 300) were male, with no statistically significant differences between groups. Falls were the most frequent trauma mechanism (45%, n = 174), although high-energy trauma such as traffic accidents was more prevalent in the < 60 mmHg DBP group (40% vs. 37% vs. 25%; p < 0.05). Traumatic brain injury was present in 69% of patients, with no significant differences among groups. Abdominal trauma was more frequent in patients with DBP < 60 mmHg (37% vs. 21% vs. 11%; p < 0.05). No significant differences were found in severity scores (ISS, NISS, RTS, and TRISS), although patients with DBP < 60 mmHg had lower systolic and mean arterial pressures, reduced Diastolic Pressure Time Index, and higher SI values (Table 1). No differences were observed in ICU or hospital mortality, nor in length of stay. However, patients with DBP < 60 mmHg required more norepinephrine, RBC transfusions, and MTP activation, and had a higher incidence of trauma-induced coagulopathy (TIC) (Table 2).
Conclusions: In patients with severe trauma and initial hemodynamic stability, lower DBP at presentation does not appear to be associated with increased mortality. However, it may serve as an early marker of transfusion needs and higher risk of TIC, providing a potential value in early risk stratification and clinical decision-making.

Table 1 Hemodynamic status at initial assessment

Parameter	DBP < 60 mmHg (n=43)	DBP 60–80 mmHg (n=182)	DBP > 80 mmHg (n=166)	Total (n=391)	p-value
Shock Index, median (IQR)	0.71 (0.56–0.79)	0.63 (0.53–0.71)	0.59 (0.48–0.69)	0.62 (0.52–0.72)	< 0.001
Systolic BP (SBP), mmHg, median (IQR)	110 (95–120)	130 (120–140)	149 (135–160)	134 (120–150)	< 0.001
Diastolic BP (DBP), mmHg, median (IQR)	58 (52–60)	72 (66–77)	90 (85–98)	79 (68–90)	< 0.001
Mean Arterial Pressure (MAP), mmHg, median (IQR)	75 (68–80)	91 (87–96)	110 (103–119)	97 (88–108)	< 0.001
Diastolic Pressure Time Index (DPTI), points, median (IQR)	33.00 (28.18–39.42)	38.58 (32.94–47.00)	44.80 (36.79–54.07)	40.47 (33.38–49.90)	0.001
DPTI/SPTI > 1, n (%)	42/43 (97.67%)	167/182 (91.76%)	150/166 (90.36%)	359/391 (91.82%)	0.296

Table 2 Outcomes and resource utilization

Parameter	DBP < 60 mmHg (n=43)	DBP 60–80 mmHg (n=182)	DBP > 80 mmHg (n=166)	Total (n=391)	p-value
Resource Use					
Norepinephrine use during initial management, %	9/28 (32.14%)	15/191 (12.40%)	11/122 (9.02%)	35/271 (12.92%)	0.004
Lowest Hb within 24h, g/dL, median (IQR)	9.1 (7.0–9.3)	12.2 (10.7–13.5)	12.9 (10.6–13.7)	12.2 (10.1–13.5)	0.051
Tranexamic acid administration, %					
1 g dose	9/43 (20.93%)	20/181 (11.05%)	15/166 (9.04%)	44/390 (11.28%)	
2 g dose	7/43 (16.28%)	12/181 (6.63%)	14/166 (8.43%)	33/390 (8.46%)	0.041
Massive Transfusion Protocol (MTP) activation, %	4/28 (14.29%)	8/125 (6.40%)	2/126 (1.59%)	14/279 (5.02%)	0.013
RBC transfusion required, %	11/41 (26.83%)	16/173 (9.25%)	10/160 (6.25%)	37/374 (9.89%)	< 0.001
RBC volume transfused, mL, median (IQR)	0 (0–251)	0 (0–0)	0 (0–0)	0 (0–0)	< 0.001
Trauma-induced coagulopathy within 24h, %					
Thrombocytopenia	16/42 (38.10%)	28/182 (14.29%)	31/165 (18.79%)	73/389 (18.77%)	
INR > 1.4	0/42 (0%)	1/182 (0.55%)	0/165 (0%)	1/389 (0.26%)	0.008
Crystalloids in first 24h, mL, median (IQR)	3500 (2000–4500)	3000 (2500–3500)	3000 (2500–4200)	3000 (2500–3875)	0.707
>5 L crystalloids in 24h, %	2/9 (22.22%)	4/37 (10.81%)	9/62 (14.52%)	15/108 (13.89%)	0.658
Outcomes					
ICU length of stay, days, median (IQR)	4.06 (1.02–10.14)	3.01 (1.58–6.12)	3.18 (1.68–7.49)	3.13 (1.56–7.66)	0.626
Hospital length of stay, days, median (IQR)	9.90 (5.20–18.15)	9.51 (5.23–17.76)	10.87 (6.20–19.86)	10.10 (5.55–19.27)	0.422
ICU mortality, %	7/41 (17.07%)	16/159 (10.06%)	21/152 (13.82%)	44/352 (12.50%)	0.389
Hospital mortality, %	7/41 (17.07%)	19/157 (12.10%)	23/150 (15.33%)	49/348 (14.08%)	0.605

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Topic: Trauma.

001379

Comparison of midazolam and ketamine for conscious sedation during bronchoscopy

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Introduction: Conscious sedation is a technique used to minimize discomfort and pain during invasive medical procedures, ensuring smoother execution. However, its application in bronchoscopy is still relatively uncommon.

Objectives: The aim of this study was to compare two sedative molecules: ketamine and midazolam during therapeutic and/or diagnostic bronchoscopy and to assess their efficacy and safety.

Methods: This was a prospective, single-blind interventional comparative study conducted in the Zaghouan's regional hospital over 9 months, including patients over 18 years with an indication for bronchoscopy with no contraindication to any of the proposed molecules. Patients' consent for sedation was obtained prior to the initiation of the procedure. After randomization (1:1), patients were divided into two groups: G1 = midazolam and G2 = ketamine. A comparison was made between both groups before, during, and after bronchoscopy. Sedation depth was assessed using the MOAAS score, and pain was measured on a numerical rating scale (NRS). The operator satisfaction was judged on a Likert scale.

Results: A total of 64 patients were included (32 patients in each group) with a median age of 62 years [51–72]. Epidemiological and clinical characteristics were similar between both groups. The median doses used were 18 mg of ketamine [16.5–20] and 1 mg [0.62–1] of midazolam. There was no significant difference in the degree of conscious sedation obtained according to the MOAAS score. The bronchoscopy duration was shorter in G2 (4 [3–5] min vs. 5 [3–6] min; $p = 0.026$). Pre- and post-procedural vital parameters were comparable. There were no differences in the minor adverse effects observed, except for tachycardia, which was more frequent with ketamine ($p = 0.006$), and cough with midazolam ($p = 0.014$). No major complications were observed. Pre-procedural pain was more intense in G1 (NRS = 2 [1–3.75] vs. 1 [0–2]; $p = 0.004$). Operator dis-satisfaction was more frequent with midazolam ($p = 0.011$).

Conclusions: Conscious sedation during bronchoscopy appears to be a safe and effective procedure. Both molecules proposed were comparable. However, ketamine provided greater operator satisfaction.

Topic: Sedation, analgesia and delirium.

001380

Outcomes after OHCA: insights into survival, neurological function, and quality of life

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Intensive Care Medicine Experimental 2025,* 13(1)*:001380

Introduction: Out-of-Hospital Cardiac Arrest (OHCA) remains a major global health challenge, significantly contributing to mortality and morbidity. Despite advances in pre-hospital management, OHCA is often associated with poor neurological outcomes and high mortality. In Portugal, there is limited information regarding post-OHCA survival, quality of life (QoL), and functional status. This study aims to address this gap by analyzing these outcomes.

Objectives: To evaluate survival, QoL, and performance status after OHCA.

Methods: This retrospective, single-centre study included consecutive adult OHCA patients admitted to an Intensive Care Unit (ICU) from January 2017 to December 2019. Data were collected from clinical records (pre-hospital, emergency room, ICU, and post-discharge) and telephone interviews with survivors. QoL was assessed using the Cerebral Performance Category (CPC) scale and EQ-5D-5L questionnaire, while performance status was measured with the Eastern Cooperative Oncology Group (ECOG) scale.

Results: Of the 72 patients (mean age 61 ± 15 years), 26 (36.1%) survived to hospital discharge. Most OHCA events (84.7%) were witnessed, with 70.8% receiving basic life support (BLS) and 22.1% BLS with automated external defibrillator (AED). The most common OHCA

location was at home (43.1%), and cardiac causes accounted for 68.1% of cases. A shockable rhythm was present in 51.4%. Higher Glasgow Coma Scale (GCS) scores after return of spontaneous circulation (ROSC) were associated with improved ICU ($p < 0.001$, V-Cramer = 0.565) and hospital ($p < 0.001$, V-Cramer = 0.625) survival rates.
At hospital discharge, 65% of survivors had a CPC score of 1 or 2. Five years later, 19 patients were alive, with 92.5% of interviewed survivors maintaining CPC scores of 1 or 2. Most survivors (50%) reported "no problems" in EQ-5D-5L domains. However, declines were noted in "Mobility," "Usual Activities," and "Anxiety/Depression." The EQ-5D-5L index was 0.903 (SD = 0.193). Regarding performance status, 64.3% of survivors were able to perform at least sedentary work (ECOG score ≤ 1).
Conclusions: A total of 36.1% of OHCA patients survived to hospital discharge, with higher GCS scores after ROSC linked to improved outcomes. Long-term follow-up revealed that most survivors reported good QoL and functional performance.

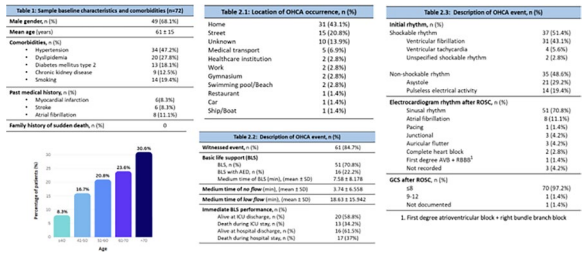


Image 1 .

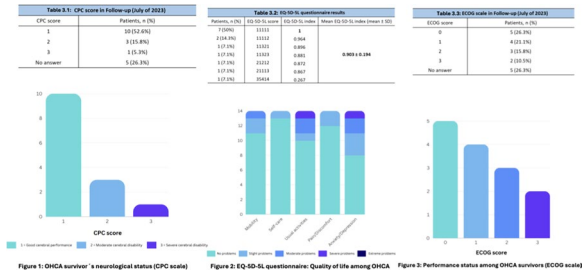


Image 2 .

Topic: Cardiac arrest.

001386

Effect of fluid challenge on microcirculation: a comparison between patients with and without venous congestion

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Intensive Care Medicine Experimental 2025,* 13(1)*:001386

Introduction: Recent evidence suggests that patients who respond to fluid administration may still have a sign of venous congestion. However, the behavior of the microcirculation in relation to venous congestion remains unclear. This study aimed to assess sublingual microcirculation before and after fluid challenge in critically ill patients with and without clinical signs of venous congestion.
Methods: Sublingual microcirculation was evaluated using the Cytocam at baseline and post-fluid challenge to measure Proportion of Perfused Vessels (PPV), Total Vessel Density (TVD), Perfused Vessel Density (PVD), and Microvascular Flow Index (MFI). The three highest-quality videos per timepoint, according to Massey Score, were manually analyzed using AVA 3.2 software. Patients were classified as congested based on the presence of ≥ 2 of the following criteria: VExUS score > 1, LUS score ≥ 10, central venous pressure > 10 mmHg, or lateral E/e' > 10. Patients with none or only one of these findings were categorized as non-congested. Fluid challenge consisted of 500 mL of crystalloids infused over 15 min.
Results: Ten critically ill patients were included in the interim analysis (median age 73.5 [59.4–79.6], SOFA score 7 [5–10.5], and SAPS II 53 [38.9–69.3]). A total of 60 microcirculatory videos were analyzed. Four patients showed no signs of venous congestion, two exhibited one sign, three had two signs, and one patient presented with three. At baseline, there were no significant differences in PPV, PVD, TVD, or MFI between groups. However, the mean MFI was lower in the congested group [mean 2.33 ($\pm$ 0.93)] compared to the non-congested group [mean 2.69 ($\pm$ 0.29)], suggesting impaired microvascular flow, albeit without statistical significance. Following fluid administration, PPV significantly increased in the non-congested group (from 95.43 [86.90–97.81] to 98.18 [96.44–98.78], $p = 0.03$, Fig. 1), whereas a slight, non-significant decrease was observed in the congested group (from 97.99 [77.69–99.01] to 94.81 [92.14–97.46], $p = 0.87$, Fig. 2). MFI increased no-congestion group after fluid challenge [from 2.69 ($\pm$ 0.30) to 2.89 ($\pm$ 0.15), $p = 0.06$], and a similar pattern was observed in patients with venous congestion, although values remained below 2.6 [from 2.33 ($\pm$ 0.93) to 2.54 ($\pm$ 0.37), $p = 0.59$]. TVD and PVD remained unchanged in both groups before and after fluid challenge.
Conclusions: In critically ill patients undergoing fluid resuscitation, those without signs of venous congestion demonstrate improvement in microcirculatory parameters, particularly PPV. Conversely, in the presence of two or more indicators of venous congestion, microvascular flow does not significantly improve following fluid administration.

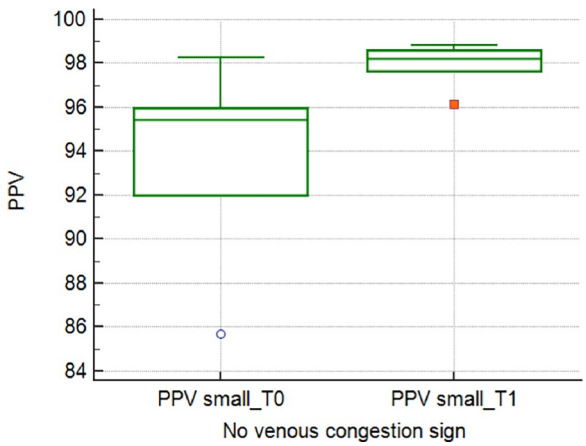


Fig. 1 .

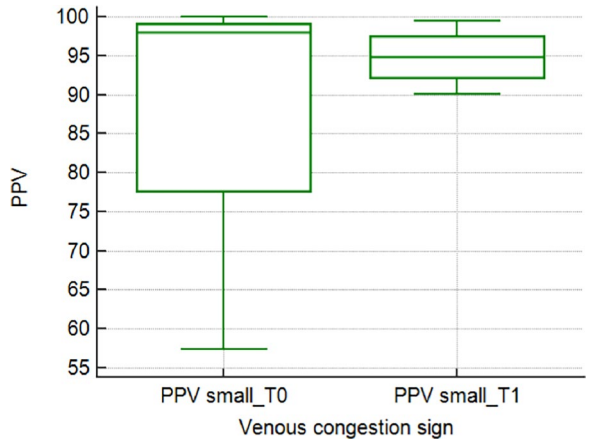


Fig. 2 .

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Topic: Cardiovascular issues in ICU.

001387

Predictors of ICU mortality following a cardiac arrest: a retrospective study from a tertiary care centre

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Intensive Care Medicine Experimental 2025,* 13(1)*:001387

Introduction: Cardiac arrest (CA) is a leading cause of death globally with poor hospital survival, ranging from 8% for out of hospital CA (OOHCA) to 34% for in-hospital CA (IHCA)[1]. Initial measures such as high-quality CPR and early defibrillation improve survival [2]. Identifying predictors of good outcomes would optimize patient care and aid decision-making.
Objectives: The aim was to retrospectively analyze data on patients admitted to the ICU after OOHCA or IHCA to assess for predictors of ICU survival.
Methods: Patients admitted to a 32 bed UK University tertiary centre adult ICU after a CA from 1/23 to 1/25 were included. Electronic medical records (EMRs) were used to obtain data. A multivariable logistic regression analysis was performed. Odds ratios (OR) and 95% confidence intervals (CI) were calculated.
Results: 77 patients were identified in total. Median age was 61 (IQR 46–74) and 60% were male. Median ICU length of stay was 4 days (IQR 1–7). 60% had had an OOHCA. A majority of patients had a non-shockable primary cardiac rhythm (71%). The median downtime was 18 min (IQR 10–32.5) with shorter downtimes in the IHCA subgroup (median 10.5 min, IQR 5–30). Mean admission pH and lactate were 7.22 ± 0.16 and 5.54 ± 4.84, respectively. Eleven variables showed a significant association with ICU mortality in univariate analysis (Table 1) and entered the logistic regression model.
Stepwise model construction identified acute kidney injury (AKI; OR = 17.67, 95% CI 1.13–275.63, $p = 0.041$) and the use of neuromuscular blockade (NMB; OR = 8.27, 95% CI 1.01–67.88, $p = 0.049$) was independently associated with mortality, whereas the duration of inotrope use (OR = 0.928, 95% CI 0.884–0.975, $p = 0.003$), a more positive base excess on admission (OR = 0.837, 95% CI 0.709–0.989, $p = 0.035$), was associated with an increased survival. None of the other variables were significantly associated with outcome in this model.

Table 1 Variables identified as significant predictors of mortality in univariate analysis and following adjustment in multivariable logistic regression

Variable	Survivors	Non-survivors	Univariate *p* Value	Multivariate *p* Value
Downtime (mins)	14.5 (5–18)	25 (13–35)	0.013	0.503
Shockable rythm	40%	7.7%	0.01	0.315
Admission pH	7.34 (7.25–7.4)	7.18 (7.05–7.28)	< 0.001	0.714
Admission P/F ratio	31.7 (21–44.2)	21.99 (12.98–32.88)	0.018	0.136
Admission lactate	1.98 (1.50–3.03)	5.07 (2.79–10.18)	0.025	0.742
Admission base excess	− 4.1 (− 8.9– − 0.9)	− 10.85 (− 15.68– − 7.40)	< 0.001	0.036
Pyrexia in first 72 h	68%	36.5%	0.029	0.204
NMB use	12%	50%	0.006	0.049
Duration of inotrope infusion (hrs)	39 (16.5–83.5)	12 (0–50.5)	< 0.001	0.003
AKI	16%	51.9%	0.002	0.041

Conclusions: This study found that post-cardiac arrest AKI and the use of NMB were predictors of ICU mortality. Interestingly, factors thought to be predictive such as admission pH and lactate, downtime and fever were not found to be independent predictors of mortality in this cohort. Sample size and high number of variables are some of the limitations of this study.

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Topic: Cardiac arrest.

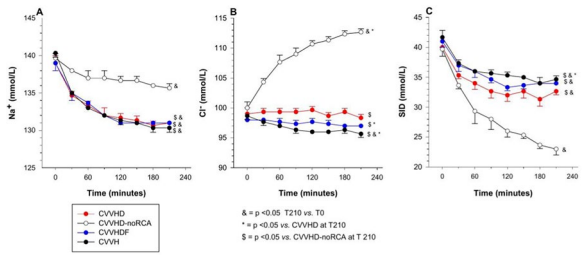
001388

Sodium, chloride, and SID variations induced by different CRRT modalities: an in-vitro study

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Introduction: Continuous renal replacement therapy (CRRT) is widely used in critically ill patients. Different CRRT modalities—hemofiltration (CVVH), hemodialysis (CVVHD), and hemodiafiltration (CVVHDF)—as well as employed dialysis fluid bags, including citrate-containing fluids for regional anticoagulation, impact plasma electrolytes and strong ion difference (SID) differently. This in-vitro study was designed to investigate these effects.
Methods: The PrisMax (Baxter), an ST150 filter, and a 2L fluid reservoir ([Na +] = 140 mmol/L, [Cl-] = 99 mmol/L) were employed, with a constant blood flow (150 ml/min) without weight loss. Biphozyl (Baxter) (Na = 140 mmol/L, Cl = 122 mmol/L) and Phoxilium (Baxter) (Na = 140 mmol/L, Cl = 116 mmol/L) were used as dialysis and reinfusion fluids, respectively. Regiocit (Baxter) (Na = 140 mmol/L, Cl = 86 mmol/L) was used in predilution, mimicking regional citrate anticoagulation (RCA). Four in-vitro experiments were carried out as follows. CVVH: Regiocit 1500 ml/h, Phoxilium 1500 ml/h; CVVHD: Regiocit 1500 ml/h, Biphozyl 1500 ml/h; CVVHDF: Regiocit 1500 ml/h, Biphozyl 750 ml/h, Phoxilium 750 ml/h; CVVHD-noRCA: Biphozyl 1500 ml/h. Samples were collected from the fluid reservoir at baseline and every 30 min, up to 210 min. Electrolytes were measured using the Radiometer ABL800 Flex analyzer. Each experiment was repeated in triplicate.
A simplified SID was calculated as [Na +]- [Cl-].
Results: Although [Na +] decreased in all experiments, the reduction was smaller with CVVHD-noRCA (**Panel A**). A slight decrease in [Cl-] was observed in all experiments, except for CVVHD-noRCA, where [Cl-] increased by nearly 15 mmol/L (**Panel B**). As a result, the simplified SID was reduced in all experiments. Its reduction seems associated with the use of the chloride-rich biphozyl and was thus particularly pronounced in CVVHD-noRCA (**Panel C**).
Conclusions: CRRT has a marked effect on plasma electrolytes and acid–base, which depends upon the chosen modality and the employed dialysis fluid bags.



White: CVVHD-noRCA.
Red: CVVHD.
Blue: CVVHDF.
Black: CVVH.
& = $p < 0.05$ T210 vs.T0* = $p < 0.05$ vs. CVVHD at T210$ = $p < 0.05$ vs. CVVHD-noRCA at T 210.

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Topic: Acute Kidney Injury and haemofiltration.

001389

Predicting ICU outcome after traumatic brain injury in patients admitted to a polyvalent ICU

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Introduction: Traumatic brain injury (TBI) is a frequent indication for intensive care unit (ICU) admission. Studies have shown that patients with TBI have better outcomes when cared for in specialized neurocritical care units (Sekhon et al., 2017). However, such specialized units are not available in many regional hospitals. In this study, we analyzed sequential TBI patients admitted to a polyvalent ICU in Portugal in 2024 to identify variables associated with good and poor outcomes in this population.
Objectives: 1. To characterize TBI patients admitted to a polyvalent ICU.
2. To identify variables associated with ICU survival and length of stay.
Methods: We conducted a retrospective observational cohort study of TBI patients admitted to a level 2 and level 3 polyvalent intensive care unit in Portugal in 2024. Patients with catastrophic brain injury admitted for organ donation assessment were excluded. Clinical and demographic data were collected from the electronic medical record. We used logistic and linear regression to analyze variables associated with ICU mortality and ICU length of stay (measured as days alive and out of the ICU to day 28), respectively.
Results: In 2024, 84 TBI patients were admitted to the polyvalent ICU with treatment intent. The median age of TBI patients was 57 (interquartile range [IQR]: 39, 72), and 24/84 (27%) were female. The median APACHE II score on admission was 7 (IQR: 3, 16), and the initial sequential organ failure (SOFA) score was 4 (IQR: 2.7). Invasive mechanical ventilation (IMV) was required in 40/84 (48%) patients for a median of 4.6 days (IQR: 1.6, 19.0), and an intracranial pressure (ICP) monitor was inserted in 21/84 (24.6%) patients for a median of 3.4 (IQR: 2.6, 4.7) days. At ICU discharge, 63 (75%) patients had improved, 11 (13%) were unchanged, 3 (3.6%) had worsened, and 7 (8.3%) had died. Non-survivors were older (77 vs. 56 years, $p < 0.001$), had higher APACHE II scores (median 28 vs. 7, $p < 0.001$), were more likely to be admitted to the level 3 ICU (100% vs. 36%, $p < 0.001$), were more likely to be mechanically ventilated (100% vs. 43.0%, $p = 0.004$), and were more likely to have an ICP monitor inserted (71.0% vs. 20.9%, $p = 0.006$). In regression models, the best predictor of ICU mortality was APACHE II score (ajusted r2 = 0.29), while the best predictors of ICU length of stay were male sex, SOFA score on admission, and the need for an ICP monitor.
Conclusions: In this TBI population, cared for in a polyvalent ICU, mortality was strongly associated with higher APACHE II scores on admission. Further studies are required to compare outcome prediction with existing scores such as the IMPACT score (Steyerberg et al., 2008; Yue et al., 2024).

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Topic: Neurointensive care.

001390

The place of the TAPSE/PASP in the diagnosis of right heart dysfunction in critically ill patients

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Introduction: Many intensive care unit (ICU) patients have heart failure. ICU treatments increase right heart load, requiring reliable parameters to assess right heart dysfunction (RHD).
Objectives: This study aims to investigate the degree of the right ventriculo-pulmonary artery (RV-PA) uncoupling [tricuspid annular plane systolic excursion (TAPSE)/pulmonary artery systolic pressure (PASP)] in the place of diagnosis of RHD in ICU patients.
Methods: We retrospectively analyzed ICU patients' echocardiographic and clinical data. 133 patients were included and stratified into tertile groups based on TAPSE/PASP ratio as < 0.30%, 0.30–0.50 and > 0.50. The diagnostic value of TAPSE/PASP was compared with other RHD parameters (figure).
Results: This study showed that as the TAPSE/PASP ratio decreased, the dimensions of both the right and left chambers of the heart progressively increased and left ventricle outflow tract velocity time integral and right ventricle outflow tract velocity time integral, stroke volume, cardiac output, and ejection fraction decreased. Compared with other RHD parameters, TAPSE/PASP better reflects right and left cardiac structural and functional changes and diagnoses in more patients. If TAPSE < 16 mm or RV-FAC < 35% is accepted as the gold standard for RHD, the matching TAPSE/PASP value was 0.48 mm/mmHg in this study population.

Table Echocardiographic characteristics by TAPSE/PASP tertile

TAPSE/PASP mean ± SD	Tertile 1 < 0.30	Tertile 2 0.30–0.50	Tertile 3 > 0.50	*p*
Age, yrs	75 ± 21	76 ± 11	66 ± 16	0.001
TAPSE, mm	14 ± 4	19 ± 3	20 ± 5	0.005
PASP, mm Hg	65 ± 20	47 ± 9	24 ± 13	0.005
TAPSE/PASP, mm/mmHg	0.23 ± 0.06	0.40 ± 0.07	1.13 ± 0.7	0.005
S' velocity, cm/s	11 ± 3	10 ± 4	10 ± 4	0.005
Right atrial area, cm^2	23 ± 6	19 ± 6	15 ± 5	0.005
RV basal diameter, cm	48 ± 7	43 ± 7	38 ± 7	0.005
RV fractional area change, % (RV-FAC)	0.34 ± 0.18	0.41 ± 0.12	0.46 ± 0.15	0.002
Pulmonary artery diameter, mm	26 ± 5	26 ± 6	25 ± 5	0.055
RVOT-VTI, cm	14 ± 5	19 ± 12	19 ± 14	0.014
LA area, cm^2	21 ± 8	20 ± 6	17 ± 6	0.025
LA volume, ml	71 ± 29	62 ± 30	47 ± 22	0.002
LVEDD, mm	48 ± 7	43 ± 7	38 ± 7	0.018
LVEF, %	54 ± 14	55 ± 13	56 ± 12	0.005
Early transmitral (E) vel, cm/s	0.94 ± 0.51	0.74 ± 0.25	0.70 ± 0.24	0.004
E/A ratio	1.4 ± 1.05	1.01 ± 0.56	0.98 ± 0.40	0.495
E/e' (mean)	10 ± 4	8 ± 4	8 ± 3	0.235
LVOT-VTI, cm	18 ± 7	20 ± 7	22 ± 7	0.002
Stroke volume, ml	69 ± 56	68 ± 27	71 ± 24	0.018
Cardiac output, l/min	5.6 ± 2.7	5.3 ± 2.3	5.6 ± 1.93	0.032
PVR, W	3.08 ± 1.02	2.11 ± 0.70	1.3 ± 0.6	0.005

AUC, area under the curve; CI, confidence interval; FAC, fractional area change; HFmrEF, heart failure with mildly reduced ejection fraction; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; LTOT, long-term oxygen treatment; MV, mechanical ventilation; RHD, right heart dysfunction; TAPSE, tricuspid annular plane systolic excursion.
Conclusions: TAPSE/PASP may be a good predictor of RHD in ICU patients and a good indicator of the degree of RV–PA uncoupling.

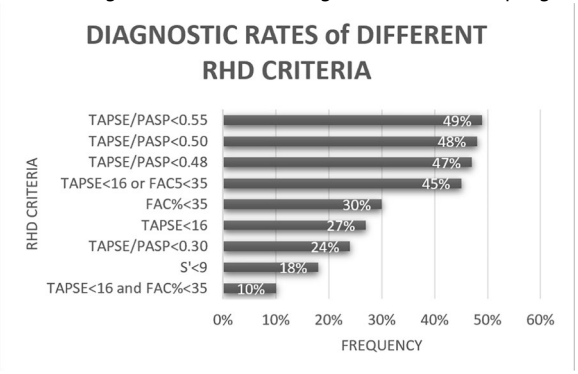


Figure right heart dysfunction rates according to different diagnostic criteria in the study populations.

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Topic: Cardiovascular issues in ICU.

001392

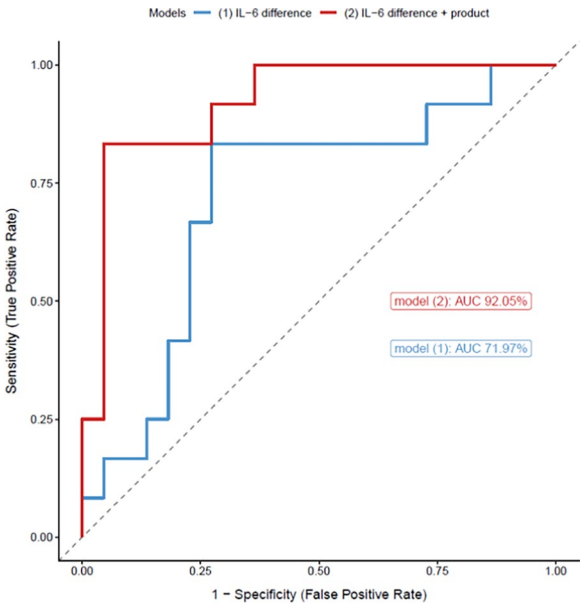
Interleukin-6 kinetics as predictor for development of ICANS after tocilizumab treatment in CAR-T cell recipients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001392

Introduction: With chimeric antigen receptor-*T* (CAR-*T*) cells being a growing therapeutic strategy for a variety of hematological diseases [1], intensivists are increasingly confronted with severe clinical complications. The two most common ones result from an overwhelming release of cytokines like IL-6 and are termed CAR-T-associated cytokine release syndrome (CRS) and the immune effector cell-associated neurotoxicity syndrome (ICANS) [2, 3]. CRS almost always precedes ICANS, which is characterized by neurological symptoms that can vary from light encephalopathy, up to cerebral edema and death [3]. As of today, tocilizumab (TOCI) is the treatment of choice against CRS, as it antagonizes peripheral IL-6 receptors [2]. However, TOCI is unable to cross the BBB [4], to the contrary to the rather small molecule IL-6. Both the rise of circulating IL-6 levels following TOCI administration [5] and its potential neurotoxic effects have been described [6]. Thus, it has been postulated that TOCI might worsen ICANS [7].
Objectives: The objective is to investigate first the predictive value of IL-6 kinetics through TOCI application and second of IL-six levels before TOCI for the later development of ICANS.
Methods: In the participating centers, Zurich (Switzerland) and Hannover (Germany), data were extracted retrospectively from patients diagnosed with CRS after CAR-T cell therapy, who received TOCI and had information about disease severity and longitudinal IL-6 levels. IL-6 levels within 24 h before TOCU administration, IL-6 levels up to 48 h after Toci administration, as well as the difference of these values were analyzed in respect of the occurrence of high-grade ICANS (grade 4) and the administered CAR-T product. The prediction of high-grade ICANS was evaluated with a logistic regression model and receiver operating characteristic (ROC) curves with Youden index.
Results: In a pre-analysis of 98 CAR-T cell patients of the University Hospital Zurich, 34 individuals that received TOCI and had available IL-6 and outcome data were included. Patients had a median age of 62 [interquartile range (IQR) 58–69] years and were predominantly male (65%). The most common indication for CAR-T cell therapy was diffuse large B-cell Lymphoma in 28 (82%) patients. Hospital survival in this cohort was 100%. ICANS grade 4 occurred in 12 (35%) patients. These patients had a significantly higher IL-6 increase across TOCI administration (Table 1). Furthermore, the prevalence of ICANS grade 4 was significantly higher in patients with Yescarta® ($p = 0.014$, Table 1).
Logistic regression with IL-6 difference as only predictor resulted in an ROC with area under the curve of 72%. The best treshold was found at 1734 ng/L with a sensitivity of 83% and a specificity of 73% for ICANS grade 4. Including the CAR-T product as a second predictor in the logistic regression model led to an area under the curve of 92% (Fig. 1). For presentation at Lives 2025, the final analysis for all patients from both centers will be available.
Conclusions: The kinetics of IL-6 before and after the application of TOCI has a predictive value for high-grade ICANS. Consideration of CAR-T cell product may further improve the predictive ability. This should be confirmed in prospective studies, as it could enable the timely identification of high-risk patients potentially allowing for early prophylactic treatment.

Table 1 IL-6 values and CAR-T cell product stratified by ICANS grade 4. Numbers are displayed as median (IQR) or count (percentage). 1Wilcoxon rank sum test, 2Fisher's exact test

Characteristic	ICANS grade 4		p-value
	No (N=22)	Yes (N=12)	
IL-6 pre TOCI	259 (48-817)	216 (170-529)	0.705[1]
IL-6 post TOCI	1397 (491-4398)	5111 (2339-7973)	0.074[1]
IL-6 difference (post–pre)	950 (222-3006)	3861 (2159-6749)	0.037[1]
Product:			0.014[2]
Kymirah®	9 (100)	0 (0)	
Tecartus®	3 (75)	1 (25)	
Yescarta®	10 (48)	11 (52)	



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Topic: Haematologic–oncologic issues in the ICU.

001393

A decade of automated data: what can it tell us about risk factors for reintubation?

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Introduction: Reintubation is a common complication in critically ill patients and is associated with worse outcomes, including increased mortality, longer ICU stays, and higher rates of ventilator-associated pneumonia. Classical studies have explored its risk factors, but often relied on limited data sets and manual data collection. The use of real-world data extracted automatically over extended periods offers a

unique opportunity to gain deeper, more comprehensive insights into this clinically relevant event.
Objectives: To explore risk factors for reintubation using clinical variables automatically extracted from the Clinical Information System (CIS). Secondary objectives included analyzing the clinical impact of reintubation and examining trends in reintubation rates over a 10-year period.
Methods: We conducted a retrospective, single-center observational study in a 28-bed polyvalent ICU at Hospital Universitari de Tarragona Joan XXIII (Spain) from January 2014 to December 2024. We included all patients over 18 years of age who received invasive mechanical ventilation (IMV) for more than 48 h. Exclusion criteria were: limitation of life-sustaining treatment before extubation, never extubated (due to tracheostomy, transfer, or death), or unplanned extubation. Reintubation was defined as extubation failure occurring within 48 h after extubation. Data were automatically extracted from the CIS using SQL and Python. Univariate analysis was performed using the Kruskal–Wallis test for continuous variables and chi-square for categorical variables. A multivariate logistic regression analysis was also conducted. Statistical significance was set at $p < 0.05$.
Results: A total of 62 clinically relevant variables were selected and successfully extracted automatically with a mean missing data rate of 6.5%, which decreased progressively over time. Among 1329 patients included, 152 (11%) were reintubated. Univariate analysis showed that reintubated patients had longer exposure to midazolam, lower Glasgow Coma Scale scores, higher heart rate (HR), higher pressure support (PS), and lower median SpO_2 in the 6 h preceding extubation. They also had longer duration of IMV and ICU stay prior to extubation. Antibiotic administration within 24 h prior to extubation was associated with a lower risk of reintubation. Classical risk factors—such as age, COPD, obesity, or heart failure—were not significantly associated with reintubation, except for prolonged IMV duration.
In the multivariate model, only higher HR and PS were independently associated with increased risk of reintubation. Recent antibiotic use showed a protective effect (Fig. 1). Reintubated patients had significantly longer ICU stay, longer duration of IMV, higher rates of ventilator-associated pneumonia, and higher ICU mortality, consistent with findings from previous studies.
Over the 10-year study period, reintubation rates declined from 10% to 20% in the early years to 6–8% in recent years, and from 12% before protocol implementation to 7% after (Fig. 2).

Conclusions:

1. Automated extraction of clinical data about reintubation is feasible and enables robust identification of reintubation risk factors in critically ill patients.
2. Longer mechanical ventilation, higher PS, and elevated heart rate increased risk of reintubation, while antibiotic seems to reduce it.
3. Reintubated patients have worse clinical outcomes.
4. Reintubation rates have declined over the past decade, coinciding with structured protocol implementation.

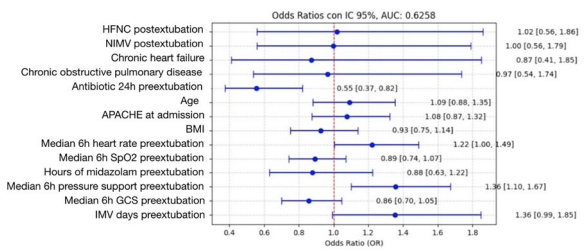


Figure 1 Multivariate analysis for reintubation

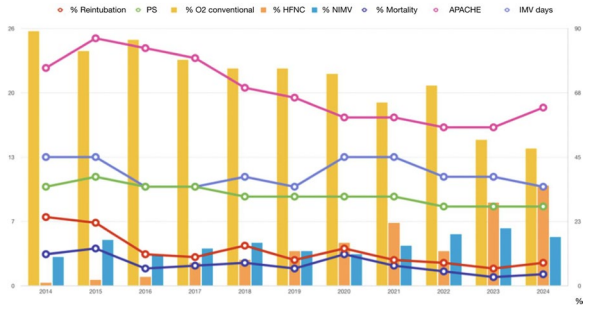


Figure 2 Evolution of reintubation data

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6. No grant acknowledge

Topic: Acute respiratory failure and mechanical ventilation.

001394

Preliminary results of "endothelial activation and stress Index (EASIX) in Sepsis: association with mortality and poor prognosis, a prospective observational study"

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Introduction: The EASIX, a prognostic tool utilized for predicting mortality and outcomes in hematological malignancies, has been demonstrated to be useful in risk stratification for sepsis in a limited number of retrospective studies (1–3). However, further validation is necessary to ascertain its efficacy in predicting mortality and prognosis in patients with sepsis.
Methods: The study was conducted between 09.01.2024 and 03.31.2025. Adult patients (≥ 18 years) with a diagnosis of sepsis were included in study after ethics committee approval (date: 03.09.2024, IRB no: 2744). Sepsis/septic shock and AKI were defined based on SEPSIS 3 and KDIGO guidelines, respectively (4.5). The EASIX score was calculated as follows: serum LDH U/L x creatinine level mg/dL/platelet

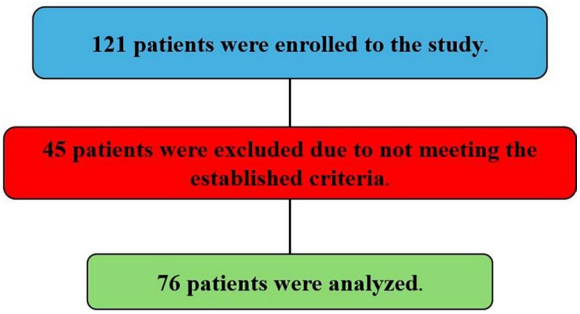
count × 109/mL. The relationship between the EASIX score and mortality was assessed using multivariate logistic regression and decision trees.
Results: Of the 76 patients included in the study, 42 (55.3%) survived (Fig. 1). The analysis revealed that deceased patients exhibited significantly higher rates of shock and the necessity for invasive mechanical ventilation ($p < 0.001$) and higher LDH, BUN, lactate, and EASIX scores and lower albumin levels compared to survivors (Table 1).

Table 1 Unadjusted vs. adjusted

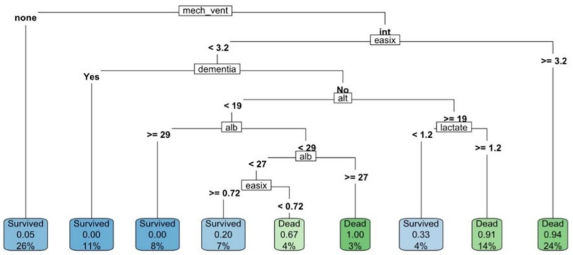
	Mortality			Mortality		
Predictors	***Odds Ratios***	***std. Error***	***Statistic***	***Odds Ratios***	***std. Error***	***Statistic***
(Intercept)	0.31 ** (0.14–0.62)	0.12	-3.10	0.29 (0.00–33.94)	0.71	-0.51
Albumine				0.86 (0.72–1.00)	0.07	-1.88
MV: none	*Reference*			*Reference*		
MV: int				56.50 ** (6.14–1642.05)	76.86	2.97
EASIX	1.38 ** (1.14–1.79)	0.16	2.73	1.61 * (1.17–2.57)	0.33	2.37
Lactate				1.40 * (1.05–2.04)	0.23	2.09
Observations	76			76		
R2 Tjur	0.203			0.533		

*MV: Mechanical Ventilation, * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$*

The univariate logistic regression revealed that an increase in EASIX scores was significantly associated with increased risk of mortality (OR = 1.38; 95% CI 1.14–1.79; $p < 0.01$; Tjur's $R^2 = 0.203$). This association remained statistically significant after adjusting for albumin, the necessity for mechanical ventilation, and lactate levels. The decision tree method (Fig. 2) validated the effect of EASIX score and mechanical ventilation in predicting mortality.
Conclusions: The preliminary findings of the present study, which are scheduled for completion in January 2026, demonstrate that EASIX score can be easily used to predict mortality in sepsis patients. Future studies should evaluate its validation in other settings such as postoperative patients.



Flowchart of the study.



Decision Tree.

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Topic: Sepsis.

001395

Enterobacteriaceae-related ventilatoryassociated pneumonia in burn patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001395

Introduction: Ventilator-associated pneumonia (VAP) due to Enterobacteriaceae represents a serious complication in burn patients, contributing to important morbidity and mortality.
Objectives: To determine the incidence, associated risk factors, and mortality related to Enterobacteriaceae-induced VAP inburn patients.
Methods: A retrospective study was conducted over a 2-year period (2022–2023) in Intensive Burn Care Department in Tunisia. Adult burn patients who developed VAP caused by Enterobacteriaceae were included. VAP diagnosis was based on the criteria established by the French Society of Anesthesia and Intensive Care (SFAR). Patients with VAP due to Enterobacteriaceae were compared to those with VAP from other pathogens to identify associated risk factors.
Results: During the study period, 856 patients were hospitalized burn patients, and 214 (25%) required invasive mechanical ventilation. A total of 79 VAP episodes were recorded in 64 patients, averaging 1.23 episodes per patient. Of these, 50 episodes (63.3%) were attributed to Enterobacteriaceae. The median patient age was 44 years [31.2–45 years], with a male-to-female ratio of 3.88. A majority of patients

(n = 35; 79.5%) were transferred from other hospitals. Thermal burns accounted for 91% of cases, and 57% were due to self-immolation. The mean total body surface area (TBSA) burned was 42.7 ± 20.3%. Polymicrobial VAP was observed in 72.7% of cases. The most frequently isolated Enterobacteriaceae were *Klebsiella pneumoniae* (52%), *Providencia stuartii* (34%), *Proteus mirabilis* (14%), *Enterobacter cloacae* (8%), *Escherichia coli* (6%), *Klebsiella oxytoca* (4%), and *Enterobacter aerogenes* (2%). These isolates were multidrug-resistant bacteria in 64% of cases, with resistance to carbapenems in 46% of cases, fluoroquinolones in 68% of cases, and aminoglycosides in 54% of cases. Independent risk factors associated with Enterobacteriaceae-related VAP included a history of psychiatric disorders (OR: 5.786; 95% CI [1.218–27.491]; p = 0.027), higher APACHE II scores (p = 0.028), and eosinopenia with a cutoff of 35 cells/mm^3 (p = 0.013, AUC: 0.669, sensitivity: 74%, and specificity: 65.5%) (Fig. 1). Septic shock was observed in 96% of cases and acute respiratory distress syndrome (ARDS) in 56% of cases. Recurrence of infection was reported in 22% of cases. Attributable mortality for Enterobacteriaceae-related VAP was 50%.

Conclusions: In our series, VAP due to Enterobacteriaceae is frequent (63%) in burn patients, commonly caused by Klebsiella pneumoniae, Providencia stuartii, and Proteus mirabilis, with high antimicrobial resistance and attributable mortality of 50%.

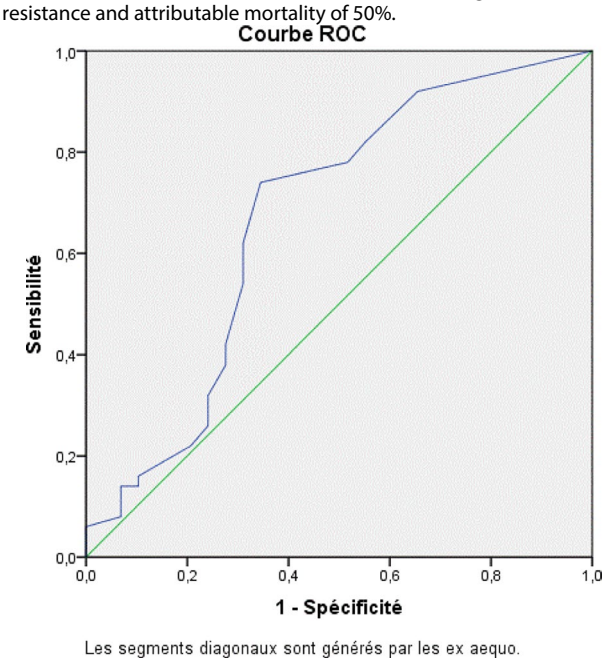


Figure 1 ROC curve of eosinopenia as predictive factor of Enterobacteriaceae-related VAP

Topic: Infections and prevention.

001396

Longitudinal serum proteomic analysis reveals dynamic protein expression changes during COVID-19-related ARDS progression

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Introduction: Acute respiratory distress syndrome (ARDS), caused by inflammation-mediated alveolar and endothelial injury, is a life-threatening condition with high mortality rates in the intensive care unit [1, 2]. Since the COVID-19 epidemic, ARDS cases surged around the globe, raising significant concerns regarding the absence of clearly defined therapeutic strategies [3]. In addition, the underlying pathophysiology of COVID-19-related ARDS remains unclear. In recent years, proteomic analysis has become a powerful tool to explore the host's molecular response to viral infections [4]. Longitudinal serum proteomic profiling in patients with COVID-19-related ARDS holds promise for identifying biomarkers and potential therapeutic targets.

Objectives: In this study, we investigate the dynamic changes in serum proteomic profiles of COVID-19-related ARDS patients and identify differentially expressed proteins associated with different clinical outcomes.

Methods: This is a prospective cohort study on critically ill COVID-19 ARDS patients without coexisting lung infections. After the diagnosis of ARDS, serum samples were collected at the baseline, 3 days after the diagnosis, and 6 days after the diagnosis. Mass spectroscopy was used to identify and quantify protein expressions. Differential expression analysis between the three timepoints and the subgroups stratified by ventilator-free days (VFD) was conducted using the Welch's t test. Multiple testing correction was applied using the Benjamini–Hochberg method. Functional enrichment analysis, such as gene ontology and KEGG pathway analysis, was used to characterize the biological activities of differentially expressed proteins.

Results: We collected serum samples from 17 patients diagnosed with COVID-19-related ARDS at three timepoints for proteomic profiling. In total, 5075 proteins were identified (Fig. 1). A marked shift in protein expression was observed between baseline and day 3, with 132 proteins upregulated and 45 proteins downregulated. In contrast, only three proteins were significantly upregulated between day 3 and day 6 (adjusted $p < 0.05$, $|\log_2 FC| > 1$). Gene ontology analysis showed that the most enriched upregulated proteins were associated with membrane, cytoplasmic, and mitochondrial activities (Fig. 2). Subgroup analysis between patients with different ventilator-free days within 28 days (VFD > 7 vs. VFD ≤ 7) further identified multiple differentially expressed proteins (Fig. 3). Several proteins were differentially expressed at more than one timepoint, and two proteins, NDUFAF3 and KIF1B, were consistently differentially expressed at all three timepoints.

Conclusions: This study demonstrates a significant proteomic shift in the disease progression of COVID-19-related ARDS, particularly within the first 3 days after diagnosis. Proteins associated with membrane, cytoplasmic, and mitochondrial activities were notably upregulated. Subgroup analysis based on ventilator-free days identified several proteins differentially expressed across multiple timepoints, suggesting their potential as biomarkers for different clinical outcomes.

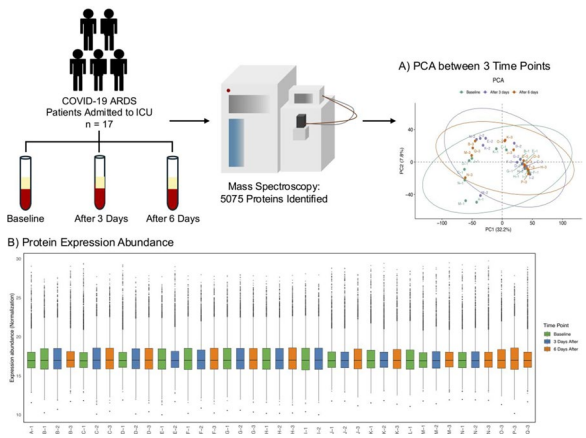


Figure 1 Experimental design and overall protein expression **A** PCA plot between protein expressions at baseline, 3 days after diagnosis, and 6 days after diagnosis. **B** Protein expression abundance of all samples collected in the study

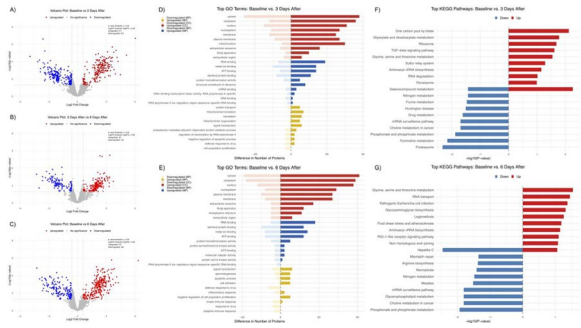


Figure 2 Differential analysis between different timepoints **A–C** Volcano plots showing differential protein expression between baseline and 3 days after diagnosis (**A**), between 3 days after diagnosis and 6 days after diagnosis (**B**), and between baseline and 6 days after diagnosis (**C**). **D E** GO analysis between baseline and 3 days after diagnosis (**D**) and between baseline and 6 days after diagnosis (**E**). **F G** KEGG pathway analysis between baseline and 3 days after diagnosis (**F**) and between baseline and 6 days after diagnosis (**G**)

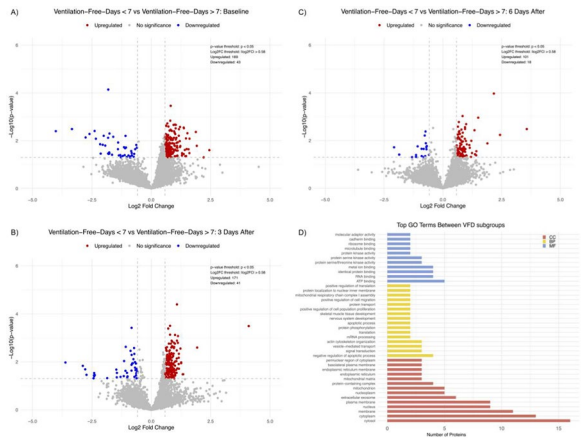


Figure 3 Differential analysis between subgroups with different ventilator-free days **A–C** Volcano plots showing differential protein expression between ventilator-free-day < 7 group and ventilator-free-day > 7 group at baseline (**A**), 3 days after diagnosis (**B**), and 6 days after diagnosis (**C**). **D** GO analysis showing top GO terms of most significant differentially expressed proteins between the two VFD groups across three timepoints

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Topic: Acute respiratory failure and mechanical ventilation.

001397

The impact of intra-abdominal pressure on urine output in postoperative cardiac surgery patients: insights from continuous monitoring

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001397

Introduction: Acute kidney injury (AKI) is a multifactorial condition, with postoperative cardiac surgical patients representing a distinct subgroup of critically ill patients. This study aims to investigate the effect of intra-abdominal pressure (IAP) on urine output (UO) in postoperative cardiac surgery patients during the stay in the Intensive Care Unit (ICU).
Methods: In this prospective pilot study, patients aged 18 years or older undergoing cardiac surgery with subsequent postoperative admission to the ICU of the University Medical Center Groningen (UMCG) were considered eligible for inclusion. UO and IAP were measured continuously via the bladder using the Accuryn Monitoring System (Accuryn Medical, Hayward, CA, USA) during ICU stay. Trends in IAP and UO were explored, and correlations between both their absolute values and their changes over time were assessed using Spearman's rank correlation. Finally, a linear mixed effect model was fitted to assess the fixed effect of IAP on UO while accounting for inter-patient variability through random effects.
Results: Thirty-six patients were included in this study, with a total of 3531 observations (Fig. 1). Eighteen patients developed AKI based on UO, according to the Kidney Disease: Improving Global Outcomes (KDIGO) criteria [1]. The median ICU length of stay was 18.3 h at the ICU (IQR 12–25). The median UO per 15 min was 0.5 ml/kg/hr (IQR 0.3–0.8), and the median IAP was 15.2 mmHg (IQR 12.4–18.5). The correlation between IAP and UO was − 0.3 ($p < 0.001$), while the correlation between changes in IAP and changes in UO was not statistically significant (0.02, $p = 0.25$) (Fig. 2). The linear mixed-effects model showed that IAP was negatively associated with logarithmically transformed hourly UO ($\beta = -0.067$, 95%CI − 0.08–(− 0.05), $p < 0.001$) (Fig. 3). One mmHg increase in IAP was associated with an estimated 6% decrease in UO.
Conclusions: In this exploratory pilot study, a linear mixed-effects model revealed a significant negative association between increased intra-abdominal pressure and urine output. Urine output in postoperative cardiac surgery patients during their ICU stay appears to be influenced by multiple factors, highlighting the need for further research to better understand these relationships.

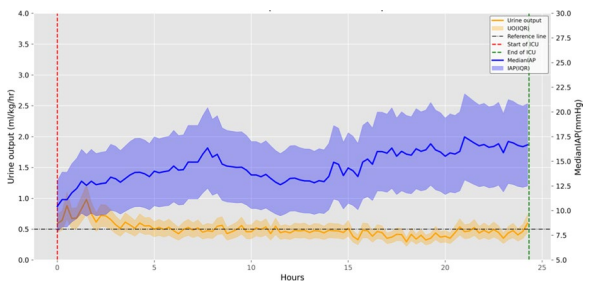


Figure 1 Median intra-abdominal pressure and urine output of 36 patients during ICU stay
IAP: intra-abdominal pressure.

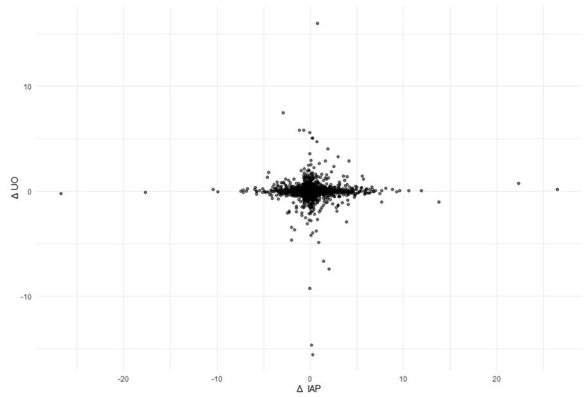


Figure 2 Scatterplot of Δ urine output per 15 min in ml/kg/h and Δ median intra-abdominal pressure per 15 min in mmHg
IAP: intra-abdominal pressure, UO: urine output.

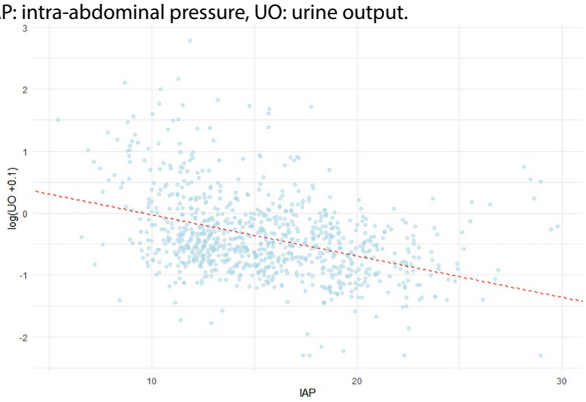


Figure 3 Visual representation of the fixed effect of intra-abdominal pressure on logarithmically transformed hourly urine output (red-dotted line)
IAP: intra-abdominal pressure, UO: urine output.

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Topic: Acute Kidney Injury and haemofiltration.

001398

A study of the use of corticosteroids in patients admitted to a single intensive care unit with community acquired pneumonia

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Intensive Care Medicine Experimental 2025,* 13(1)*:001398

Introduction: The use of steroids in severe community acquired pneumonia (CAP) has been shown to reduce mortality, and the society of Critical Care Medicine (SCCM) recommends the administration of corticosteroids in patients with septic shock and also patients hospitalized with severe CAP [1, 2].
Objectives: To investigate the use of corticosteroids in patients admitted to our intensive care unit (ICU) with severe CAP and the association of steroid use with vasopressor requirements, acute kidney injury (AKI) and ICU length of stay (LOS).
Methods: Patients admitted to ICU with CAP between April 2024 and April 2025 were identified using our electronic patient system. The use of steroids in these patients was investigated and summarized using descriptive statistics. Severe CAP was defined as per Dequin et al. [1], and steroid and vasopressor dose were described as hydrocortisone and noradrenaline equivalent, respectively [3]. Numerical variables were analysed using Wilcoxon rank sum test.
Results: We identified 29 patients admitted to our ICU with severe CAP. Fourteen (48%) had no vasopressor requirements, 15 (52%) required vasopressors, and 11 (38%) had a significant vasopressor requirement with noradrenaline equivalent dose of > 0.1 mcg/Kg/min. Of the patients with no vasopressor requirements, 6 (43%) received steroids and all survived. ICU LOS for the patients with severe CAP and no vasopressor requirements was 4.5 [3.25, 5] vs. 6 [5, 7.5] days, $p = 0.04$ for those that had steroids vs. those that did not (Fig. 1). Mean maximum steroid dose for those patients was 160 mg for 6 [3.5, 10.75] days. The incidence of AKI was similar in the patients with severe CAP who received steroids and those that did not (29% vs. 27%).
Of the patients that required vasopressors, eight (53%) received steroids and of the patients that had a significant vasopressor requirement, and six (55%) received steroids. Vasopressor dose for patients with severe CAP that survived ICU admission was 0.111 [0.036, 0.261] for those that had steroids vs. 0.184 [0.178, 0.21] for those that did not, $p = 0.56$ (Fig. 2).
Conclusions: Despite SCCM recommendations, under half of patients with severe CAP received steroids, and only about half with septic shock and significant vasopressor requirements were prescribed them. Our analysis showed significantly lower ICU LOS in severe CAP patients without septic shock who received steroids. Given the demonstrated mortality benefit of corticosteroids and the cost and bed pressures of prolonged ICU stays, education on their use in severe CAP—with or without septic shock—must be improved.

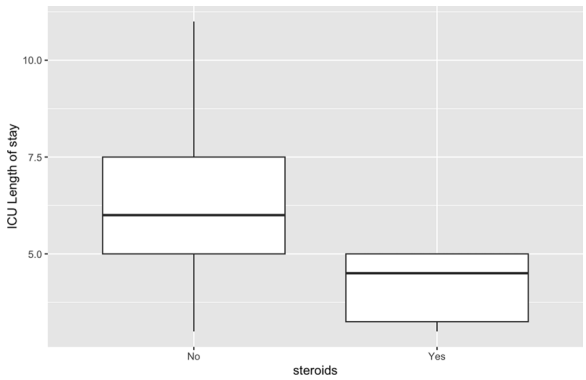


Figure 1 Boxplot of ICU LOS (days) for patients with severe CAP and no septic shock who did not and did receive corticosteroids

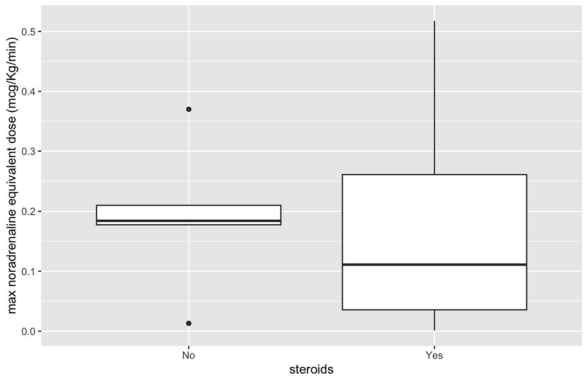


Figure 2 Boxplot of maximum noradrenaline equivalent dose (mcg/Kg/min) for patients with severe CAP who survived ICU admission and did not or did receive corticosteroids

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Topic: Sepsis.

001400

Accelerating sepsis diagnostics through culture-free bacterial detection in whole blood

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Intensive Care Medicine Experimental 2025,* 13(1)*:001400

Introduction: Sepsis diagnostics rely on blood cultures to identify bloodstream infections and guide antibiotic treatment. However, blood culture results may take 2–5 days, possibly delaying targeted therapy and leaving Intensive Care Unit (ICU) patients on broad-spectrum antibiotics without a confirmed source (1). Moreover, blood cultures may be unreliable after antibiotic use or for uncultivable pathogens (2).
Objectives: To evaluate a DNA-based method for broad-range bacterial detection in whole blood, delivering same-day results.
Methods: In an ongoing ICU study, 274 blood samples from 115 patients suspected of sepsis were collected alongside routine blood cultures. After human DNA depletion (Polaris, Philips), a broad-range PCR-based method targeting the 16S-23S bacterial DNA interspace (Molecular Culture®, Inbiome) was used, delivering results within 6 h. Molecular findings were compared with blood cultures and further validated using other patient cultures and clinical data.
Results: Blood cultures detected a pathogen in 47/274 samples; the molecular method in 63/274 samples. At the patient level, 24/115 patients had at least one positive blood culture vs. 34/115 by the molecular method. Overall, there was an 84% concordance between the molecular method and blood cultures (Fig. 1). Of these 84%, 79% were direct matches between molecular results and blood cultures taken simultaneously from the same anatomical location. An additional 3% of matches occurred when the molecular method identified bacteria missed by the corresponding blood culture but confirmed by other patient cultures taken at different times or from different anatomical sites. Another 2% of matches involved cases, where the molecular method did not detect bacteria, while blood cultures did, but these were classified as contaminants rather than true pathogens. Outside of the 84% concordance, in 5% of cases, the molecular method failed to detect a pathogen found by blood culture due to factors, such as low bacterial signal, the presence of yeast (not included in the bacterial molecular method), or other technical limitations. In 1% of the cases, each method identified different pathogens. In addition, the molecular method detected bacteria in an extra 10% of samples that were negative by blood culture. These additional detections seem to align with the patient's clinical course, including fever episodes and increases in inflammatory markers such as CRP, suggesting their potential clinical relevance.
Conclusions: This DNA-based method allows rapid bacterial detection from the same blood volume as cultures, shows strong concordance, and identified bacteria in an additional 10% of cases missed by blood cultures. This speed and knowledge could provide greater insights into the infection process of patients suspected of sepsis.

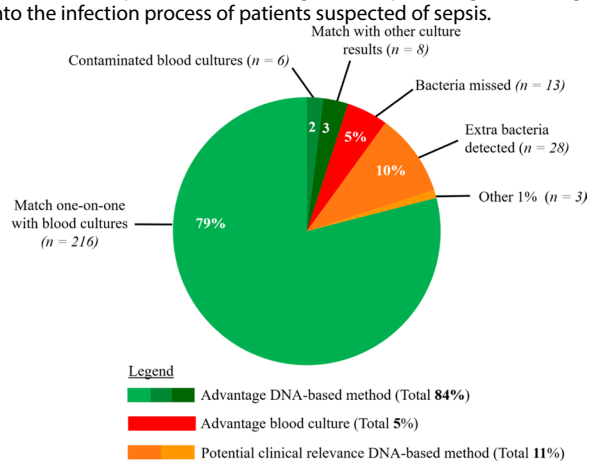


Figure 1 *Comparison of results from DNA-based method compared to traditional blood culture.*

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3. This research is funded through a TKI Grant from NL Health Holland for public–private partnership.

Topic: Sepsis.

001401

Association of frailty and pre-frailty with the prognosis of ICU-admitted patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001401

Introduction: Frailty is a multidimensional syndrome characterized by the loss of physiological reserves, which predisposes individuals to increased mortality, dependency, and institutionalization. It is independent of age and can occur in younger patients (< 65 years), although most studies exclude this group. The aim of this study is to analyze the impact of frailty and pre-frailty on the prognosis of critically ill patients and the factors associated with hospital mortality.
Methods: Prospective observational cohort study in a medical–surgical ICU. All patients admitted between October 2016 and May 2019 were included, except those transferred from other centers. Frailty was assessed based on the patients' pre-ICU physical condition using the nine-point Canadian Clinical Frailty Scale (CFS). Patients were categorized as non-frail (CFS $\leq$ 3), pre-frail (CFS = 4), and frail (CFS $\geq$ 5).
Categorical variables were described using frequencies and percentages, and continuous variables using medians and interquartile ranges or means and standard deviations. A multivariable logistic regression analysis was performed to evaluate significant differences between the three frailty categories, particularly regarding mortality. In addition, a univariable logistic regression was conducted to identify risk factors for hospital mortality in the frail–pre-frail group, followed by a multivariable analysis including statistically significant variables.
Results: A total of 1462 patients were included: 1141 non-frail, 250 pre-frail, and 71 frail. Median age was 66 years (range 15–93). ICU survival was 96.8% and hospital survival 93.8%. Higher hospital mortality was observed in pre-frail patients (RR 4.04 [2.11–7.74]) and frail patients (RR 5.88 [2.45–14.10]).
In the frail–pre-frail group, four factors were associated with increased hospital mortality, with no statistically significant differences in age: days of hospital stay prior to ICU admission (RR 1.08, CI 1.01–1.16), higher severity on admission (SAPS 3) (RR 1.07, CI 1.03–1.12), and the development of neurological deterioration (RR 4.14, CI 1.23–13.98) and/or thrombocytopenia (RR 11.46, CI 2.21–59.42) during ICU stay.
Conclusions: These findings support the identification of frailty and pre-frailty in all ICU patients, regardless of age, due to their association with increased hospital mortality. Mortality-related factors include pre-ICU hospital stay, illness severity at admission, and the occurrence of neurological deterioration and/or thrombocytopenia during ICU admission.

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Topic: Ethics and end-of-life care.

001402

The role of triglyceride–glucose index in acute kidney injury and acute pancreatitis severity: a retrospective cohort investigation

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Intensive Care Medicine Experimental 2025,* 13(1)*:001402

Introduction: The triglyceride–glucose (TyG) index is regarded as a dependable biomarker to gauge insulin resistance. The present work utilized standard blood tests to evaluate this cost-effective biomarker for its efficacy in predicting acute kidney injury (AKI) prognosis and the severity of acute pancreatitis (AP).
Methods: In the present retrospective cohort study, AP patients were recruited from the First College of Clinical Medical Science of China Three Gorges University between January 2019 and October 2023; a total of 1470 patients were included in the study. The TyG index was calculated as follows: ln [serum triglyceride (mg/dL) × serum blood glucose (mg/dL)/2]. Logistic regression models, curve fitting, sensitivity analyses, subgroup analyses, and receiver operating characteristic (ROC) curves were employed to assess the predictive efficacy of the TyG index.
Results: Among the included 1470 AP patients, 250 (17%) and 166 (11.3%) patients had AKI and severe acute pancreatitis (SAP), respectively. TyG was positively correlated with AKI and AP severity. TyG showed a positive linear relationship with both A*P* severity (P for non-linearity: 0.491, OR 2.06, 95% CI 1.04–4.1) and AKI (P for non-linearity: 0.966, OR 2.34, 95% CI 1.2–4.54). In addition, the correlation strengths of the TyG index with AP severity and AKI were revealed through sensitivity analyses and subgroup analyses. Significant interactions were not observed for age, sex, hypertension, diabetes mellitus, SOFA score, or AP severity (all p values for interaction > 0.05).
Conclusions: This work is the first attempt to indicate that the TyG index is crucial for evaluating the risk of AKI, and early severity screening is recommended in patients suffering from acute pancreatitis.
Topic: Acute kidney injury and haemofiltration.

001404:

Predictive value of pre-operative serum NT-proBNP in detecting delayed cerebral ischemia in post-procedure aneurysmal SAH: a prospective observational cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001404

Introduction: Aneurysmal subarachnoid hemorrhage (aSAH) is a critical neurovascular emergency affecting 2–16 per 100,000 individuals annually, with women at a 1.24-fold higher risk than men. 1 Complications arise in approximately 40% of cases, often leading to significant morbidity. Early diagnosis and timely intervention via neurosurgical clipping or endovascular coiling are vital to minimize secondary brain injury. Delayed cerebral ischemia (DCI), occurring in about 30% of patients within 3–14-day post-aSAH, contributes substantially to poor outcomes, with 50% of these individuals developing cerebral infarction. 2–4 Its multifactorial pathophysiology makes early prediction crucial. NT-proBNP, a marker of myocardial stress, may reflect neurogenic injury post-aSAH5. This study aimed to evaluate the prognostic role of preoperative NT-proBNP in predicting DCI in aSAH patients.
Objectives: Primary: To assess if elevated pre-op NT-proBNP levels predict DCI in aSAH patients. Secondary: To correlate NT-proBNP with troponin T, ECG changes, clinical grades, and long-term neurological outcomes (mRS, GOSE) and to determine its additive value to existing prediction models.
Methods: A prospective observational cohort study was conducted at PGIMER, enrolling 184 adult patients with angiographically confirmed aSAH undergoing clipping/coiling within 4 days of ictus after institutional ethics committee approval (IEC-INT/2023/MD-1326) and CTRI registration (CTRI//2023/11/059850). Patients with significant systemic illness were excluded. Pre-op NT-proBNP, troponin T, and ECGs were obtained. DCI was defined clinically and radiologically. Functional

outcomes were assessed using mRS and GOSE. Data were analyzed using logistic regression and ROC curves.
Results: DCI occurred in 56 patients (30.4%). NT-proBNP levels were significantly higher in DCI patients (mean: 1091.05 pg/mL vs. 328.90 pg/mL, $p < 0.001$) (Fig. 1). NT-proBNP correlated positively with severity scores (Hunt and Hess, WFNS, and MFS) (Fig. 2). In multivariate analysis, NT-proBNP (OR 1.11 per 100 pg/mL, $p < 0.001$), age (OR 1.07, $p = 0.004$), smoking, and MFS were independent predictors of DCI. ECG abnormalities (e.g., *T*-wave inversion) were more frequent in the DCI group and associated with elevated NT-proBNP. Higher NT-proBNP levels were linked to poorer mRS and GOSE scores at follow-up (Table 1).

Table 1 Association between serum NT-proBNP levels and DCI

Serum NT-Pro BNP (pg/mL)	DCI		Wilcoxon-Mann–Whitney *U* Test	
	Present	**Absent**	**W**	***p* value**
Mean (SD)	1091.05 (1408.58)	328.90 (548.60)	6045.000	< 0.001
Median (IQR)	**655 (381.75–1138)**	**163 (108.75–325)**		
Min–Max	**101–9045**	**10–4017**		

Table 2 Logistic regression for predictors of DCI

Variable	Adjusted OR	95% CI	*p*-value
NT-proBNP (× 100 pg/mL)	1.11	1.05–1.18	< 0.001
Age (years)	1.07	1.02–1.12	0.004
Smoker	20.94	1.63–625.43	0.034
Modified Fisher Score	1.68	1.04–2.90	0.046

Conclusions: Preoperative NT-proBNP is a valuable predictor of DCI in aSAH, particularly due to its high negative predictive value. Its integration into clinical risk models may enhance early risk stratification and guide patient management. While Trop T reflects disease severity, it does not independently predict DCI.

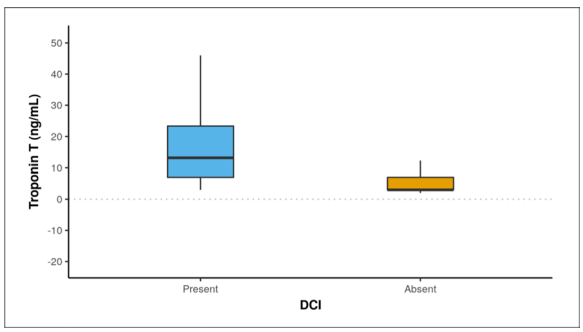


Figure 1 Box-and-whisker plot comparing NT-proBNP levels between patients with and without delayed cerebral ischemia (DCI)

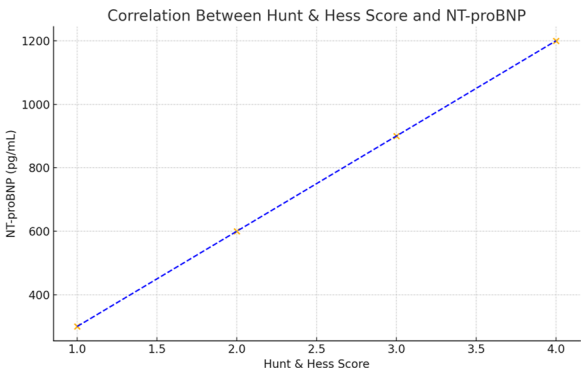


Figure 2 Scatter plot that shows a relationship between the Hunt and Hess score and NT-proBNP levels, indicating that higher biomarker levels are linked to more severe clinical conditions

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Topic: Neurointensive care.

001405

Evaluating the profile of patients on prolonged mechanical ventilation

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Intensive Care Medicine Experimental 2025,* 13(1):*001405

Introduction: Advances in intensive care have improved intensive care unit (ICU) survival but also increased the need for prolonged mechanical ventilation (PMV) [1]. PMV is defined as being mechanically ventilated for at least 21 consecutive days, 6 h or more daily [2]. Patients with PMV experience poor long-term outcomes and consume disproportionate amount of healthcare resources [3–4]. In 2010, USD$3.5 M was spent annually per independent survivor [5]. Beyond the financial burden, PMV survivors often face cognitive decline, impaired mental health, and reduced quality of life [6–9].
Objectives: Given the high healthcare burden and poorer outcomes associated with PMV, this study aims to characterize the epidemiological profile of PMV patients, identify clinical phenotypes, and evaluate their association with survival.
Methods: A retrospective single-center cohort study was conducted across the ICUs within Singapore General Hospital, a tertiary national referral hospital. Descriptive statistics were used to characterize the patients on PMV. K-modes clustering using R was performed to identify underlying patient subgroups based on comorbidity patterns.

Results: There were 8170 patients admitted to the ICUs from year 2000 to 2024. Of which, 48 patients required PMV. Mortality rate was 38/48 (79.2%) and readmission rate was 9/48 (18.8%). The average ICU and hospitalisation lengths of stay were 30.6 days and 88.3 days, respectively (Table 1). We identified five classes of patients (Table 2). With Class 1 as reference group, all the other four classes of patients demonstrate significantly higher mortality. *K*-mode clustering with $k = 5$ was selected based on the elbow method applied to the within-cluster dissimilarity metric to achieve optimal cluster cohesion and separation.

Table 1 Number of patients on PMV and their healthcare burden

Total number of patients requiring PMV	**48**
Readmission cases	18.8%
Mortality	79.2%
Average duration of ICU admission (days)	30.6
Average duration of hospitalisation (days)	88.3

Table 2 Comorbidity distribution by patient cluster and corresponding mortality

Class	**Characteristics**	**Mortality**	***P*-Value**
Class 1 ($n = 8$)	Neurological comorbidities	0.375	1
Class 2 ($n = 14$)	Respiratory comorbidities	0.857	0.018*
Class 3 ($n = 8$)	Cardiac and Endocrine comorbidities	0.875	0.041*
Class 4 ($n = 9$)	Oncological comorbidities	0.889	0.026*
Class 5 ($n = 9$)	Cardiac, Endocrine, Haematology and Oncological comorbidities	0.875	0.041*

Conclusions: PMV patients can be stratified by clinical phenotypes. Patients with only neurological comorbidities (Class 1) appear to have better survival than those in Classes 2–5 with other comorbidities. We aim to validate this classification in a larger ICU population over a longer time frame and develop a predictive algorithm for PMV outcomes. This may guide clinical management and support goal-of-care discussions for this unique patient group.

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Topic: Acute respiratory failure and mechanical ventilation.

001407

Plasma renin concentration as a potential marker of disease severity in patients with acute-on-chronic liver failure

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Intensive Care Medicine Experimental 2025,* 13(1)*:001407

Introduction: Acute-on-chronic liver failure (ACLF) refers to a syndrome observed in patients with acutely decompensated cirrhosis, characterized by a pronounced systemic inflammatory response, single or multiple organ failure, and high short-term mortality [1, 2]. In liver cirrhosis, alterations occur in both the classical and alternative pathways of the renin–angiotensin–aldosterone system (RAAS) [3, 4]. However, few data exist in ACLF about changes that contribute to elevated serum levels of renin and aldosterone.
Objectives: To evaluate the concentrations and kinetics of renin and aldosterone in patients with ACLF.
Methods: Adult (> 18 years) patients, admitted to the ICU between June 2024 and April 2025 with ACLF and included in a prospective ongoing registry (REAL registry, protocol SRB2024160), were analysed. We analyzed blood samples to evaluate renin concentrations at enrolment and at 24, 48, and 72 h after. We considered 172.7 pg/mL as the upper threshold for plasma renin levels ("high" renin), as indicated in the literature for patients with refractory shock [5]. We also recorded the clinical and demographic data of the patients.
Results: A total of 19 patients were enrolled, with 68.4% male, and a median age of 57 (IQR: 49–61) years. Patients with moderate-to-severe ACLF (grades 2–3, n = 16) exhibited significantly higher renin levels compared to patients with mild ACLF (grade 1, $n = 3$) at each timepoint (Fig. 1). Demographic and clinical characteristics were comparable between patients with high ($n = 14$) and normal ($n = 5$) renin levels (Table 1). High renin group also had significantly aldosterone levels [418 (141–618) pg/ml vs. 56 (49–82) pg/ml, $p = 0.01$]. The high renin group showed significantly higher CLIF-C organ failure [median 13 (min 10–max 17) vs. median 10 (min 9–max 12), $p = 0.01$] and SOFA score [median 14.5 (min 8–max 18) vs. 8 (min 7–max 15), $p = 0.02$] at T0 and over the study period than others (Fig. 2). More patients in the high renin group developed shock (79% vs. 20%, $p = 0.04$), with a significantly higher vasoactive–inotropic score at T0 [median 35 (min 0–max 86) vs. 0 (min 0–max 65), $p = 0.04$].
Conclusions: These preliminary analysis showed that most of the ACLF patients had high renin and aldosterone levels on ICU admission, in particular among those with greater ACLF severity.

Table 1 Demographic and clinical characteristics of patients in high and low renin group

CHARACTERISTICS	All patients (n 19)	High Renin (n 14)	Low Renin (n 5)	*p*
Age, median (IQR)	57 (49-60.5)	55.5 (43.5-59)	64 (57-66)	0.08
Male, n (%)	13 (68.4)	8 (57.1)	5 (100)	0.13
Chronic Liver Failure History, n. (%)				
Alcoholic hepatitis	18 (94.7)	14 (100)	4 (80)	0.26
Viral hepatitis	1 (5.3)	1 (7.1)	0 (0)	1.00
Metabolic hepatitis	1 (5.3)	1 (7.1)	0 (0)	1.00
NAFLD	1 (5.3)	0 (0)	1 (20)	0.26
Cause of Acute Decompensation, n. (%)				0.03
Alcohol	7 (36.8)	6 (42.9)	1 (20)	
Jaundice	1 (5.3)	0 (0)	1 (20)	
Jaundice-Ascites	4 (21.1)	4 (28.6)	0 (0)	
Metabolic	1 (5.3)	0 (0)	1 (20)	
Drugs	1 (5.3)	1 (7.1)	0 (0)	
Sepsis	2 (10.5)	2 (14.3)	0 (0)	
Cardiac Dysfunction	1 (5.3)	1 (7.1)	0 (0)	
Indeterminate	2 (10.5)	0 (0)	2 (40)	
Baseline ACLF characteristics				
ACLF grade, n (%)				0.02
- G1	3 (15.8)	0 (0)	3 (60)	
- G2	6 (31.6)	5 (35.7)	1 (20)	
- G3	10 (52.6)	9 (64.3)	1 (20)	
CLIF-C OF, median (IQR)	13 (10.5-13.5)	13 (12.3-14.8)	10 (9-11)	0.01
SOFA, median (IQR)	12 (9.5-16)	14.5 (11-16)	8 (7-9)	0.02
Child-Pugh grade, n (%)				0.08
- A	0 (0)	0 (0)	0 (0)	
- B	5 (26.3)	2 (14.3)	3 (60)	
- C	14 (73.7)	12 (85.7)	2 (40)	
MELD-Na, median (IQR)	31 (26-35.5)	32.5 (26.8-37.5)	29 (25-31)	0.15
VIS, median (IQR)	28 (4.5-52.5)	35 (21-53.8)	0 (0-0)	0.05
Renin pg/mL, median (IQR)	594 (155-1660) [n: 18/19]	1198 (588-1959) [n: 13/14]	52.1 (17.1-67)	0.01
Aldosterone pg/mL, median (IQR)	212 (78.8-460) [n: 18/19]	418 (141-618) [n: 13/14]	55.8 (49.2-82.2)	0.01
Outcomes, n. (%)				
ICU death	14 (77.8) [n: 18/19]	11 (84.6) [n: 13/14]	3 (60)	0.53
Listed for transplant	10 (55.6) [n: 18/19]	8 (61.5) [n: 13/14]	2 (40)	0.60
Developed shock	12 (63.2)	11 (78.6)	1 (20)	0.04

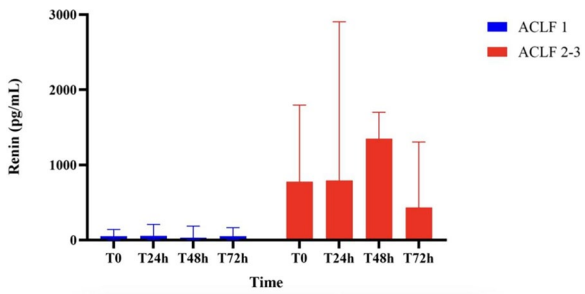


Figure 1 Renin levels at each timepoint (median + IQR) between patients with ACLF grade 1 and ACLF grades 2–3

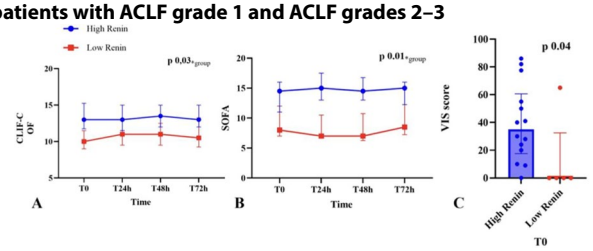


Figure 2 Trends in SOFA and CLIF-C OF scores across the timepoints and difference in VIS score at T0 between the high renin and low renin groups

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Topic: Metabolism, endocrinology, liver failure and nutrition.

001408

Revisiting the obesity paradox in critical care: insights from a retrospective ICU study

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Introduction: The impact of obesity on outcomes in critically ill patients remains controversial, particularly with the emergence of the "obesity paradox," which suggests a potential protective effect in certain ICU settings.

Objectives: This study aimed to compare the characteristics and outcomes of obese vs. non-obese patients admitted to the ICU and to identify factors associated with poor prognosis.

Methods: We conducted a retrospective, single-center study in the medical ICU of Zaghouan Regional Hospital between December 2022 and December 2024. Adult patients (≥ 18 years) with a documented body mass index (BMI) were included. Obesity was defined according to World Health Organization criteria (BMI ≥ 30 kg/m^2). Collected data included demographics, comorbidities, severity scores (Acute Physiology and Chronic Health Evaluation II [APACHE II], Simplified Acute Physiology Score II [SAPS II], Charlson Comorbidity Index, and 4C Mortality Score), therapeutic interventions, complications, and outcomes. The primary endpoint was in-hospital mortality.

Results: Of the 412 patients included (228 obese and 184 non-obese), obese patients were older (58 ± 12 vs. 56 ± 13 years, $p = 0.02$) and more frequently female. The mean BMI in the obese group was 34.2 ± 3.8 kg/m^2. They had significantly more cardiovascular comorbidities, notably hypertension and obstructive sleep apnea ($p = 0.01$ for both). While APACHE II and SAPS II scores were comparable, Charlson Comorbidity Index and 4C Mortality scores were higher in the obese group ($p = 0.02$ and $p = 0.04$, respectively). The primary causes of admission included respiratory failure (42%), septic shock (28%), and cardiogenic shock (18%). Complementary examinations, such as chest imaging and echocardiography, were performed in 85% of patients. Mechanical ventilation was utilized in 60% of cases, with no significant differences in ventilation modalities (invasive vs. non-invasive) or duration between groups. ICU-acquired complications, including ARDS severity, thromboembolic events, and healthcare-related infections, were similar in both groups. In-hospital mortality and ICU length of stay were also comparable. Cardiogenic shock occurred more frequently in obese patients and was independently associated with mortality ($p = 0.01$; OR = 2.52; 95% CI [1.3–4.87]). Interestingly, the incidence of post-COVID pulmonary fibrosis at 3 months was lower in obese patients ($p = 0.01$; OR = 0.50; 95% CI [0.30–0.85]). No significant difference was observed regarding post-traumatic stress disorder.

Conclusions: Obesity was not associated with increased mortality, ventilation duration, or ICU stay, reinforcing the "obesity paradox." However, this study highlights a reduced incidence of post-COVID pulmonary fibrosis in obese patients, suggesting a potential protective effect in this specific context. Further research is needed to explore the underlying mechanisms of these findings.

Topic: Metabolism, endocrinology, liver failure, and nutrition.

001409

The impact of the time spent in hyperoxemia and the neurological outcome of patients with subarachnoid hemorrhage

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Intensive Care Medicine Experimental 2025,* 13(1)*:001409

Introduction: Hypoxia is one of the potentially modifiable mechanisms of secondary brain injury in patients with subarachnoid hemorrhage (SAH) (1) (2). In fact, avoiding hypoxemia by supplementing oxygen is part of the management of these patients. However, hyperoxemia is potentially deleterious due to the excessive production of reactive oxygen species leading to increased cell death by apoptosis and increased release of endogenous damage-associated molecular pattern molecules (DAMPs) that stimulate an inflammatory response and vasoconstriction (3). However, studies in other acute brain injury etiologies have showed conflicting results regarding the impact of hyperoxemia on outcome and many gaps in the management of patients with SAH still exist (4).
Objectives: The objective of this study is to assess the impact of hyperoxemia on the neurological outcome of SAH patients.
Methods: This is a retrospective single-center study of subarachnoid hemorrhage patients admitted to the Intensive Care Unit (ICU) of Erasme Hospital from 2015 to 2023. We included only patients that had at least one arterial blood gas analysis per day in the first 21 days of their hospitalization or until discharge/death, whichever came first. We defined hyperoxemia as PaO2 > 120 mmHg. We calculated the % time spent with a PaO2 > 120 mmHg weighted by the duration of monitoring. Neurological outcome was measured by the Glasgow Outcome Scale (GOS) at 3 months. Unfavorable outcome was defined as GOS 1–3 (death, vegetative state/minimally conscious state, and severe disability.)
Results: We included 251 patients; the mean age was 55 years (± 14) and 153 (61.0%) patients were female. Most aneurysms were located in the anterior circulation (167, 66.5%), and 144 (57.4%) patients had poor clinical grade on admission. The median % of time spent in normoxemia, hyperoxemia, and hypoxemia was 88% (IQR 71–95%), 9% (IQR 0–29%), and 0 (IQR 0–1) of the duration of monitoring, respectively. Patients with unfavorable outcome (21% [IQR 9–41]) had a higher % of time spent in hyperoxemia compared to patients with favorable outcome (3% [IQR 0–11]) at 3 months ($p = 0.001$). In a multivariate logistic regression model adjusted for age, poor clinical grade on admission, presence of seizure, re-bleeding, delayed cerebral ischemia, and intracranial hypertension, the % of time spent in hyperoxemia was independently associated with unfavorable neurological outcome at 3 months (OR 1.04 95% CI 1.01–1.06).
Conclusions: In this study, a longer duration of hyperoxemia defined as a PaO2 > 120 mmHg was associated with short-term unfavorable outcome. Targeting normoxemia seems to be beneficial for SAH patients**.**

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Topic: Neurointensive care.

001410

Prospective evaluation of the outcomes of patients with central venous catheters inserted in intensive care unit: a preliminary report

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Intensive Care Medicine Experimental 2025,* 13(1)*:001410

Introduction: Central venous catheters (CVCs) are frequently used in intensive care units (ICUs) for hemodynamic monitoring, medication administration, and renal replacement therapies. However, CVC use carries a risk of complications, including infections, thrombosis, and mechanical injuries, which can adversely impact patient outcomes.
Objectives: This study aims to prospectively evaluate the frequency of catheter-related complications in ICU patients and identify clinical and laboratory factors associated with these complications.
Methods: This prospective observational study included 213 ICU patients who had CVCs inserted. Demographic data, comorbidities, ICU admission characteristics, and various clinical/laboratory parameters were recorded. Patients were divided into two groups based on the presence or absence of catheter-related complications. Statistical analyses were performed to identify significant differences between the groups.
Results: Complications occurred in 17% ($n = 36$) of the catheters. The complication group had a significantly younger median age (62 vs. 67 years; $p = 0.032$) and longer ICU stay (11 vs. 8 days; $p = 0.002$). Mechanical ventilation duration and vasopressor use were also significantly longer in patients with complications ($p = 0.031$ and $p = 0.039$, respectively). The Charlson Comorbidity Index was significantly lower in the complication group ($p = 0.038$). Blood–urea–nitrogen (BUN) levels were also lower in this group ($p = 0.020$), while other laboratory markers showed no statistically significant differences.
Conclusions: CVC-related complications in ICU patients are associated with younger age, prolonged ICU stay, and increased duration of mechanical ventilation and vasopressor therapy. Recognizing these factors may guide the development of strategies to reduce complication rates. Future studies should focus on identifying modifiable risk factors and implementing targeted protocols to prevent catheter-related complications in critically ill populations.

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Topic: Cardiovascular issues in ICU.

001411

The weight of survival: decoding mortality trends in the ICU

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Intensive Care Medicine Experimental 2025,* 13(1)*:001411

Introduction: Body weight and BMI are known to influence outcomes in critical illness, but evidence remains mixed regarding their independent prognostic value. This single-centre study investigates the relationship between admission weight, BMI category, and mortality in a large, unselected ICU cohort over a period of 4 years.
Methods: A retrospective analysis was conducted on adult patients admitted to the Intensive Care Unit at East Surrey Hospital, a UK District General Hospital, between January 2020 and December 2024. Weight and height were recorded on ICU admission, and BMI was calculated and categorized per WHO criteria. Patients were then stratified into 5-kg weight brackets, by which mortality was assessed, and rates were calculated per BMI and weight bracket. A polynomial regression model was then fitted to identify trends.
Results: Out of 3995 patients included in the study:

- Mortality rates ranged from 21% to 32% across BMI categories, with the **highest mortality observed in the mildly underweight group (32%).**
- In contrast, mortality in absolute weight brackets peaked in the 30–34.9 kg group (67%) but remained relatively stable (~ 20–28%) across the 45–124.9 kg range. The trendline indicates a **modest decline in mortality with increasing weight** until approximately 80–84.9 kg, beyond which rates plateau.
- Increased mortality was observed at both extremes:

  - **< 40 kg**—up to **67%** mortality
  - **> 110 kg**—up to **26%**

Conclusions: Mid-range weight brackets (e.g., 60–84.9 kg) have a consistent but moderate mortality rate (~ 23–29%), while both extremes (< 35 kg and > 115 kg) show mortality fluctuations, possibly indicating that both underweight and very high weight carry elevated risk of mortality. This suggests a potential U-shaped association between weight and mortality, and the existence of a protective weight ranges in critical care patients. Despite assumptions of worse outcomes with obesity, this study shows relatively consistent mortality from 45 kg up to 124.9 kg, supporting the hypothesis that having an underweight BMI, rather than overweight, may be a more critical risk factor in ICU settings.

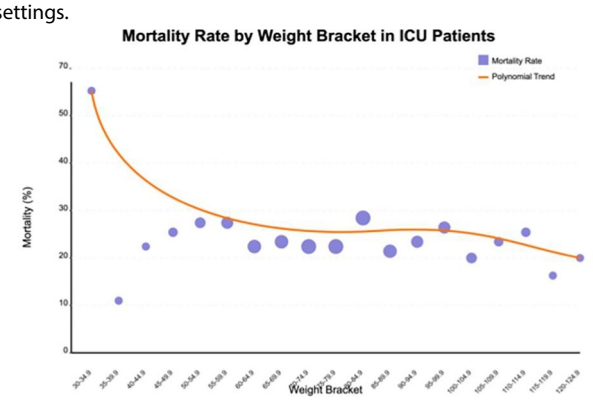


Figure 1 .

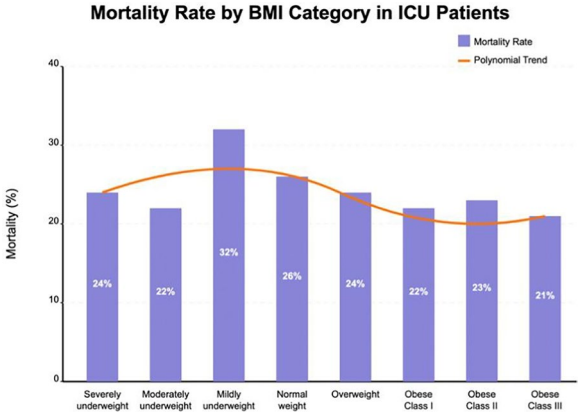


Figure 2 .

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Topic: Metabolism, endocrinology, liver failure, and nutrition.

001413

Evaluation of point-of-care creatinine and urea measurements in the ICU

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Introduction: In the ICU plasma, creatinine and urea are typically measured daily in blood samples sent to the clinical chemistry laboratory (CCL). We evaluated the use of point-of-care (POC) measurements of creatinine and urea in ICU patients.
Objectives: POC measurements of creatinine and urea performed in bloodgas samples were compared with CCL measurements.
We also assessed the ability of POC measurements to detect acute kidney injury (AKI) at an earlier stage [1].
Methods: Over a 10-week period in our mixed tertiary ICU, all POC blood gas measurements included creatinine and urea. These measurements were performed on the ABL90 radiometer analyzer in Li–heparin anticoagulated blood. The CCL measurements were performed on Roche Cobas PRO platforms in Li–heparin anticoagulated plasma. AKI was defined according to the KDIGO criteria [1]. POC and plasma samples were time-matched before linear correlation analysis.
Results: In 433 patients, a total 9779 POC creatinine/urea measurements were performed, with a mean (± SD) of 6.7 ± 3.9 assays/

day, during the study period. These were time matched with 1306 CCL measurements. Upon comparison of POC with CCL, for creatinine, R^2 was 0.994 with a 5.1% lower value of POC vs. CCL. For urea, R^2 was 0.987, with a 7.8% lower result for POC compared to CCL (both $P < 0.001$) level compared to the CCL.
The development of AKI was observed in 69 patients of whom 17 received renal replacement therapy. Another 85 patients showed apparent recovery from early AKI. The lab-based diagnosis of AKI could be made 11 ± 7 h (mean ± SD) earlier with the POC creatinine values. Furthermore, the high time resolution of POC measurements also facilitated the detection of pre-analytical errors.
Conclusions: The creatinine and urea levels reported by the POC system showed a good relation with those from the clinical chemistry laboratory. The considerably higher sampling density with POC measurement allowed earlier creatinine-based diagnosis of AKI, as well as the detection of other phenomena, such as early resolution from AKI.

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1. [1] KDIGO Clinical Practice Guideline for Acute Kidney Injury Kidney International 2012.
2. This study was supported by an unrestricted grant from Radiometer.

Topic: Acute kidney injury and haemofiltration.

001415
Stenotrophomonas-associated healthcare infection in severely burned patients
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Introduction: *Stenotrophomonas maltophila*, a human opportunistic pathogen, was associated with increasing incidence of nosocomial and community-acquired infections in immunocompromised patients, such as burn victims. It represents a significant challenge for microbiologists and clinicians.
Objectives: To study clinical, bacteriological, and evolutionary characteristics of *Stenotrophomonas* infections in severely burned patients.
Methods: A retrospective observational study conducted in the intensive burn care department in tunisia over a period of 4 years (June 2020–June 2024). All burn patients which had a *Stenotrophomonas* isolated from a microbiological sample were included. Demographic, clinical, microbiological, and evolutionary data were collected and analyzed.
Results: During the study period, 54 positive samples for *Stenotrophomonas* were recorded in 49 patients. The average age of our patients was 39 ± 15 years, with a male-to-female ratio of 1.52. Burns were thermal in the majority of cases (92%), resulting from domestic accidents in 54% of cases ($n = 26$) and suicide attempts in 33% of cases ($n = 16$). Seventy percent of patients ($n = 34$) were transferred from another hospital. The mean total burned surface area (TBSA) was 45 ± 20%. Seventy-one patients required invasive mechanical ventilation (IMV). *Stenotrophomonas* infection was confirmed in 20 patients (40% of samples) with a median onset of 9 days [5–12], associated with catheter-related infection in 10 patients, bacteremia in 7 patients, and ventilator-acquired pneumonia in 5 patients. Colonization was identified in 60% of cases ($n = 29$). The isolated species in all cases was *Stenotrophomonas maltophilia* ($n = 54$). Fifty-one (95%) strains were sensitive to minocycline, while 47 (87%) were sensitive to cotrimoxazole. All strains were sensitive to levofloxacin. Among the 20 patients with an infection, septic shock was observed in 90% of cases ($n = 18$). All infected patients were treated with levofloxacin. Mortality rate was 70%.
Conclusions: In severely burned patients, nosocomial infections with *Stenotrophomonas maltophilia* is reported in 40% of cases and is associated with septic shock in 90% of cases. Prevention remains the cornerstone of management, emphasizing adherence to hygiene, and the rational use of broad-spectrum antibiotics.

Topic: Infections and prevention.

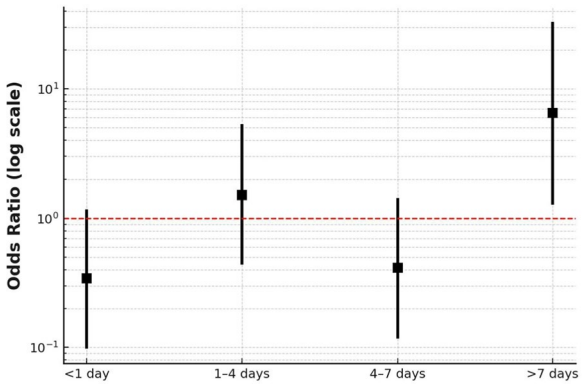
001416
Predictors of in-hospital mortality in patients with acute respiratory distress syndrome supported with venovenous extracorporeal membrane oxygenation: a 10-year single-center retrospective cohort study
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Introduction: Venovenous extracorporeal membrane oxygenation (VV-ECMO) has emerged as a life-saving intervention for patients with severe respiratory failure unresponsive to conventional therapies. However, prognostication remains challenging due to the heterogeneity in patient characteristics and clinical trajectories (1).
Objectives: This study aimed to identify independent predictors of in-hospital mortality in patients with acute respiratory distress syndrome supported with venovenous extracorporeal membrane oxygenation (VV-ECMO).
Methods: We conducted a retrospective cohort study of adult patients (≥ 18 years) who received VV-ECMO at a quaternary academic center in São Paulo, Brazil, from January 2012 to December 2022. To identify independent predictors of in-hospital mortality, we performed multivariable logistic regression analysis using a backward stepwise selection approach. Variables with $p < 0.10$ in univariable analysis were considered for inclusion in the model. Results were reported as adjusted odds ratios (aORs) with 95% confidence intervals (CIs). Statistical significance was defined as $p < 0.05$.
Results: A total of 74 patients were included, of whom 34 (46%) survived hospitalization and 40 (54%) did not. Non-survivors were significantly older than survivors (60 [51–63] vs. 52 [39–60] years; $p = 0.047$) and had a longer duration of invasive mechanical ventilation (IMV) prior to ECMO (5 [1–9] vs. 2 [0–6] days; $p = 0.045$). No significant differences were observed between groups in terms of sex, SAPS 3 score, COVID-19 status, comorbidities (e.g., hypertension, diabetes, solid tumors, COPD, and immunosuppression), laboratory markers, or ventilatory parameters prior to ECMO. There was a trend toward lower pH levels in non-survivors (median 7.14 vs. 7.24; $p = 0.066$), and a higher prevalence of norepinephrine use (70.0% vs. 47.1%; $p = 0.077$) and inhaled nitric oxide administration (25.0% vs. 5.9%; $p = 0.057$) prior to cannulation among non-survivors compared to survivors. In multivariable analysis, age ≥ 60 years (aOR 5.22; 95% CI 1.47–21.81; $p = 0.015$), prolonged IMV duration prior to ECMO (aOR 1.21; 95% CI 1.06–1.45; $p = 0.012$), and norepinephrine use (aOR 4.71; 95% CI 1.27–20.54; $p = 0.027$) were independently associated with increased in-hospital mortality (Table 1). The model showed good calibration (Hosmer–Lemeshow test: $p = 0.135$) and discrimination (AUROC = 0.81). Odds ratios for in-hospital mortality increased significantly with pre-ECMO IMV duration > 7 days, while shorter durations showed no significant association (Fig. 1).
Conclusions: In this 10-year single-center cohort, older age and clinical deterioration prior to VV-ECMO—as reflected by prolonged mechanical ventilation and vasopressor requirement—were independently associated with higher in-hospital mortality. These findings underscore the prognostic relevance of pre-ECMO physiological status and support the importance of early identification and careful selection of candidates to optimize outcomes.

Table 1 Logistic regression for hospital mortalilty

	OR	5%	95% IC	P-value
Age				
<60 years	reference			
≥60 years	5.22	1.47	21.81	0.015
IMV days prior to ECMO	1.21	1.06	1.45	0.012
Norepinephrine use	4.71	1.27	20.54	0.027

IMV: invasive mechanical ventilation.



IMV: invasive mechanical ventilation.

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Topic: Acute respiratory failure and mechanical ventilation.

001417

ICU-acquired infections: the role of immunosuppression in patient outcomes

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Introduction: Healthcare-associated infections (HAIs) are a global public health concern and represent the most frequent adverse event in hospitalized patients. Most HAIs are caused by multidrug-resistant micro-organisms and lead to high morbidity and mortality rates, prolonged hospital stays, and significant healthcare costs. HAIs are particularly prevalent in immunocompromised patients, that, as a result of medical advances, currently are a substantial proportion of ICU admissions.
Objectives: This study aims to epidemiologically characterize ICU-acquired infections (ICU-AI) and compare the mortality rates between immunocompromised and immunocompetent patients affected by such infections.
Methods: Observational study including patients admitted to an ICU of a Portuguese tertiary university hospital between January 1st and June 30th, 2025. Collected data included demographic variables (age and sex), immunosuppression status, invasive mechanical ventilation, development of ICU-AI, as well as the responsible pathogens, management, and patient outcomes. A patient was considered immunocompromised in case of active solid or haematological neoplasm, or current immunosuppressive therapy. The primary endpoint was defined as the development of ICU-AI and the secondary endpoint as in-hospital and ICU mortality.
Results: As shown in Table 1, 167 patients were included in the study, of whom 63 (37.7%) developed ICU-AI, resulting in 82 documented infections. Of the 167 patients, 125 (74.8%) were immunocompetent and 42 (25.1%) were immunocompromised. Of the 125 immunocompetent patients, 49 (39.2%) developed ICU-AI. In the immunocompromised group, 14 out of 42 patients (33.3%) developed infections during ICU stay. In immunocompetent patients, the most common infections were respiratory and urinary infections, whereas in immunocompromised patients, respiratory infections and bloodstream infections were the most frequently observed. In both groups, the predominant pathogens were Gram-negative bacteria. Of the 34 patients who died either in the ICU or in other hospital ward, 15 (44.1%) had developed ICU-AI, of whom 8 were immunocompromised and 7 immunocompetent.

Table 1 Characterization of study patients and ICU-acquired infections

	Immunocompetent	Immunocompromised
Number of patients	125	42
Sex	74 males; 51 females	29 males; 13 females
Mean Age	62 ± 15.9 years	64 ± 13.9 years
Number of patients with ICU-AI	49 (39.2%)	14 (33.3%)
Predominant type of ICU-AI	Respiratory and urinary	Respiratory and bloodstream
Predominant pathogens	Gram-negative bacteria (mainly P. aeruginosa, K. pneumoniae and E. coli)	Gram-negative bacteria (mainly *E. coli, P. aeruginosa,* and *K. pneumoniae*)
Outcome of patients with ICU-AI	7 died (14.3%)	8 died (57.1%)

Conclusions: The incidence of ICU-AI was similar in immunocompetent and in immunocompromised patients admitted to the ICU. However, mortality was higher in the immunocompromised group, with results demonstrating statistical significance ($p < 0.01$). It should be noted that this is a single-center on-going study and that only interim results are presented here.

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Topic: Infections and prevention.

001419

Pharmacodynamics of milrinone in critically ill patients: association between milrinone levels, vasodilatation, and vasopressor use

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Introduction: Milrinone is widely used as an inotropic and vasodilator in the ICU. In a previous pharmacokinetic study, we compared milrinone dosing with milrone plasma levels and the measured creatinine clearance. We found that the so-called intact nephron hypothesis holds for milrinone. This allows the estimation of milrinone levels when creatinine clearance is known. The current pharmacodynamic study examined the relation between milrinone levels and its vasodilatory effects.
Objectives: Assess the relation between milrinone levels and its vasodilatatory effects. This was done by relating the administered norepinephrine dose with milrinone plasma levels and the temperature difference (ΔT).
Methods: Only patients that received a continuous milrinone infusion were studied. Milrinone levels were determined from spent Li-heparined blood gas samples that were centrifuged before further plasma analysis by liquid chromatography–tandem mass spectrometry (LC–MS/MS). Norepinephrin dose was expressed as µg/kg/m and ΔT in ◦C. ΔT was calculated as the difference between the central temperature and the peripheral temperature of the patient. Recorded ΔT values were verified by two investigators. Recorded norepinephrin rates and ΔT were only compared with plasma levels determined within 90 min.
Results: 26 patients (38% females) with a mean ± SD age of 58 ± 13 years and a body weight of 77 ± 17 kg, received a continuous infusion of milrinone at rates varying from 0.09 to 1.0 µg/kg/m. In these patients, 432 milrinone plasma levels were determined from blood gas samples. Norepinephrine rates could be compared with 230 milrinone plasma levels and validated ΔT measurements. Median (IQR) ΔT was 3.5 (2.7–6.3)◦C, the median norepinephrine infusion rate was 0.07 (0–0.33), and the median milrinone levels were 162 (133–202) µg/L. Upon multivariate linear regression analysis, the milrinone level and ΔT were both independently related to the norepinephrine rate ($R = 0.57$; $P < 0.001$).
Conclusions: Measured milrinone levels are quantitatively related to its vasodilatatory effects. This underscores the utility of taking the renal function into account in milrinone dosing.

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Topic: Cardiovascular issues in ICU.

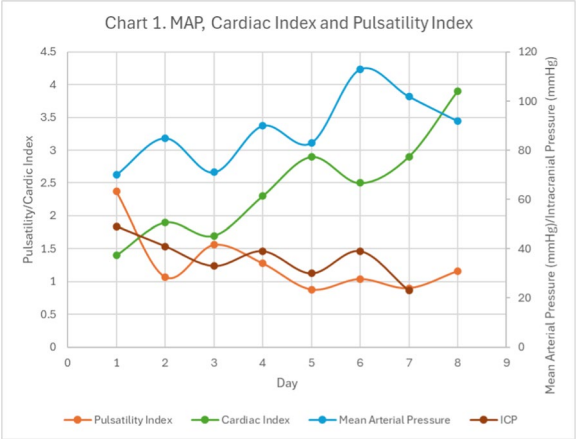
001421

Cardio-cerebral triangulation: a POCUS-guided approach to hemodynamic optimization in severe TBI

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Introduction: Echocardiography is routinely performed in patients with severe traumatic brain injury (TBI) at King's College Hospital. In this population, optimizing neuroprotection requires real-time integration of cerebral and systemic hemodynamics. ICP alone may become less reliable post-decompression. Transcranial Doppler (TCD) has been used to assess cerebral hemodynamics (5, 6) before and after decompressive craniectomy, though its utility is influenced by technical and physiological variables (1–4). Meanwhile, cardiac dysfunction—manifested as regional or global dysfunction, or even valvular abnormalities—can complicate cerebral perfusion optimization.
Objectives: We aimed to describe a hypothesis of a novel triangulated approach combining TCD, echocardiography, and cardiac output monitoring to guide neuroprotective hemodynamic optimization while preventing myocardial strain.
Methods: The triangulation method design involved daily integration of three data streams in severe TBI with escalating vasopressor requirements: (1) TCD metrics (PI and EDV of the MCA), (2) focused echocardiography using the BSE Level 2 protocol to assess systolic and diastolic function, structural valve abnormalities, regional wall motion abnormalities, and signs of pulmonary congestion, and (3) advanced cardiac output monitoring (PiCCO). MAP was adjusted to maintain PI > 1.3 and EDV > 20 cm/s while preserving CI > 2.0 L/min/m^2(7).
Results: The triangulation strategy provided a systematic approach to assess for focal or global dysfunction and structural abnormalities, including identification of a stress cardiomyopathy. Lung USS was required to further establish the extent of pulmonary congestion. The overall PI trends followed that of the ICP trace. This POCUS approach was observed in a patient post-decompressive craniectomy with increasing vasopressor needs. ICP-guided escalation to maintain

CPP > 60 mmHg led to myocardial strain—evidenced by troponin rise, ECG changes, pulmonary oedema, and impaired LV function. Introduction of our POCUS-guided strategy in a systematic approach enabled tailoring of noradrenaline and milrinone and reduction of the stress cardiomyopathy while maintaining adequate EDV and PI (Ch@art 1).
Conclusions: There is a need for a real-time, POCUS-guided cardiocerebral triangulation method for neuroprotective hemodynamic optimization in severe TBI. While individual components—TCD, echocardiography, and cardiac output monitoring—are established and have been in our hospital regularly, their dynamic integration at the bedside in a systematic manner is novel. Lung USS was found to be a pivotal addition to the protocol. Further work is warranted to validate this hypothesis across broader populations and clarify the outcome measures needed (such as imaging) to identify its impact on clinical outcomes.



Trends of ICP, MAP, CI, and PI over 9 days in a post-decompressive craniectomy patient.

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Topic: Imaging in intensive care.

001422

Role and mechanisms of Trex1 in mediating Irf3 nuclear translocation to enhance immune tolerance in sepsis

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Introduction: Sepsis, a prevalent post-traumatic complication, is defined as a life-threatening syndrome of organ dysfunction caused by a dysregulated host response to infection [1]. In 2017, approximately a mortality rate of 22.5%, accounting for nearly 20% of all deaths worldwide, was reported [2–4]. Immunosuppression is increasingly recognized as a critical determinant of sepsis-related mortality. TREX1, a critical mammalian exonuclease, is an upstream regulator of the STING–TBK1–IRF3 pathway. Loss of TREX1 function triggers autoinflammatory diseases [5]. However, the specific regulatory mechanisms of TREX1 in sepsis-induced immune tolerance remain unclear.
Objectives: To investigate the role and underlying molecular mechanisms of Trex1 in sepsis-induced immune tolerance.
Methods: To examine the intracellular localization of IRF3 and Trex1 proteins during the inflammatory and immunosuppressive phases, immunofluorescence and nuclear-cytoplasmic fractionation assays were performed. An endotoxin-induced immune tolerance model was established, and genomic DNA was extracted from cells for immediate agarose gel electrophoresis to evaluate DNA fragmentation. In addition, alkaline comet assays were utilized to further quantify single- and double-strand DNA breaks. The endogenous interaction between Trex1 and PARP1 was investigated using immunofluorescence, co-immunoprecipitation, and Coomassie Brilliant Blue staining. Prokaryotic and eukaryotic expression vectors tagged with EGFP and Cherry, respectively, were constructed, and droplet formation assays were conducted to assess whether Trex1 and PARP1 interact through liquid–liquid-phase separation. Subsequently, RAW264.7 cells were treated with the phase separation inhibitor 1,6-hexanediol, and the extent of genomic DNA damage was evaluated using agarose gel electrophoresis and alkaline comet assays.
Results: During endotoxin tolerance (ET), Irf3 and Trex1 predominantly localize to the nucleus, with reduced genomic DNA fragmentation and shorter comet tails observed (Fig. 1). Immunofluorescence staining revealed the co-localization of Parp1 and Trex1 in the nucleus of the endotoxin-tolerant group, and co-immunoprecipitation and Coomassie Brilliant Blue staining confirmed their interaction, identifying the NTF domain of Trex1 as critical for this interaction. In vivo and in vitro droplet formation assays demonstrated that Trex1 and Parp1 form liquid–liquid phase-separated condensates, which are disrupted by the phase separation inhibitor 1,6-hexanediol. Concurrently, treatment with the phase separation inhibitor led to increased genomic DNA fragmentation and reduced genomic stability (Fig. 2).
Conclusions: During endotoxin tolerance, Trex1 protein expression is upregulated and translocated to nucleus with Irf3, where IRF3 phosphorylation levels are reduced. Concurrently, PARP1 interacts with

Trex1 via liquid–liquid phase separation, enhancing genomic DNA stability. This mechanism likely contributes to immune tolerance in sepsis.

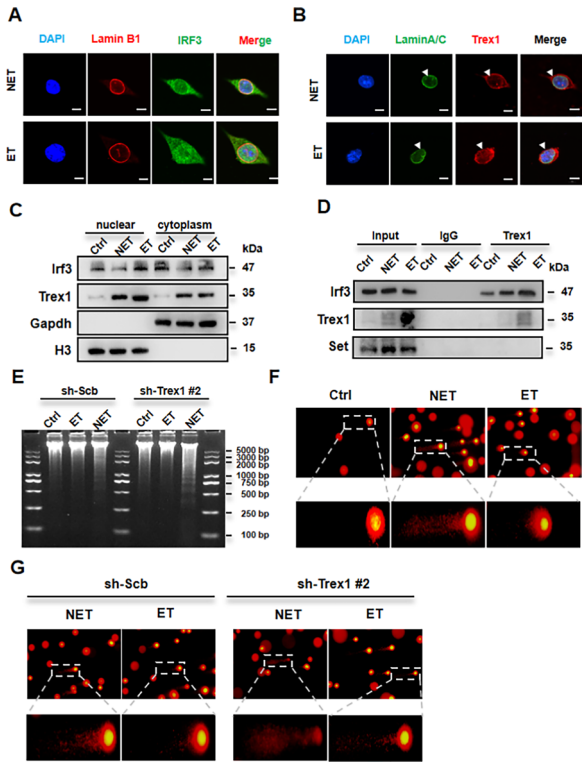


Figure 1 Trex1 facilitates IRF3 nuclear translocation and stabilizes genomic DNA. A Localization of IRF3 in endotoxin-tolerant (ET) and non-endotoxin-tolerant (NET) groups. **B** Localization of Trex1 in endotoxin-tolerant and non-tolerant groups. **C** Expression levels of Trex1 and IRF3 in nuclear and cytoplasmic fractions. **D** Co-immunoprecipitation assay confirming the interaction between Trex1 and IRF3. **E** Agarose gel electrophoresis assessing genomic DNA stability in endotoxin-tolerant and non-tolerant groups. **F, G** Comet assay evaluating the extent of genomic DNA damage in endotoxin-tolerant and non-tolerant groups

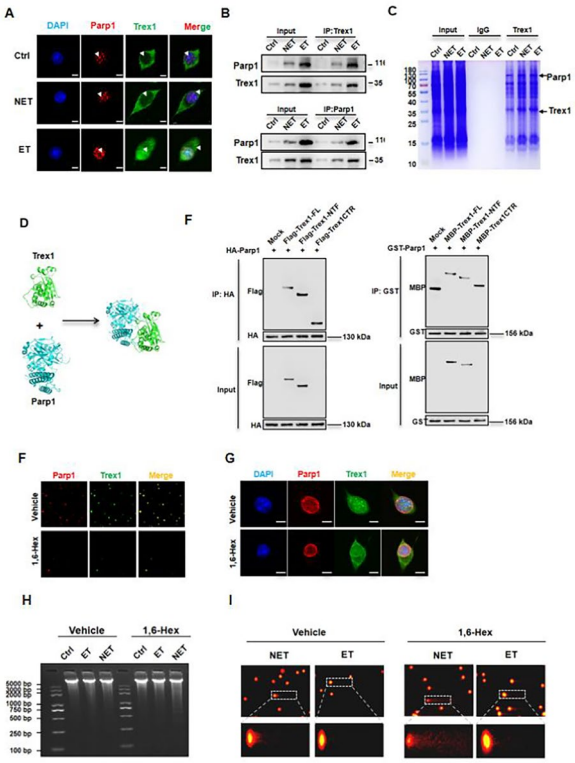


Figure 2 . Trex1 and IRF3 nuclear translocation and genomic DNA stabilization. A Immunofluorescence showing the localization of Trex1 and PARP1 within cells. **B, C** Co-immunoprecipitation assays indicating the interaction between Trex1 and PARP1. **D** Molecular docking results of Trex1 and PARP1 protein interactions. **E** In vitro binding assay revealing the interaction domains of Trex1 and PARP1. **F** In vitro droplet formation of Trex1 and PARP1. **G** Droplet formation of Trex1 and PARP1 within the cell nucleus. **H** Agarose gel electrophoresis showing the impact of phase separation inhibitors on genomic DNA stability. **I** Comet assay demonstrating the extent of genomic DNA damage following treatment with phase separation inhibitors

Topic: Sepsis.

001423

Potential organ donors in the ICU: a 10-year retrospective analysis in a Portuguese center

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Introduction: Organ transplantation remains the only effective treatment for many end-stage organ failures. Identifying and optimizing potential organ donors in the intensive care unit (ICU) are a cornerstone of donation systems. Portugal applies a presumed consent policy; however, legal limitations currently restrict donation after circulatory death (DCD). Only uncontrolled DCD (Maastricht II) is permitted, while controlled DCD (Maastricht III)—involving patients who die after planned withdrawal of life-sustaining therapy—is not authorized under current national law. Understanding the characteristics

of potential donors who did not progress to brain death may inform future policy considerations.
Objectives: To characterize patients admitted to the ICU as potential organ donors between 2013 and 2023, describe donation outcomes, identify reasons for non-donation, and evaluate patients potentially eligible for Maastricht type III DCD.
Methods: A retrospective descriptive analysis was conducted using data from the Portuguese National Transplant Registry (RPT) and clinical records. All patients admitted to a single ICU during the study period and recorded as potential donors were included. It is important to note that this registry does not capture all ICU admissions of patients with potential for organ donation—particularly those who did not progress to brain death and were not identified as potential donors during their ICU stay. Collected variables included demographics, comorbidities, presumed neurological cause, donation outcomes, and causes for non-donation. Patients were stratified into effective donors, non-effective donors (with confirmed brain death), and non-donors. A subgroup of patients who did not progress to brain death but died after withdrawal of life-sustaining therapy was analyzed for potential Maastricht type III eligibility.
Results: A total of 91 patients were identified. The mean age was 61.4 years (range 19–86), and 66% were male. Brain death was confirmed in 35 patients (38%), of whom 27 (77%) became effective donors. Kidneys (84%) and liver (63%) were the most frequently considered organs for procurement. Non-donation occurred in 56 patients (62%), with main reasons, including medical exclusion criteria, lack of progression to brain death, or intraoperative findings. Among non-donors, 14 patients (15%) fulfilled clinical criteria compatible with Maastricht type III DCD (mean age 63.7 years; 64% male). The most frequent comorbidities in the overall cohort were hypertension (63%), dyslipidemia (43%), cardiac disease (31%), and diabetes mellitus (22%).
Conclusions: This 10-year single-center study reveals that, although a substantial proportion of potential donors became effective, many patients did not progress to organ donation despite supportive clinical profiles. The identification of patients compatible with Maastricht type III DCD highlights the relevance of re-evaluating current legal frameworks to potentially expand the donor pool and improve transplant availability.

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Topic: Brain death, organ donation, and transplantation.

001425

The impact of occupational therapy within a specialist critical care rehabilitation team

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Introduction: Occupational therapists (OT) provide functional rehabilitation to reduce ICU-acquired delirium and reduce ICU and hospital length of stay (LOS) and holistic outcomes (1, 2).
Objectives: To evaluate the role of OT in a Critical Care Physiotherapy Rehabilitation Team (CCRPT) and their impact on patient outcomes.
Methods: The CCPRT provides enhanced daily rehabilitation to patients requiring > 4 days of mechanical ventilation (MV), excluding those with traumatic or neurological injuries. Before the QIP, OT was staffed at a ratio of 1:30 level 3 beds, reviewing patients on a priority basis. Retrospective data were collected between September 2022 and August 2023 and compared to data post-implementation of an OT, between December 2023 and June 2024.
Results: 133 patients were included in analysis. No difference in patient demographics, acuity of illness, or ICU management was observed between cohorts (Table 1). A non-statistical reduction in MV days (21 v 18, P = < 0.05) and incidence of delirium was observed (76 vs. 61.3% post). All patients were reviewed by an OT post-QIP, seen 8 days earlier (23 vs. 15), with an increased number of contacts (2 vs. 5), and interventions (50 v 296). Postural management and cognitive and perceptual interventions were most frequently provided.
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Table 1 .

Demographics		Statistic			*p* value
	N	**Pre OT**	***N***	**Post OT**	
Age at Admission (Years)	71	60 (44–69)	62	59 (51–72)	0.246
Gender (% Male)	71	41 (58%)	62	46 (74%)	0.364
APACHE II	69	17.6 ± 5.6	62	18.9 ± 6	0.185
Outcomes					
Duration of MV (days)	68	21 (10–32)	56	18 (11–28.5)	0.667
ICU Length of Stay (days)	67	25 (17–40)	56	26 (16–35)	0.728
Incidence of delirium	71	54 (76.1%)	62	38 (61.3%)	0.43
Hospital Length of Stay (days)	60	40 (26–54)	48	50.5 (31.75–69.25)	0.0349
OT Service Delivery					
Seen by OT	71	18 (26%)	62	62 (100%)	
Time from ICU admission to OT assessment (days)	18	23 (16–38)	62	15 (11.25–18)	
Total number of OT contacts on ICU	18	2 (1–2.75)	62	5 (3–9)	
OT interventions delivered	50		269		
Cognition and perception	11		60		
Postural management	13		66		
Psychological intervention	5		46		
Equipment provision	6		30		
Upper limb intervention	8		54		
Patient or NOK education	5		40		
Discharge planning	2		0		

*All figures displayed as median (interquartile range) unless specified.
Conclusions: Despite the positive impact of OT in the CCRT, no impact on hospital LOS was observed. Further research is required to determine the impact of functional interventions.

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Topic: Nursing care and physiotherapy.

001426

The association of fluid balance and outcomes in critically ill patients with septic shock

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Intensive Care Medicine Experimental 2025,* 13(1)*:001426

Introduction: Fluid management remains a cornerstone in the treatment of septic shock, but excessive positive fluid balance (FB) may have deleterious effects. Identifying optimal fluid balances may help guide resuscitation practice.
Objectives: To assess the association of cumulative fluid balance during the first 72 h of Intensive Care Unit (ICU) admission with in-hospital mortality in septic shock patients. Secondary outcomes included evaluating the association between fluid balance and weaning from invasive mechanical ventilation and vasopressor support.
Methods: This single-center retrospective study included 45 adult patients with septic shock admitted to a polivalent ICU between January and December 2023. Patients were stratified by cumulative fluid balance (< 4 Liters vs. ≥ 4 Liters) in the first 72 h. Demographic, clinical, and outcome data were compared between groups. Survival analysis and Mann–Whitney or chi-square tests were used as appropriate.
Results: Higher fluid balances in the first 72 h of ICU admission were associated with higher severity of illness, more vasopressor use and more prolonged mechanical ventilation. A fluid balance ≥ 4L in the first 72 h was significantly associated with increased intra-hospital mortality (89% vs. 11%; $p < 0.001$), even after adjustment for illness severity. No differences were noted between surgical and non-surgical patients. The strongest predictor of mortality was a persistently positive daily fluid balance on each of the first 3 days of ICU admission (73.5% vs. 18.2% mortality, $p < 0.001$).
Conclusions: In this single-center retrospective study, a cumulative positive fluid balance ≥ 4L during the first 72 h of ICU admission was associated with significantly higher in-hospital mortality. Moreover, a persistently positive fluid balance over the first 3 days of ICU admission appeared to be an independent marker of poor prognosis. While there was a trend toward greater vasopressor dependence and more prolonged mechanical ventilation in patients with FB ≥ 4L, a larger sample size is required to confirm these associations. Larger, multicenter prospective studies are needed to validate these findings and assess whether earlier fluid restriction can improve patient outcomes.

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Topic: Sepsis.

001427

Inflammatory biomarkers associated with delayed cerebral ischemia in patients with aneurysmal subarachnoud hemorrhage

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Introduction: Aneurysmal subarachnoid hemorrhage (aSAH) is a critical neurological condition with high morbidity and mortality. Delayed cerebral ischemia (DCI) is one of its most severe complications that could to be influenced by inflammatory processes. Identifying early biomarkers of inflammation could improve the prediction and management of DCI.
Objectives: To identify plasma inflammatory biomarkers associated with the development of DCI in patients with aSAH using high-throughput proteomic analysis.
Methods: Prospective study including 16 aSAH adult patients admitted to the ICU, of which 8 developed DCI and 8 did not (controls), matched by age, sex, and clinical severity. Plasma samples were collected within 24 h of ICU admission. Protein expression profiling was performed using Olink Proteomics' proximity extension assay (PEA) across 8 panels (2943 proteins total). Statistical analysis involved linear Bayes models (limma package) with false discovery rate (FDR) correction. Significant proteins ($p < 0.01$) were visualized using volcano plots and heatmaps.
Results: There were no statistically significant differences in baseline characteristics—such as sex, age, comorbidities, or severity scores—among the 16 SAH case patients.
The 11 proteins showing the lowest expression levels in DCI patients compared to controls ($p < 0.01$) were CA3, PROK1, THSD1, and MYL4 which are the only biomarkers belonging to the neuroloinflammatory panel, whereas the remaining proteins belong to the oncologic biomarcer panel (Fig. 1).
Conclusions: This exploratory analysis identified inflammatory and metabolic biomarkers potentially involved in the pathogenesis of DCI following aSAH. Further validation in larger cohorts is needed to confirm these findings and explore their clinical utility.

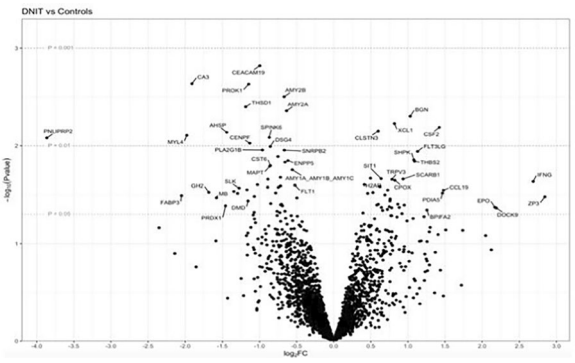


Figure 1 Volcano plot showing differentially expressed proteins between patients with DCI and controls obtained by Olink proteomics assay

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Topic: Neurointensive care.

001428

Multi-omics study reveals postoperative risk of critically ill patients after cardiac surgery with cardiopulmonary bypass

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Intensive Care Medicine Experimental 2025,* 13(1)*:001428

Introduction: Patients undergoing cardiac surgery with cardiopulmonary bypass (CSCPB) are at substantial postoperative risk, which may be influenced by alterations in gut microbiota and metabolites. The roles of these biological changes in postoperative outcomes remain inadequately explored.
Methods: We collected 54 preoperative samples and 33 postoperative samples from 60 CSCPB patients. Metagenomic and metabolomic sequencing were performed to identified the gut microbiota and serum and fecal metabolites. We examined the dynamics pattern of these microbiota and metabolites, as well as their associations with the postoperative risk. In addition, we developed a predictive model for postoperative risk based on preoperative microbiome and metabolome data.
Results: We revealed significant alterations of gut microbiota (P = 0.012), serum metabolites (P = 3.50e-10), and fecal metabolites (P = 0.0081) in patients following CSCPB, among which lysophosphatidylcholines (LPCs) exhibited notable changes. Particularly, we identified a potential regulatory function of the microbiota on LPC metabolism, which further influence the postoperative risk. The predictive model for ICU stay duration achieved a mean absolute error (MAE) of 1.27 days and R^2 of 0.63, suggesting its utility in assessing postoperative risk. In addition, this study provides a valuable resource (catalogue GM3C) for further investigation into potential medical targets in CSCPB patients, comprising more than 2000 metagenome-assembled genomes and 3 million unigenes.
Conclusions: This study provides valuable insights and resource for understanding the gut microbiome and metabolome in CSCPB patients. The findings highlight the potential of microbiome and metabolite analysis in predicting postoperative outcomes, offering opportunities for improved risk management and patient care.

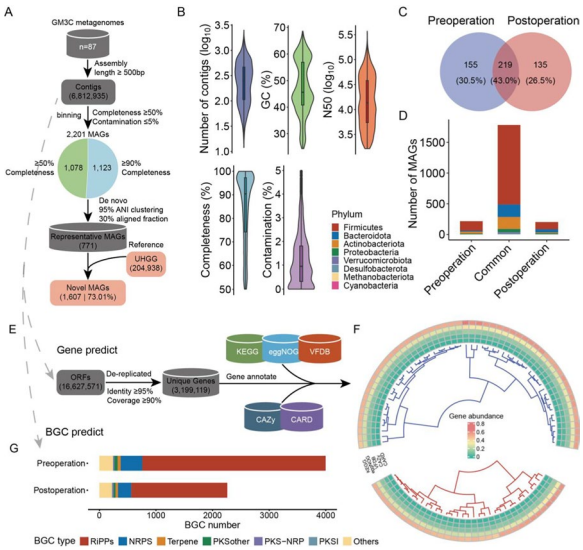


Figure 1 . Gut microbial genome and gene profile of patients undergoing CSCPB. **A** A total of 2201 MAGs were recovered from 87 gut microbial community samples in the GM3C. All MAGs have a completeness of at least 50% and a contamination level of less than 5%. These 2201 MAGs were clustered based on 95% ANI and 30% AF, resulting in 771 OTUs. Compared with the UHGG database, 1607 MAGs were identified to be novel MAGs. **B** Distribution of quality metrics for the MAGs (n = 2201), showing minimum, first quartile, median, third quartile, and maximum values. **C** 219 OTUs were shared between patients in preoperative and postoperative group. **D** Microbiota composition of the MAGs in the preoperative and postoperative group. **E** 3,199,119 unigenes were identified, which are annotated based on eggNOG, KEGG, CARD, CAZy, and VFDB. **F** Distribution of the functional profile in samples of preoperative and postoperation group. **G** Composition of the identified BGC in the preoperative and postoperative group. MAG, metagenome-assembled genome; GM3C: Gut Microbiome Catalog of patients undergoing Cardiac Surgery with Cardiopulmonary Bypass; ANI, average nucleotide identity; AF, alignment fraction

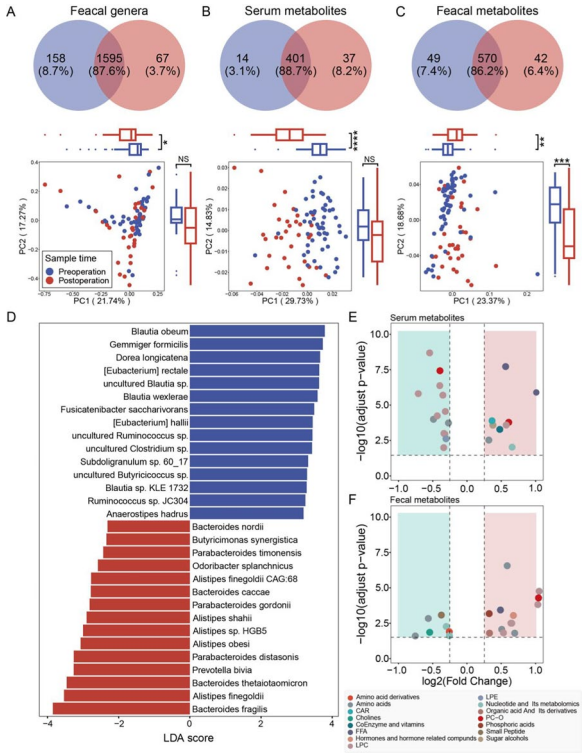


Figure 2 . Alterations of gut microbiome and metabolome in patients undergoing CSCPB. A–C Significant difference were observed between the preoperative and tpostoperative samples in microbiome (**A**) and serum (**B**) and fecal (**C**) metabolome. *P* values are calculated by two-sided Mann–Whitney test. * P < 0.05, ** P < 0.01, *** P < 0.001, **** P < 0.0001. **D** Identification of differential gut microbiota at the species level in preoperative and postoperative groups using LDA coupled with effective size measurement. The top 15 species with the highest LDA scores in each group are shown. **E, F** Volcano plots illustrate the differential serum (**E**) and fecal (**F**) metabolites between preoperative and postoperative groups. Metabolites with P < 0.05 and |log2 (Fold Change)|> 0.25 are shown. The Benjamini–Hochberg method was used to adjust *p* values for multiple testing

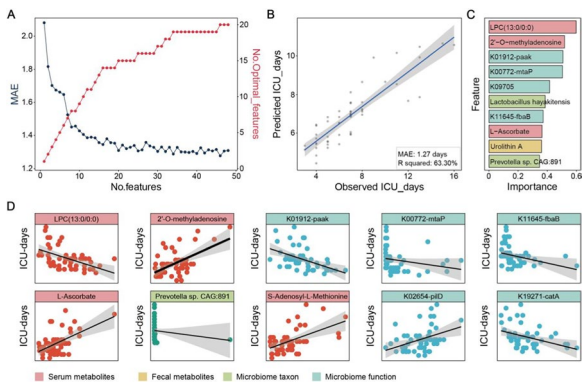


Figure 3 Integrative microbiome and metabolome biomarkers for prediction of postoperative risk using random forest model. A Model performance is improved with greedy feature selection. The blue line represents the variation in MAE value, and the red line indicates the number of features in the optimal feature set (refer to the "Methods" section) during the feature selection. **B** Performance in ICU-day prediction of the model trained using the optimal features. Linear regression was applied between the observed ICU days and predicted ICU days, with a 95% confidence interval in shadow. **C** Permutation importance of features in the prediction model. Top 10 features are shown. **D** Strong associations between microbiome and metabolome biomarkers and postoperative risk with fitted linear regression line and 95% confidence interval in shadow (Spearman correlation > 0.4 are shown)

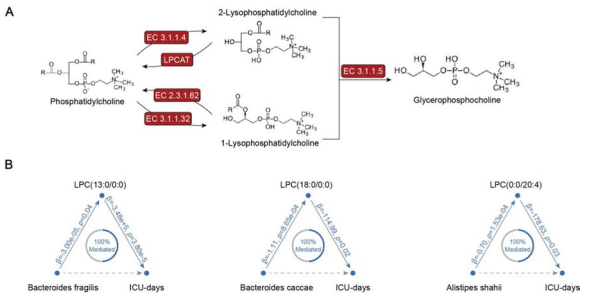


Figure 4 Metabolite LPCs link the gut microbiota with postoperative risk. A Schematic diagram illustrates the LPC metabolism pathways and the critical enzymes involved in these processes. EC 3.1.1.4, phospholipase A2; EC 3.1.1.32, phospholipase A1; LPCAT, lysophosphatidylcholine acyltransferase; EC 2.3.1.62, 2-acylglycerol-3-phosphorylcholine acyltransferase; EC 3.1.1.5, lysophospholipase. **B** Gut microbiota influence postoperative risk of CSCPB patients though specific LPC biomarkers. The blue lines represent significant associations, with corresponding beta values and *p* values. The gray dashed lines indicate insignificant associations

Topic: Metabolism, endocrinology, liver failure, and nutrition.

001430

Assessing microcirculatory dysfunction in septic shock: the role of noradrenaline, peripheral temperature, and perfusion index—pilot study

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Introduction: Septic shock is characterized by profound circulatory, cellular, and metabolic abnormalities, with microcirculatory dysfunction playing a pivotal role in organ failure. Noradrenaline (NA) is commonly administered to restore mean arterial pressure; however, high doses of vasoactive drugs can impair microcirculatory function and perfusion, which are crucial for organ viability.
Objectives: To investigate the relationship between NA dose, peripheral temperature (PT), and perfusion index (PI) and lactate levels as alternative markers of microcirculatory status in patients with septic shock.
Methods: In this single-center, prospective observational pilot study, we included nine patients with septic shock. Patients received varying dosages of noradrenaline. Peripheral temperature (PT), perfusion index (PI), and serum lactate were recorded by the means of thermography (PT) and photoplethysmography (PI).
Results: A significant relationship was observed between NA dose and both peripheral temperature and PI. Patients receiving higher doses of NA (from 0.05mcg/kg/min to 0.3mcg/kg/min) demonstrated lower peripheral skin temperatures (from 33.3 ◦C to 24.4◦C) and reduced PI values (from 0.42a.u. to 0.25a.u.), and higher lactate levels were associated with higher NA dose (from 2.2 mmol/l to 5.8 mmol/l) suggesting compromised peripheral perfusion.
Conclusions: This pilot study shows that increasing NA doses are associated with impaired peripheral perfusion, as evidenced by decreased peripheral temperature and perfuison index and increased lactate levels.

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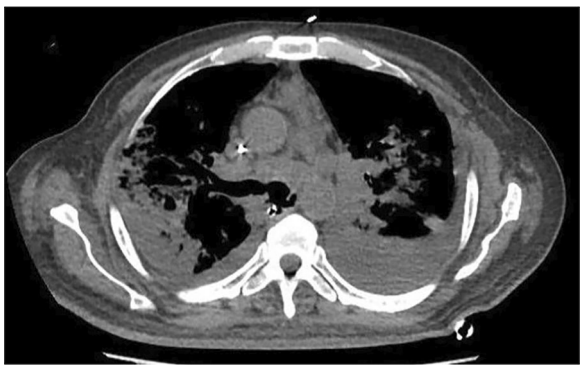
Topic: Sepsis.

001431

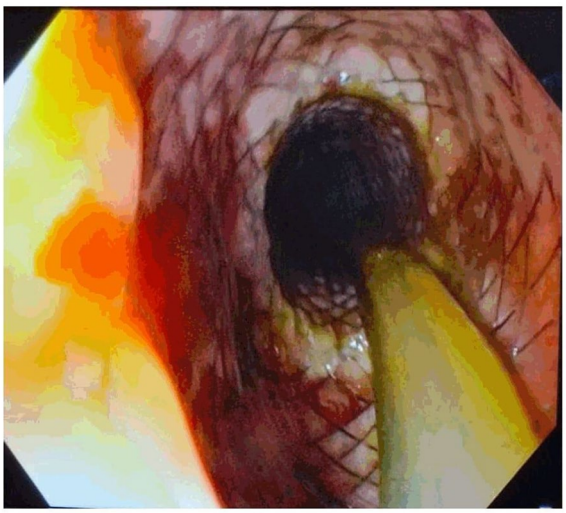
Post-intubation bronchoesophageal fistula unveiling underlying lymphoma

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Intensive Care Medicine Experimental 2025,* 13(1)*:001431

Introduction: Bronchoesophageal fistulas are rare pathological communications between the bronchial tree and the esophagus. Congenital BEF is significantly less common than tracheoesophageal fistula (TEF), and the incidence of acquired BEF is not well-established. Reported causes of acquired BEF include malignancies, infections such as tuberculosis and HIV, and traumatic factors, including prolonged intubation, blunt chest trauma, or foreign bodies [1, 2]. BEF secondary to lymphoma is exceedingly rare. Clinical suspicion is often delayed, which can result in respiratory failure, recurrent pneumonia, or fatal complications.
Objectives: To raise awareness in diagnosing bronchoesophageal fistula as a post-intubation sequele presenting as tidal volume leak.
Methods: We report a rare case of bronchoesophageal fistula of the left main bronchus associated with underlying lymphoma. A 50-year-old male was admitted with acute symptoms of 1-week duration inclusive of cough and shortness of breath. Found to be severely hypoxic on arrival, initially given respiratory support with non-invasive ventilation and high flow nasal cannula, and subsequently required intubation. Fistulous communication was suspected when immediately post-intubation he failed to deliver exhaled tidal volumes showing persisting leak. Despite high ETT cuff pressures, change of ETT, repositioning of ETT, and tidal volume leak were noted. Abdominal gaseous and small bowel distention on radiographic images were seen, and nasogastric tube placement was attempted but failed. Subsequent laryngoscopy revealed air leak and suspicion of communication. Confirmed upon CT chest with contrast a bronchoesophageal fistula was seen, alongside pulmonary infection with effusion, multiple extensive lymphadenopathy. Esophageal stenting was done and patient was deemed clinically unstable for surgical repair by cardiothoracic team. Cervical lymph node biopsy performed histopathology of which revealed diffuse large B-cell lymphoma. Patient failed spontaneous breathing trial for extubation and code was revised to comfort care when bronchoscopy revealed worsening of tear. He expired upon extubation. In conclusion, this is a rare presentation of a post-intubation etiology for bronchoesophageal fistula, with an underlying lymphoma as a potential cause of friability to predispose formation once positive pressure ventilation was initiated.
Results: Bronchoesophageal fistula in adults is an uncommon and often overlooked diagnosis, with malignancy being the most frequent cause [2]. Benign etiologies include infections (e.g., tuberculosis, syphilis, and actinomycosis), trauma, and iatrogenic injuries. Prolonged intubation has been cited as a cause of BEF, yet this case demonstrates an atypical scenario, where fistula formation followed shortly after intubation—likely triggered by barotrauma in the setting of an underlying friable mediastinal lymphoma [3].
BEF can present subtly with recurrent respiratory infections, cough while eating (Ohno's sign), or unexplained air leaks on mechanical ventilation. Early diagnosis is vital to prevent complications such as mediastinitis, pneumomediastinum, and respiratory compromise [4]. CT imaging with contrast remains the gold standard for diagnosis.
Our case illustrates the potential for acute BEF formation post-intubation in a patient with mediastinal lymphadenopathy and suspected malignancy. The presence of persistent air leak, failed NG tube placement, and abdominal distension should prompt consideration of a fistula.
Early multidisciplinary involvement is crucial, including input from pulmonology, gastroenterology, thoracic surgery, and critical care. While surgical repair is often definitive, endoscopic stenting may be an effective temporizing or palliative measure in unstable patients.
Conclusions: This case highlights that the need for high clinical suspicion of BEF in patients with persistent tidal volume leaks post-intubation, especially in the context of mediastinal masses. Underlying malignancy may predispose airway tissue to injury, and positive pressure ventilation can precipitate fistula formation. Prompt imaging, multidisciplinary evaluation, and individualized management are key to optimizing outcomes. Consent to publish had been obtained.



BronchoEsophageal Fistula—Left Main bronchus.

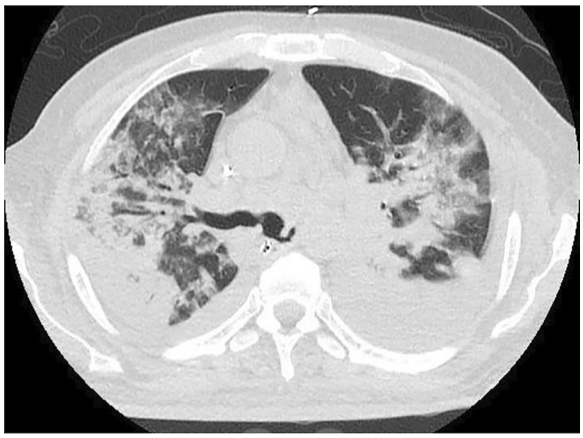




Tear in Bronchus.



Post-intubation gaseous distention.



BEF—Lung window.

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Topic: Acute respiratory failure and mechanical ventilation.

001433

Inhaled nitric oxide after lung transplantation: a systematic review and meta-analysis of prospective studies

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Introduction: Lung transplantation (LT) improves survival and quality of life in patients with end-stage lung disease, but ischemia–reperfusion injury (IRI) remains a significant problem. This condition is associated with longer ICU stays, higher long-term problems, and mortality. This is because one of the main causes of early postoperative complications is primary graft dysfunction (PGD), especially grade 3 PGD. As a vasodilator and antioxidant, iNO has been considered for the management of IRI and the severity of PGD3. Some studies have proposed its preventive use and some clinical guidelines, but presently, there

is no sufficient evidence and the drug has not been approved by the regulators.

Methods: Between August and September 2024, four electronic databases—PubMed, Web of Science, Scopus, and Cochrane—were searched. Two independent researchers evaluated every study that was searched against predetermined search criteria. First, titles and abstracts were evaluated for relevancy before conducting a full-text assessment using predefined inclusion criteria. The following types of studies were considered for analysis: prospective non-randomized trials and double blinded or non-blinded randomized controlled trials (RCTs). The participants were critically ill adults (18 years or older) who had undergone a lung transplant, and the comparisons were made between the control group and the inhaled nitric oxide group. Third investigator resolved any study selection discrepancies to provide an unbiased assessment procedure. The chi-square and I2 statistics were used for evaluating the degree of heterogeneity and either fixed-effects or random-effects models were used for statistical analysis. To determine possible bias, Cochrane risk of bias 2 (ROB2) tool was used.

Results: Six of the 2503 studies that were identified met the inclusion criteria, and 420 patients were included (212 patients in the iNO treatment group and 208 patients in the control group). The time of iNO doses was 12–48 h after transplantation and the iNO doses used ranged from 10 to 20 ppm. Analysis showed a non-significant tendency to a lower risk of PGD3, but there was no significant impact on the length of hospital stay in general (MD = − 0.72, 95% CI = − 4.65–3.22) or the length of stay in the ICU (MD = − 0.21, 95% CI = − 3.78–3.36). An analysis by fixed effects showed that there was a statistically significant decrease in the duration of mechanical ventilation (MV) (MD = − 0.23 days, 95% CI = − 0.36–0.10). Nevertheless, the observed reduction was not statistically significant when random effects model was used (MD = − 0.20 days, 95% CI = − 0.69–0.28). No statistically significant difference was observed in 30-day mortality (RR = 0.97, 95% CI = 0.36–2.57).

Conclusions: As the results show, iNO can be well tolerated and may be of benefit for lung transplant recipients to have a shorter duration of mechanical ventilation. However, there was no significant effect on 30-day mortality, ICU stays, total hospital stays, and the incidence of PGD3. Hence, based on the available data, there is a possibility of its therapeutic benefit, and large-scale, high-quality randomized controlled trials are needed to substantiate this and develop standard guidelines for its use in lung transplantation. Although the reduction in the duration of MV suggests some potential benefit, further investigation is required to determine its wider therapeutic value.

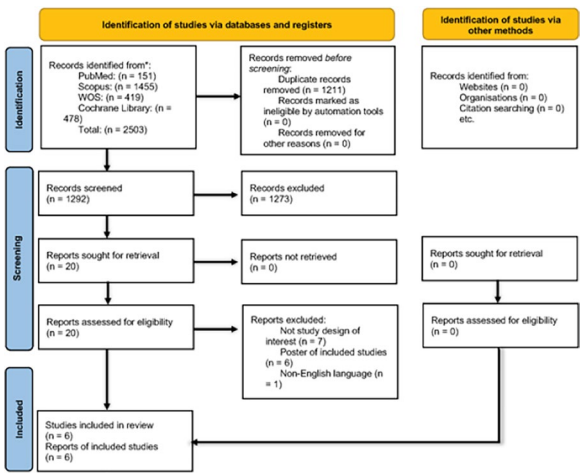


Figure 1 PRISMA flow diagram

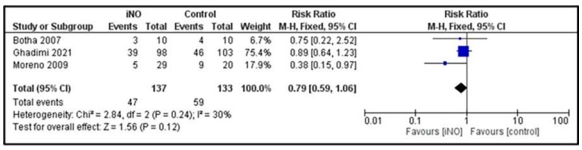


Figure 2 Forest plot showing the primary graft dysfunction (PGD3) risk ratio using a fixed-effects model in patients receiving iNO therapy vs. controls

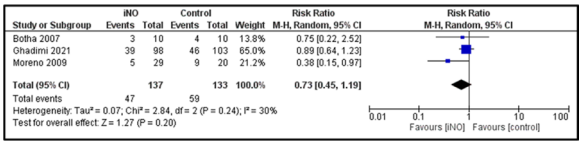


Figure 3 Forest plot showing the primary graft dysfunction (PGD3) relative risk using a random-effects model in patients receiving iNO therapy vs. controls

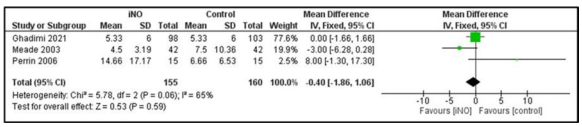


Figure 4 Forest plot showing the ICU Length of Stay (LOS) mean difference using a fixed-effects model in patients receiving iNO therapy vs. controls

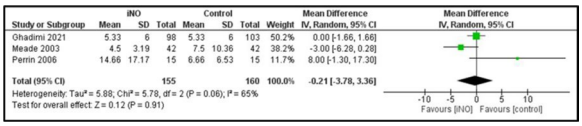


Figure 5 Forest plot showing the ICU Length of Stay (LOS) mean difference using a random-effects model in patients receiving iNO therapy vs. controls

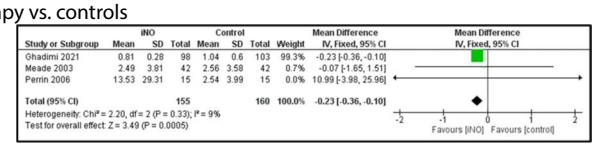


Figure 6 Forest plot showing the mechanical ventilation duration in days mean difference using a fixed-effects model in patients receiving iNO therapy vs. controls

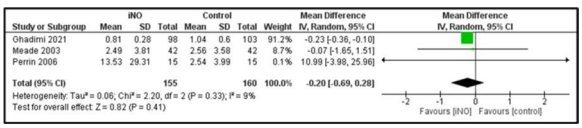


Figure 7 Forest plot showing the mechanical ventilation duration in days mean difference using a random-effects model in patients receiving iNO therapy vs. controls

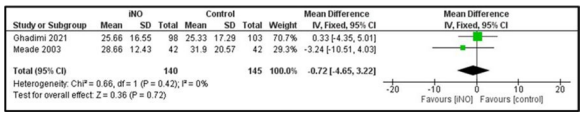


Figure 8 Forest plot showing the hospital stay duration in days mean difference using a fixed-effects model in patients receiving iNO therapy vs. controls

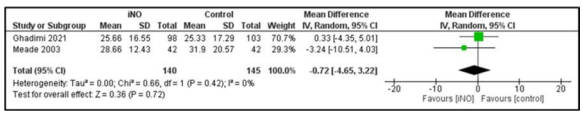


Figure 9 Forest plot showing the hospital stay duration in days mean difference using a random-effects model in patients receiving iNO therapy vs. controls

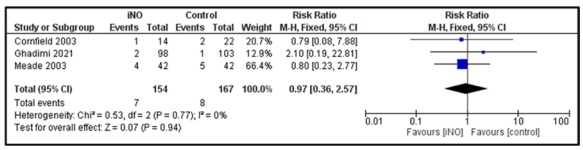


Figure 10 Forest plot showing the 30-day mortality mean difference using a fixed-effects model in patients receiving iNO therapy vs. controls

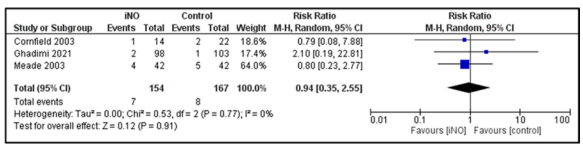


Figure 11 Forest plot showing the 30-day mortality mean difference using a random-effects model in patients receiving iNO therapy vs. controls

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Topic: Acute respiratory failure and mechanical ventilation.

001434

Enhancing sepsis prediction with large language model-based summarization of unstructured clinical text

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Introduction: Sepsis is a life-threatening condition that remains a major cause of morbidity and in-hospital mortality worldwide [1]. Early detection is crucial for improving patient care and survival. Recent advancements suggest that machine and deep learning approaches used in structured clinical data, such as lab results, vital signs, and patient medical history, can predict sepsis onset with high precision. Incorporating clinical notes, which can contain early indicators of sepsis not reflected in structured data, may enhance the predictive performance beyond what is achievable using structured clinical data alone. Summarizing the clinical notes using large language models (LLMs) may reduce noise while preserving clinical relevance.
Objectives: We aimed to develop a convolutional neural network (CNN)-based model for early sepsis prediction using structured data and unstructured clinical notes. We also intended to compare the performance of models trained with unsummarized (full-text) notes vs. those using LLM-generated summaries of the notes.
Methods: We utilized ICU data from the MIMIC-IV database [2], consisting of time-series and static patient features, along with associated clinical notes. Adults (≥ 18 years) without sepsis in ICU admission were included. Sepsis onset was defined according to Sepsis-3 criteria. The model was trained on two data sets: one including full clinical notes, and another using notes summarized by the DeepSeek-R1 model with 32 billion parameters. The notes were truncated to contain information known up to the point of admission to the ICU. Structured features included hourly vitals, laboratory tests, demographics, and comorbidities. The evaluation was performed using a leave-group-out approach to imitate a real-world scenario.
Results: Utilizing an observation window of 48 h and a prediction window of 24 h, the patients with enough available data were 7591 with 1011 of them developing sepsis. The CNN model using unsummarized notes achieved an area under the receiver operating curve (AUROC) of 0.82 (± 0.015), specificity of 0.76 (± 0.023), and sensitivity of 0.72 (± 0.041). Similarly, the summarized-note model demonstrated an AUROC of 0.819 (± 0.016), specificity of 0.78 (± 0.07), and sensitivity of 0.69 (± 0.125). However, the time required to generate summaries using an LLM was substantial (mean generation per note = 1.5 min), increasing the overall model development time.
Conclusions: Both raw and LLM-summarized clinical notes demonstrated strong performance in predicting sepsis within a 24-h window, achieving comparable scores. These findings suggest that while large language models can enhance signal extraction from clinical narratives, the computational cost of summarization may limit their practicality in time-sensitive clinical applications. Future work should explore more efficient summarization techniques or real-time strategies to fully leverage the potential of LLMs in clinical prediction tasks.

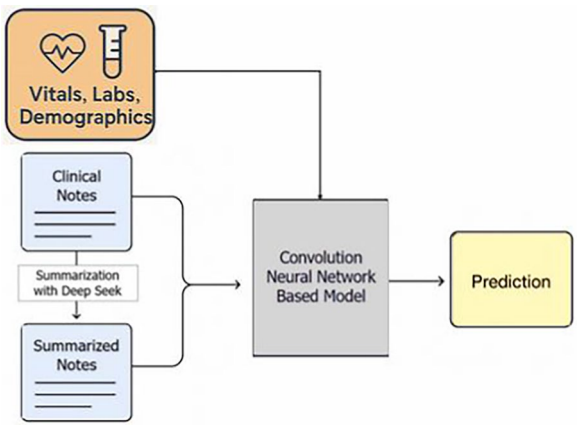


Figure 1 Proposed sepsis prediction framework. The CNN-based model utilizes MIMIC-IV data (vitals, labs, and demographics) and clinical notes (summarized or full text) within a 48-h observation window to predict sepsis risk over a 24-h prediction window

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Topic: Sepsis.

001435

Identification of a body mass index threshold associated with reduced respiratory system compliance during trunk inclination in acute respiratory failure: a preliminary analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001435

Introduction: The differences in physiological effects of changes in trunk inclination on respiratory mechanics in patients with acute respiratory failure with and without obesity remain poorly understood [1, 2].
Objectives: To evaluate whether increasing body mass index (BMI) is associated with reducing respiratory system compliance (CRS) in response to greater trunk inclination. To identify the BMI cutoff point beyond which the CRS significantly deteriorates with increased trunk inclination.
Methods: A secondary analysis of two physiological studies evaluated changes in CRS in response to increased trunk inclination. One study evaluated 22 patients who changed trunk inclination from 10° to 45° [3], while the other assessed 21 patients transitioning from 30° to 45° [4]. Data from 43 patients under passive ventilation with acute respiratory failure were included in the analysis. PEEP levels were maintained unchanged throughout the study.
Results: Increasing the angle of trunk inclination revealed an association between body mass index (BMI) and changes in respiratory system compliance (ΔCRS).
Linear regression analysis showed an inverse relationship between BMI and ΔCRS ($\beta = -0.439$, $p = 0.00328$). CRS decreased by 0.43 mL/cmH_2O per unit increase in BMI. The model explained that an increase in the trunk inclination angle accounted for 19% of the variance in ΔCRS ($R^2 = 0.19$) per unit increase in BMI (Fig. 3).
Figure 1. Correlation between changes in BMI and CRS after an increase in the angle of trunk inclination.
Receiver operating characteristic (ROC) curve analysis identified a BMI cutoff of 28.2 kg/m^2 (sensitivity of 70% and a specificity of 80%) as the optimal threshold for predicting a reduction in CRS following an increasing trunk inclination angle (Fig. 1).
Figure 2. ROC curve.
When stratified by this cutoff, patients with BMI < 28.2 kg/m^2 experienced a mean increase in CRS (ΔCRS = + 2.2 (± 6.4) mL/cmH_2O), whereas those with BMI ≥ 28.2 kg/m^2 showed a mean decrease (ΔCRS = − 4 (± 4.6) mL/cmH_2O). Independent samples t test of two groups ($t = 3.3$, df = 22, $p = 0.003$) with a mean difference of − 6.29 [95% CI 2.3–10.1] (Fig. 2).
Figure 3. CRS in patients with BMI < 28.2 kg/m^2 and BMI ≥ 28.2 kg/$m.^2$
Conclusions: In this analysis, increasing the angle of trunk inclination in patients receiving invasive mechanical ventilation, under passive breathing conditions and without changes in PEEP, significantly reduced CRS. This effect was partially explained by BMI, suggesting that patients with higher BMI values are more likely to experience a decline in compliance when the trunk is elevated. These findings highlight the importance of implementing individualized respiratory management strategies, including adjusting bed inclination angles based on each patient's physiological profile.

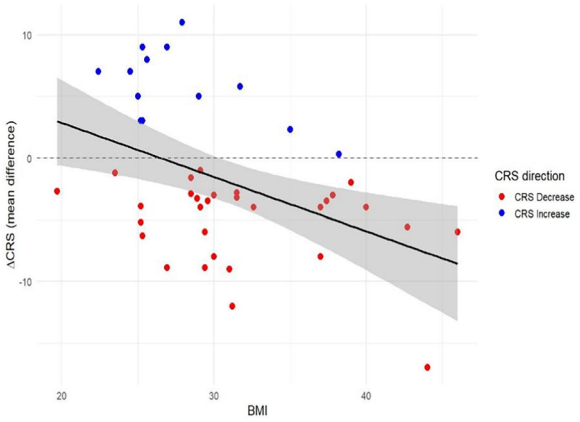


Figure 1 Scatter plot with linear regression (scatter plot with fitting line). Each point represents the mean difference per patient resulting from the increase in trunk inclination angle (from the supine position to the head-up position)

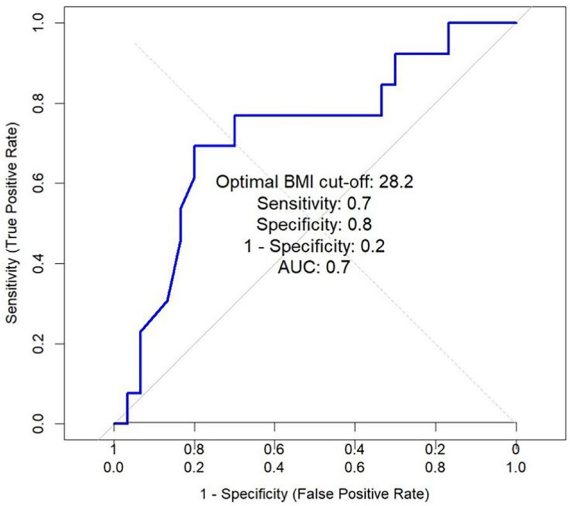


Figure 2 ROC curve: Threshold BMI above which CRS decreases

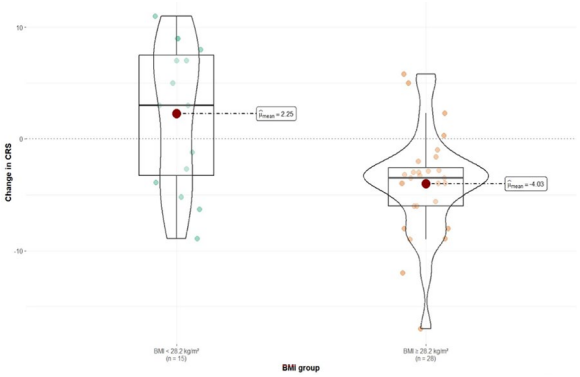


Figure 3 Box–Violin plot. BMI < 28.2 kg/m2 and BMI ≥ 28.2 kg/m2. Each point represents the mean difference per patient resulting from the increase in trunk inclination angle (from the supine position to the head-up position)

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Topic: Acute respiratory failure and mechanical ventilation.

001437

Acute kidney injury in polytraumatized patients admitted to the intensive care unit: a retrospective analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001437

Introduction: Acute kidney injury (AKI) is a frequent and severe complication in polytraumatized patients, with an incidence of 20–24% worldwide.1 It is associated with increased morbidity, prolonged hospitalization and higher mortality. Development of AKI in trauma patients is multifactorial, involving factors such as Injury Severity Score (ISS), shock, nephrotoxic drugs, and sepsis.2

Objectives: Aim of this study was to describe the incidence of AKI during the first ICU week after trauma and address the main risk factors.

Methods: This is a retrospective single-center study performed at the Niguarda Hospital from January to October 2024. Trauma patients aged > 14 years admitted to the ICU were included. AKI occurring within the first week of admission was defined according to KDIGO criteria.3 Data collected included demographics, trauma severity scores, used drugs, and red blood cell transfusions. Standard base excess (SBE) and lactate were measured at admission in the shock room. The highest creatine phosphokinase (CPK) and myoglobin concentrations recorded during the first ICU week were recorded.

Results: Fifty-five trauma patients were enrolled, with an AKI incidence of 13% (57% stage 1, 14% stage 2, and 29% stage 3 requiring RRT). AKI was more frequent in females ($p = 0.03$) and was primarily associated with abdominal, pelvic, and long bone trauma. While ISS did not differ between groups, patients developing AKI had significantly higher TASH scores and were transfused more frequently ($p = 0.003$ and $p = 0.01$, respectively). SBE, but not lactate, was significantly associated with AKI development ($p = 0.007$ and $p = 0.39$, respectively). AKI patients had also higher CPK and myoglobin levels during their ICU stay ($p = 0.04$ and $p = 0.002$, respectively) and exhibited increased mortality ($p = 0.007$). Detailed results are presented in Table 1.

Conclusions: AKI development in trauma patients is multifactorial. Abdominal trauma, pelvic and long bone fractures, along with transfusion requirements and exposure to nephrotoxic drugs emerged as possible risk factors.

Table 1 Demographic and clinical characteristics. Where not specified, values are expressed as median [IQR]

Variable	Total (N=55)	AKI (N=7, 13%)	No AKI (N=48, 87%)	p-value
Age, years	50 [31, 57]	51 [40, 57]	50 [30, 57]	
Female sex, n (%)	13 (24)	4 (57)	9 (19)	0.03
Creatinine, mg/dL	1 [0.9, 1.2]	1.4 [1.2, 1.7]	1 [0.9, 1.1]	0.001
ISS, points	22 [14, 27]	27 [27, 27]	18 [13, 28]	0.10
Injured region				
Head and neck, n (%)	29 (43)	3 (43)	26 (59)	0.34
Thorax, n (%)	37 (74)	6 (86)	32 (73)	0.50
Abdomen, n (%)	21 (44)	6 (86)	16 (38)	0.049
Pelvis and long bones, n (%)	29 (58)	7 (100)	23 (52)	0.03
CPK ICU, U/L	1175 [443, 3272]	2616 [1318, 9248]	1066 [411, 3013]	0.04
Mb ICU, ng/mL	795 [353, 1886]	4139 [1738, 7508]	658 [330, 1420]	0.002
SBE, mmol/L	-4.5 [-7.3, -1.5]	-11.2 [-12.5, -4.8]	-4.4 [-6.0, -0.7]	0.007
Lactate, mmol/L	2.9 [2.0, 4.3]	3.7 [2.0, 6.8]	2.9 [2.0, 4.1]	0.39
Nephrotoxic drugs, n (%)	43 (78)	7 (100)	36 (75)	0.13
Aminoglycosides, n (%)		4 (57)	5 (10)	0.01
Vancomycin, n (%)		0 (0)	2 (4)	0.76
Contrast Agent, n (%)		6 (86)	17 (35)	0.01
NSAID, n (%)		4 (57)	30 (63)	0.79
Tash score, points	7 [2, 10]	16 [8, 18]	5 [2, 9]	0.003
Any transfusions Shock Room, n (%)	30 (56)	7 (100)	23 (49)	0.01
RBC units SR	7 [3, 9]	9 [4, 34]	6 [2, 8]	0.17
Any transfusions in ICU, n (%)	21 (38)	6 (86)	15 (31)	0.006
RBC units ICU	4 [2, 5]	8 [4, 10]	3 [2, 5]	0.07
ICU-LOS, days	5 [3,13]	4 [2, 6]	6 [3, 16]	0.21
H-LOS, days	17 [8, 40]	12 [2, 47]	18 [9, 40]	0.52
Mortality, n (%)	8 (15)	4 (57)	4 (8)	0.007

Table 1 ***Demographic and clinical characteristics.*** *Where not specified, values are expressed as median [IQR].*

ISS=Injury Severity Score;
CPK ICU=Creatinine Phosphokinase in ICU;
Mb ICU=Myoglobin in ICU;
SBE=Standard Base Excess;
RBC=Red Blood Cells;
ICU-LOS=Intensive Care Unit Length of stay;
H-LOS=Hospital Length of stay

ISS = Injury Severity Score;
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ICU-LOS = Intensive Care Unit Length of stay;
H-LOS = Hospital Length of stay.

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Topic: Acute Kidney Injury and haemofiltration.

001438

Impact of neuromuscular blockers on intracranial pressure in acute brain injury: an observational retrospective study

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001438

Introduction: Intracranial hypertension (ICHT) is a frequent and challenging complication in patients with acute brain injury (ABI). While factors such as agitation, posturing and coughing are known to exacerbate ICHT, sedation and non-depolarizing neuromuscular blockers (NMB) have been shown to reduce intracranial pressure (ICP) and are classified as second-tier interventions [1]. However, current guidelines and most of the available literature primarily focus on traumatic brain injury (TBI) [2, 3], with limited data regarding the use of NMBs in other forms of ABI, such as subarachnoid hemorrhage (SAH) [4].
Objectives: To assess the impact of NMB administration on intracranial pressure in a broader ABI population.
Methods: This retrospective, single-center observational cohort study included consecutive patients with ABI, admitted to the ICU of a Belgian university hospital between 2015 and 2024. All patients received an NMB (either as a bolus or continuous infusion) and were monitored concurrently with invasive ICP measurement via external ventricular drain or intraparenchymal probe. ICP, cerebral perfusion pressure (CPP) and mean arterial pressure (MAP), were recorded at baseline (T0) and at 1, 2, 3, and 4 h following NMB administration. Patients were stratified into two groups based on ICP at T0: a high-ICP group (ICP $\geq$ 20 mmHg) and a low-ICP group (ICP < 20 mmHg).
Results: Out of a total of 814 patients with ABI admitted to the ICU, 96 met the inclusion criteria: 52 (54.2%) with SAH and 44 (45.8%) with TBI. The median age was 48 years ($\pm$ 16.2) and 62 (64.6%) were male. The clinical and demographic profiles were comparable between the high and low ICP groups. The overall population exhibited a reduction in ICP from a median of 14.5 mmHg (IQR 8–22) at T0 to 12 mmHg (IQR 9–18) at T4, although this change was not statistically significant ($p = 0.35$), alongside a significant increase in both CPP and MAP (Table 1, Fig. 1). Subsequently, when comparing ICP trends between the high and low ICP groups, after NMB administration a greater reduction over time was observed in the high ICP group ($p = < 0.0001$), with values decreasing from 27 mmHg (IQR 23–35) at T0 to 17 mmHg (IQR 12–26) at T4 (Fig. 2). Between groups, an increase in CPP over time was also observed, although it did not reach statistical significance ($p = 0.35$). Considering the responder patients—those who achieved at least a 20% reduction in ICP within the first hour—the majority belonged to the high ICP group: 19 (65.5%) vs. 18 (26.9), $p < 0.001$. In patients without intracranial hypertension, ICP values remained below 20 mmHg at all timepoints, with no significant change following NMB administration.
Conclusions: The administration of NMB was associated with a reduction in ICP in patients with ABI and ICH.

Table 1 Intracranial pressure, mean arterial pressure and cerebral perfusion pressure before and after neuromuscular blockade. Data are shown as median and P25–75%. *P* **value made by Friedman test**

All patients [N 96/96, 100%]						
	T0	**T1**	**T2**	**T3**	**T4**	**p-value**
ICP (mmHg)	14.5 (8-22)	14 (6-19)	14 (8-19) [N 78/96]	14 (8-20) [N 75/96]	12 (9-18) [N 73/96]	0.348
CPP (mmHg)	85 (74-105) [N 94/96]	90 (80-110)	94 (80-111) [N 78/96]	93 (79-109) [N 74/96]	93 (80-106) [N 73/96]	**<.001**
MAP (mmHg)	102 (90-121)	104 (93-121)	106 (95-128) [N 78/96]	104 (95-124) [N 75/96]	105 (93-120) [N 73/96]	**0.005**
High ICP at T0 [N 29/96, 30.2%]						
	T0	**T1**	**T2**	**T3**	**T4**	**p-value**
ICP (mmHg)	27 (23-35)	17 (10-22)	19 (14-24) [N 20/29]	22 (14-29) [N 19/29]	17 (12-26) [N 19/29]	**0.025**
CPP (mmHg)	81 (60-91) [N 28/29]	90 (75-97)	90 (80-111) [N 20/29]	87 (78-101) [N 19/29]	92 (78-101) [N 19/29]	0.092
MAP (mmHg)	107 (96-117) [N 28/29]	105 (92-113)	108 (101-128) [N 20/29]	111 (97-125) [N 19/29]	107 (96-123) [N 19/29]	0.599
Low ICP at T0 [N 67/96, 69.8%]						
	T0	**T1**	**T2**	**T3**	**T4**	**p-value**
ICP (mmHg)	11 (7-15) [N 66/67]	13 (6-17)	13 (7-16) [N 58/67]	13 (7-18) [N 56/67]	12 (7-17) [N 54/67]	0.182
CPP (mmHg)	88 (77-113) [N 66/67]	91 (82-114)	96 (80-111) [N 58/67]	93 (79-111) [N 55/67]	93 (81-108) [N 54/67]	**0.013**
MAP (mmHg)	97 (89-122)	104 (94-124)	103 (94-128) [N 58/67]	101 (95-123) [N 56/67]	105 (93-119) [N 54/67]	**0.002**

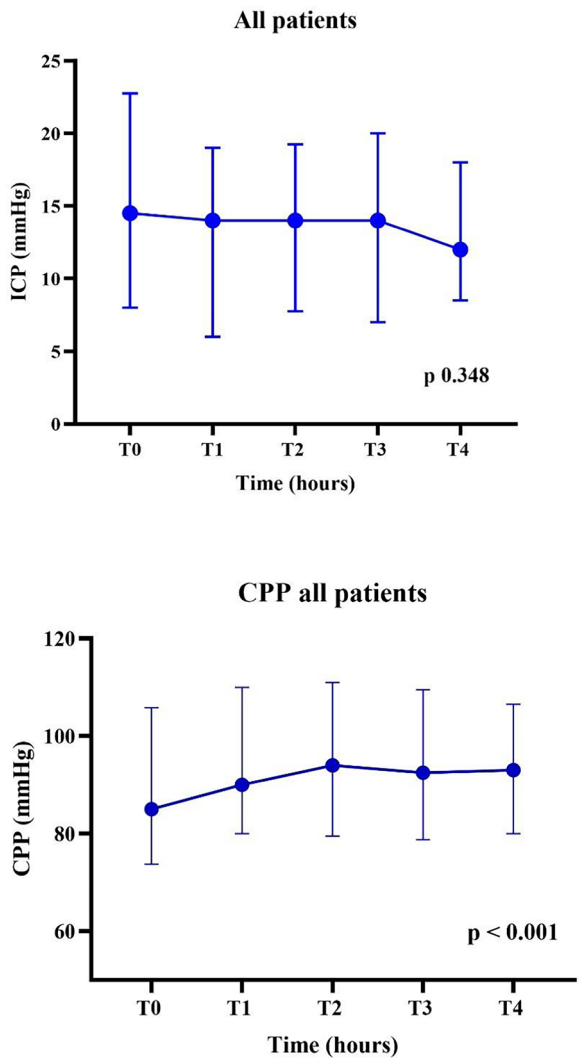


Figure 1 Trend of ICP and CPP over time in all patients. *P* **value obtained using the Friedman test**

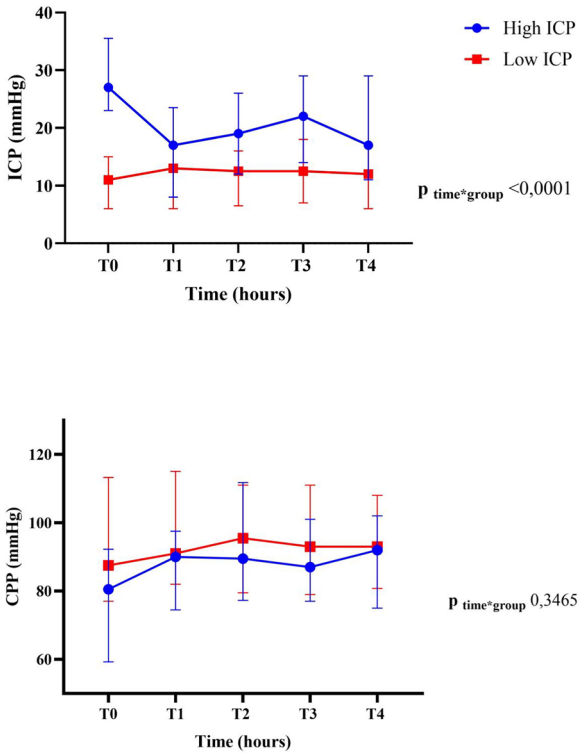


Figure 2 Time course of ICP and CPP between the high and low ICP groups. *P* values obtained using repeated measures ANOVA

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Topic: Neurointensive care.

001439

Result of postcardiotomy shock treated with ventricular assist devices in two time periods in our community: analysis of the ARIAM registry of cardiac surgery of andalusia (Spain)

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Intensive Care Medicine Experimental 2025,* 13(1)*:001439

Introduction: Postcardiotomy cardiogenic shock is a significant entity with very high mortality despite the use of mechanical circulatory support devices available in our community for no more than 13 years.
Objectives: To analyze the mortality and complications in patients undergoing cardiac surgery who have received a ventricular assist device (excluding IABP) in Andalusia during two time periods, from 2010 to 2017 and 2017 to 2024.
Methods: Retrospective, multicenter observational study of all patients included in the ARIAM registry of cardiac surgery from 2009 to November 2023 who underwent major cardiac surgery and in whom a ventricular assist device was implanted. They have been divided into two groups according to the years of intervention based on the periods in which the technique has been introduced, considering the early years within the learning curve and the later years as a period of maturity in the technique. The clinical profile, severity, and mortality of both groups, as well as mortality, complications, and length of stay, have been analyzed. Qualitative variables are expressed as number and percentage, and quantitative variables as mean and standard deviation. For the analysis, chi-square and Student's *t* tests were used as needed with a maximum alpha error of 5%.

Results:

30,519 patients undergoing cardiac surgery were registered during this period, with an overall mortality of 6.8% (2110 patients). **LVADs (left ventricular assist devices) were used in 246 patients, 78 of them in the early years and 168 in the second period analyzed**. Table 1 shows the clinical-epidemiological variables of both groups, which are comparable except for the functional class at admission and the urgency of the intervention:
No differences were found in the type of surgery in both groups, whether CABG, Valve, or mixed surgery ($p = 0.86$). **Mortality in the ICU was 78.1% in the first period and 51.2% in the second period [$p = 0.002$ OR 1.4 95%CI (1.14–1.71)]**. The analyzed complications are shown in Table 2

Conclusions: The mortality of cardiac surgery patients undergoing left ventricular assist devices shows significantly lower mortality in the most recent period probably derived by better selection of the candidates to judge by the more favorable NYHA functional status prior to surgery or the lower use in urgent/emergent surgery in this period. **Patients treated in recent years presented more complications of the sepsis type or acute kidney injury requiring dialysis**, which associated with lower mortality and similar lengths of stay in both periods translate into better management of these patients and their complications once the units have refined the indications.

Table 1 .

	2009-2017 (n=78)	2018-2024 (n=168)	Sig
Age	64 ± 16	56 ± 17	NS
Male sex	51 (65,4%)	119 (70,8%)	NS
Smoke	17 (22,4%)	39 (23,2%)	NS
Diabetes	18 (23,7%)	51 (30,4%)	NS
Dyslipidemia	26 (34,2%)	61 (36,3%)	NS
Hypertension	32 (42,1%)	88 (52,4%)	NS
Previous CAD	21 (26,9%)	42 (25%)	NS
ECC	185 ± 105	211 ± 118	NS
Pre LVEF	40 ± 20	41 ± 19	NS
ICU stay	15 ± 20	19 ± 20	NS
Hospital stay	29 ± 35	29 ± 28	NS
EUROScore	10 ± 4	9 ± 4	NS
Surgery Type Programmed	 20 (25,6%)	 72 (42,9%)	0,017
Urgent Emergent	23 (29,5%) 35 (44,9%)	47 (28%) 49 (29,2%)	
NYHA I/II III/IV	 18 (23,4%) 59 (76,6%)	 70 (42,9%) 93 (57,1%)	0,012

Table 2 .

	2009-2017 (n=78)	2018-2024 (n=168)	Sig
Tamponade	17 (21,8%)	56 ± 17	NS
Bleeding >1 litre	46 (59%)	93 (55,4%)	NS
Politransfusion	45 (57,7%)	92 (54,8%)	NS
Sepsis	17 (21,8%)	60 (35,7%)	0,028
CVVHDF	8 (10,3%)	48 (28,6%)	0,001
Reintervention	34 (43,6%)	81 (48,2%)	NS

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Topic: Perioperative care.

001441

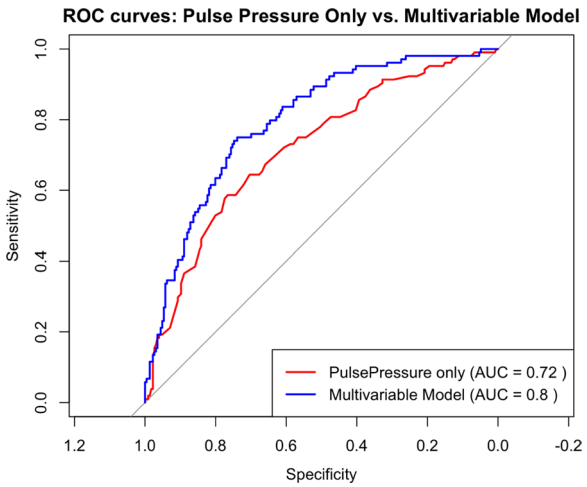
Using blood pressure to detect low stroke volume and vascular resistance in critical illness

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001441

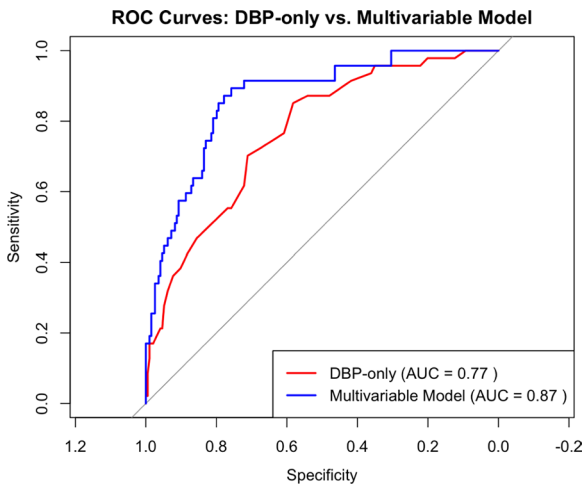
Introduction: Although the classical physiological links between pulse pressure and stroke volume and between diastolic blood pressure (DBP) and systemic vascular resistance are well-established, these relationships may behave differently in the dynamic, complex ICU environment. Critically ill patients often experience rapid hemodynamic fluctuations due to both underlying disease and the treatments they receive.
Objectives: We aimed to evaluate two associations in a mixed ICU population: (1) the relationship between pulse pressure and low stroke volume index (SVI < 35 mL/m^2) and (2) the association between DBP and low systemic vascular resistance index (SVRI < 1200 dynes·s·m^2/cm^5). We further assessed whether multivariable logistic regression models—incorporating heart rate, noradrenalin, sepsis, respiratory failure, mechanical ventilation, age, hypertension, diabetes, peripheral arterial disease, and kidney disease—improve prediction as several of these factors might influence this associations.
Methods: This was a secondary analysis of a prospective echocardiographic study in which echocardiography was performed within 24 h of ICU admission following initial resuscitation, alongside concurrent clinical data collection. We first constructed logistic regression models using pulse pressure and DBP as sole predictors for low SVI and low SVRI, respectively. Forward stepwise selection was then employed to build enriched models that included additional predictors. Model performance was evaluated using receiver operating characteristic (ROC) curves and area under the curve (AUC) analyses.
Results: For SVI < 35 mL/m^2, the forward stepwise model retained pulse pressure, heart rate, and respiratory failure. Higher pulse

pressure was linked to lower odds of low SVI ($\beta = -0.038$, $p < 0.001$), whereas higher heart rate ($\beta = 0.030$, $p < 0.001$) and respiratory failure ($\beta = 0.731$, $p = 0.016$) increased the odds. Multivariable analysis improved the AUC from 0.72 (pulse pressure only) to 0.80 ($p = 0.001$) with the multivariable model. In the crude model, a PP < 40 mmHg had a sensitivity of 29% and a specificity 91%. In our adjusted multivariable model for predicting low SVI, a sensitivity of 90% corresponded to a specificity of 54%. For SVRI < 1200 dynes·s·m^2/cm^5, the final model included DBP, heart rate, respiratory failure, and noradrenalin. Lower DBP ($\beta = -0.143$, $p < 0.001$) and higher heart rate ($\beta = 0.056$, $p < 0.001$) were significant, as was respiratory failure ($\beta = -0.883$, $p = 0.040$), while noradrenalin was borderline significant ($\beta = -1.996$, $p = 0.051$). In this analysis, the AUC increased from 0.77 (DBP only) to 0.87 in the mulitvariable model ($p = 0.001$). In the crude model, a DBP < 40 mmHg had a sensitivity of 21% and a specificity of 96%. In our adjusted multivariable model for predicting low SVRI, a sensitivity of 90% corresponded to a specificity of 72%.

Conclusions: In critically ill patients, our findings suggest clinically relevant associations between pulse pressure and stroke volume, as well as between diastolic pressure and systemic vascular resistance. Using multiple variables may increase the ability to identify patients in need of hemodynamic optimization and echocardiography.



Pulse pressure only vs. multivariable model.



Diastolic blood pressure only vs. multivariable model.

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Topic: Cardiovascular issues in ICU.

001442

Estimating pulmonary shunt during V–V ECMO without mixed venous sampling

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Introduction: Pulmonary shunt is a major contributor to hypoxemia in ARDS. Shunt fraction is considered a marker of disease severity, especially in patients undergoing venovenous extracorporeal membrane oxygenation (V-V ECMO), where the ratio between arterial partial pressure of oxygen and inspiratory oxygen fraction (PaO2/FiO2) may be an unreliable indicator of oxygenation. The measurement of shunt using Berggren equation requires both arterial and mixed venous blood gas analyses. However, central venous samples obtained from standard venous catheters are not suitable for shunt calculation due to substantial discrepancies in oxygen content compared to pulmonary artery samples. This difference may be even more pronounced during ECMO support. As a result, a pulmonary artery catheter is necessary, although it may not always be available or indicated.

Objectives: This study aims to develop a mathematical model to predict the shunt fraction in V–V ECMO patients using only arterial blood gas (ABG) data obtained increasing FiO2 to 1.0.

Methods: This is a retrospective analysis of prospectively collected data from ARDS patients treated with V–V ECMO at the intensive care unit at IRCCS San Gerardo Hospital (Monza, Italy) between 2003 and 2024.

According to our institution's clinical practice, the same FiO2 is applied both to mechanical ventilator and extracorporeal oxygenator. Pulmonary shunt is assessed daily after increasing FiO2 to 1.0, to minimize the impact of ventilation/perfusion mismatch.

We first performed univariabe linear regression analyses to identify which oxygenation parameter, assessed at both clinical FiO_2 and FiO_2 1.0, had the strongest correlation with measured shunt fraction. Subsequently, we conducted a multivariable linear regression analysis to determine whether additional parameters were independently associated with shunt. Based on the regression coefficients and intercept, we derived a linear equation to estimate shunt values using these variables. We then evaluated the accuracy of the model by assessing the correlation between the estimated and measured shunt values.

Results: We analyzed 242 ARDS patients undergoing V–V ECMO, pneumonia accounted for 89% of cases. Mean PaO2/FiO2 ratio before ECMO was 77 ± 29. We analyzed 1976 shunt measurements paired with ABGs at both clinical and 1.0 FiO_2. The PaO_2/FiO_2 ratio at FiO_2 1.0 demonstrated a stronger correlation with shunt fraction in univariable analysis ($r^2 = 0.67$, $p < 0.001$) compared to ratio at clinical FiO_2 ($r^2 = 0.60$, $p < 0.001$). In the multivariable model, both PaO_2/FiO_2 at

FiO_2 1.0 and the ECMO blood flow to cardiac output ratio (BF/CO) were independently associated with shunt ($p < 0.001$), resulting in an overall model $r^2 = 0.75$. Due to a non-linear relationship between PaO_2/FiO_2 at FiO_2 1.0 and shunt (Fig. 1), an inflection point was identified at $PaO_2/FiO_2 = 100$ (corresponding to shunt 0.65). We developed two separate multivariable models for data above and below this threshold. We derived the following equations to calculate the estimated shunt (Qs/Qt EST):

If PaO_2/FiO_2 at 1.0 $\geq$ 100—> **Qs/Qt EST** = (– 0.0011 × PaO_2/FiO_2 + 0.339 × BF/CO) + 0.61.

If PaO_2/FiO_2 at 1.0 < 100—> **Qs/Qt EST** = (– 0.0051 × PaO_2/FiO_2 + 0.519 × BF/CO) + 0.89.

Qs/Qt EST showed a strong correlation with measured shunt (r2 = 0.79, $p < 0.001$) (Fig. 2).

Conclusions: In a large retrospective cohort of ARDS patients undergoing V–V ECMO, arterial oxygenation measured at FiO_2 1.0 and BF/CO ratio was used to derive an equation for indirect pulmonary shunt estimation. In our population, this model demonstrated a strong correlation with measured shunt values. The proposed equation may offer a practical alternative for assessing shunt severity in situations, where the placement of a pulmonary artery catheter is not feasible or indicated. External validation is required to confirm the accuracy and the generalizability of these findings.

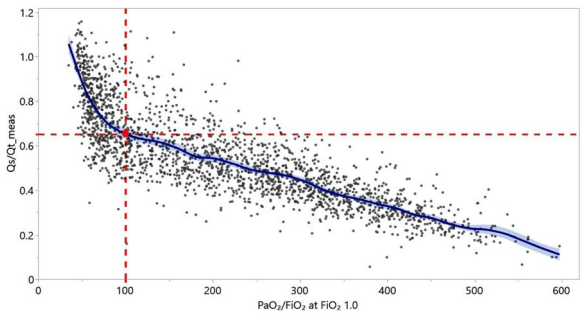


Figure 1 Non-linear relationship between PaO_2/FiO_2 ratio at FiO_2 1.0 and shunt fraction measured with Berggren equation (Qs/QtMEAS). The inflection point at $PaO_2/FiO_2 = 100$ (highlighted in red) delineates two distinct segments of the curve, each characterized by a different slope

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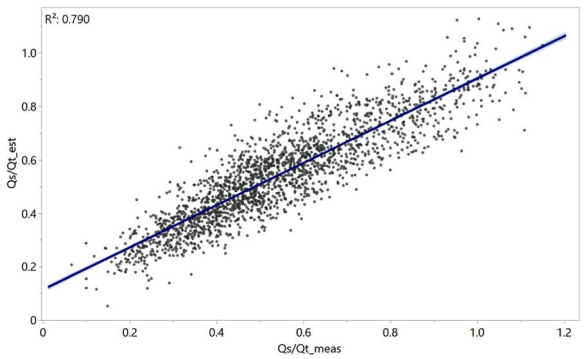


Figure 2 Linear correlation between the shunt fraction estimated by the model (Qs/QtEST) and the shunt fraction measured using the Berggren equation (Qs/QtMEAS)

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Topic: Acute respiratory failure and mechanical ventilation.

001443

Predictive modeling for ICU mortality in traumatic brain injury: insights from a level 1 trauma centre

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Intensive Care Medicine Experimental 2025,* 13(1):*001443

Introduction: Traumatic brain injury (TBI) remains a leading cause of neurocritical care admissions and mortality worldwide. Accurate prediction of in-hospital, or more specifically, in-ICU mortality is crucial for optimizing clinical decision-making, resource allocation, and individualized patient management. This study aims to develop and validate a predictive model for ICU mortality in TBI patients using statistical and machine-learning approaches.

Methods: A retrospective, cross-sectional cohort study was conducted, analyzing 222 TBI patients admitted to the ICU between January 2013 and December 2018. Predictor variables included patient demographics, injury characteristics, pre-existing comorbidities, neuroimaging severity, and ICU management parameters. ICU mortality was the primary outcome measure. Predictive modeling was performed using conditional inference tree analysis and multivariable logistic regression.

Results: ICU mortality was 22.1% ($n = 49$). Non-survivors were significantly older (median 57 vs. 42 years, $p = 0.019$), and mortality increased with age (> 66 years: 34.7% vs. < 18 years: 6.1%, $p = 0.016$). Direct admission to the trauma centre was more common in non-survivors (71.4% vs. 52.6%, $p = 0.029$). The leading injury mechanisms were falls > 2 m (36.7%) and road traffic accidents (26.5%). Charlson Comorbidity Index (CCI) > 2 was associated with higher mortality ($p = 0.026$). In the conditional inference tree analysis, Rotterdam CT score was the strongest predictor ($p < 0.001$), with scores > 4 linked to a 67.0% mortality rate. Among patients with Rotterdam Scores ≤ 4, age > 50 years ($p = 0.006$) and direct trauma centre admission ($p = 0.013$) further stratified risk. For Rotterdam Scores > 4, CCI > 2 ($p = 0.04$) identified the highest risk subgroup. Multivariable logistic regression confirmed Rotterdam CT score as the most significant predictor across all models (OR: 2.24–2.28 per unit increase, 95% CI 1.60–3.30, $p < 0.001$). Age, which was significant in univariate analysis, was not an independently significant predictor of ICU mortality in the logistic regression model ($p = 0.770$). CCI (OR: 1.02, 95% CI 0.78–1.32, $p = 0.905$) and admission type (OR: 0.50, 95% CI 0.22–1.08, $p = 0.085$) also showed trends but did not reach statistical significance. The lowest pre-intubation GCS was

not independently significant (OR: 0.95, 95% CI 0.85–1.06, $p = 0.351$) across the multivariate models.

Conclusions: This study presents a validated predictive model for ICU mortality in TBI, incorporating key clinical and radiological variables. The findings support the integration of data-driven prognostication into neurocritical care decision-making.

To enhance the clinical applicability of our findings, future research should focus on developing a standardized mortality prediction 'score' based on the key prognostic factors identified in this study. A validated risk stratification tool would allow clinicians to rapidly estimate ICU mortality risk in TBI patients, facilitating early intervention and optimizing critical care resource allocation. Such a 'score' could be integrated into electronic health records to provide real-time, data-driven clinical decision support, improving bedside prognostication and guiding neurocritical care strategies. In addition, our findings suggest that traditional statistical approaches, such as logistic regression and conditional inference trees, may fail to fully capture the intricate, non-linear interactions of some predictors. This underscores the need for more flexible modeling approaches, such as machine learning algorithms (e.g., Random Forests and Gradient Boosting Machines [XGBoost]) that can dynamically account for these complexities. Future research should explore complex machine learning-driven predictive models to refine TBI outcome prediction, potentially surpassing conventional methodologies in accuracy and reliability.

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Topic: Trauma.

001444

Nutritional practices in the critical care patient: a nationwide survey in Tunisia

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001444

Introduction: Nutrition support is essential in the management of critically ill patients. Nevertheless, it is underrecognized, being considered an adjunctive rather than a primary therapy.
Objectives: This study aimed to evaluate nutritional practices in Tunisian public ICUs and identify areas for improvement.
Methods: A nationwide, cross-sectional point-prevalence study was conducted on March 14, 2024, including all adult patients admitted to public hospital ICUs in Tunisia on that day. Data were collected via an online questionnaire (Google Forms) distributed via email to ICU departments, focusing on:
-The number of hospitalized patients and modalities of nutrition support (enteral and/or parenteral).
-Mode of administration (continuous or intermittent).
-Unplanned interruptions and their causes.
-Recommendations to improve alignment between prescribed and delivered nutrition.
An Excel sheet was included to collect patient-specific data: admission date, weight at admission and on the study day, and caloric intake (prescribed and delivered, in kcal). Statistical analysis was performed using SPSS, with descriptive statistics and paired comparisons.
Results: A total of 121 patients from 13 ICUs were included. The median number of patients per ICU was 10.5 with an interquartile range of 5.25–11.75. The median day of ICU stay on the day of data collection was 6, with an interquartile range of 3–21.5. A total of 62.81% of patients were mechanically ventilated. Regarding nutritional practices, 54% of patients (n = 65) received enteral nutrition, 29% of patients (n = 35) received parenteral nutrition, and 5% of patients (n = 6) received both enteral and parenteral nutrition. 12.4% of patients (n = 15) did not receive any artificial nutrition. Audited intensivits declareted that patients did not receive the full amount of prescribed calories, for the following reasons: patient refusal in 26% of cases and technical problems in 16% of cases. Enteral nutrition was significantly more prescribed among intubated patients compared to non-intubated patients (69% vs. 42%; p = 0.004). Furthermore, EN was less frequently interrupted in intubated patients (63% vs. 45%; p = 0.002). Continuous feeding was the most commonly used method. Clinicians provided several recommendations to improve the administration of nutritional support, as follows: equipping ICU beds with integrated weighing systems to allow daily monitoring of patient weight (n = 4); the use of combined enteral and parenteral nutrition to ensure adequate daily caloric intake (n = 6), the use of infusion pumps to guarantee precise and consistent delivery rates (n = 6); plan regular training sessions for healthcare staff (n = 5); routine bedside verification of nutrition delivery during medical rounds (n = 3), and the implementation of standardized nutrition protocols (n = 5).
Conclusions: This first nationwide audit of ICU nutrition in Tunisia highlights significant gaps between prescribed and delivered artificial nutrition. A considerable number of patients received insufficient or no nutritional support. These findings call for urgent measures, including daily nutritional monitoring, protocol implementation, investment in equipment, and staff training, to improve nutritional care and patient outcomes in critical care settings.

Topic: Metabolism, endocrinology, liver failure, and nutrition.

001445

The role of pulmonary arterial capacitance in acute respiratory failure: insights from an endotoxic shock animal model

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***Intensive Care Medicine Experimental 2025,* 13(1)**:*001445*

Introduction: Pulmonary arterial capacitance (PAC), accounting for the pulsatile component of afterload, may serve as a more informative indicator of pulmonary vascular dysfunction compared to pulmonary resistances (PVR) alone.
Methods: Forty-three pigs (53.6 ± 6.0 kg) were randomized to undergo endotoxic shock (LPS, n = 19), or serve as controls (n = 24). Shock was defined as mean arterial pressure (MAP) < 60 mmHg despite a sustained catecholamines administration. PAC was defined as stroke volume/pulmonary arterial pulse pressure, measured through right heart catheterization. Hemodynamic and respiratory variables were collected every 3 h for 24 h.
Results: The LPS group cumulatively received 0.75 ± 0.71 mg/kg of LPS and showed a lower MAP (65 ± 10 vs. 72 ± 11 mmHg, p < 0.001) despite a larger noradrenalin infusion (0.58 ± 0.24 vs. 0.02 ± 0.07 mcg/kg/min, p < 0.001). PaO2/FiO2 decreased (309 ± 79 vs. 472 ± 31 mmHg, P < 0.001) paralleling the respiratory system compliance (Crs, 27.7 ± 7.3 vs. 43.5 ± 8.2 ml/cmH2O, p < 0.001), while the cardiac output (CO) increased (6.0 ± 1.7 vs. 3.5 ± 1.0 l/min, p < 0.001). PVR were not different (4.0 ± 1.8 vs. 4.1 ± 2 WU, p = 0.85). Conversely, PAC decreased significantly (2.6 ± 1.1 vs. 4.4 ± 1.7, p < 0.001, **Panel A**) following Crs (R2 = 0.16, p < 0.001, **Panel B**) and PaO2/FiO2(R2 = 0.22, p < 0.001, **Panel C**). Vascular recruitability, measured as CO/PAC, was different in the two models (p < 0.001 of the angular coefficient, **Panel D**). This was a function of the end-inspiratory transpulmonary pressure (R2 = 0.31, p < 0.001), but not of the end-expiratory one (p = 0.43).
Conclusions: PAC was an early indicator of pulmonary vascular dysfunction, closely tracking the decline in lung mechanics and gas exchange. In our model, the loss of vascular recruitability appears more linked to overdistension than atelectasis.

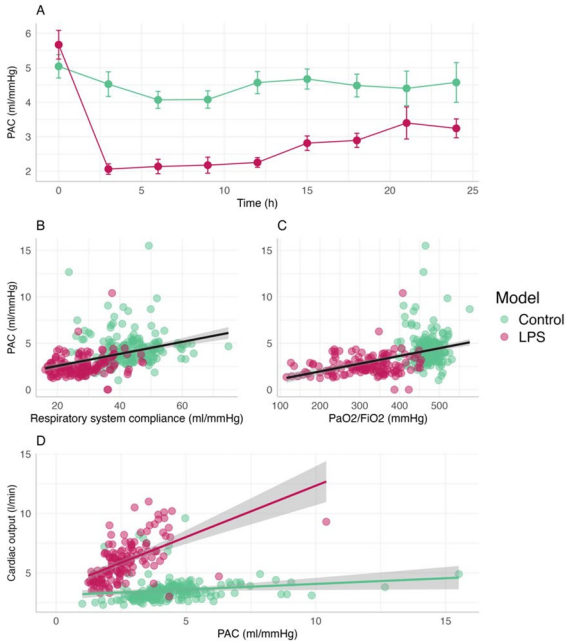


Figure 1 .

Topic: Acute respiratory failure and mechanical ventilation.

001446

Correlation between MAPSE measured by ICU medical residents and LVEF assessed by experienced echocardiographers, and its association with clinical outcomes: a preliminary analysis

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Introduction: Assessment of left ventricular function is crucial for ICU patient management, aiding in risk stratification and therapeutic decisions. Echocardiography, especially the measurement of left ventricular ejection fraction (LVEF), is an essential tool but can be challenging in emergency settings due to time constraints and image quality limitations. In this setting, mitral annular plane systolic excursion (MAPSE) measurement emerges as a practical alternative. MAPSE is a sensitive marker of ventricular function, showing a strong correlation with LVEF, and is useful in emergencies due to its rapid acquisition and technical simplicity. It can be performed at the bedside by healthcare providers with limited echocardiographic training, making it particularly valuable in critical care environments.
Objectives: This study aims to evaluate the correlation between MAPSE-derived LVEF, performed at the bedside by ICU residents, and LVEF measured by the gold-standard Simpson's method by experienced echocardiographers. In addition, it aims to explore the relationship between MAPSE-derived LVEF and clinical outcomes.
Methods: This study includes adult ICU patients from a private hospital in southern Brazil who underwent formal echocardiography within 48 h of MAPSE measurement and consented to participate. Data were obtained through bedside echocardiography, with MAPSE measured and LVEF estimated using a validated formula[1]. These were compared with Simpson's method. Correlation with SAPS3 (Simplified Acute Physiology Score 3) and ICU length of stay was also assessed. Statistical analysis used Pearson's correlation coefficient with a desired confidence interval of 20%, 95% confidence level, and expected correlation of 0.594. A sample size of 184 patients was calculated allowing for 10% of losses. Data corresponding to 40% of the expected sample size have been gathered.
Results: In this interim analysis, 73 (40% of the expected sample size) patients were evaluated. Mean age was 72 years (± 16 years), and 43.84% were female. 59 patients (80%) had an LVEF > 40%. Correlation between MAPSE and Simpson's method was moderate at $r = 0.62$ for septal MAPSE (sMAPSE), $r = 0.58$ for lateral MAPSE (lMAPSE), and r = 0.56 for mean MAPSE (mMAPSE). The correlation between the mMAPSE-derived LVEF and the official LVEF was $r = 0.61$. Regarding clinical outcomes, Pearson's correlation with SAPS3 was weak: $r = -0.28$ for sMAPSE, $r = -0.24$ for lMAPSE and $r = -0.10$ for mMAPSE. Correlation with ICU length of stay was also weak: $r = 0.08$ for sMAPSE, $r = 0.03$ for lMAPSE, $r = 0.06$ for mMAPSE, and $r = 0.06$ for MAPSE-derived LVEF.
Conclusions: Preliminary data show a moderate correlation between bedside MAPSE-derived LVEF and formal LVEF assessment in ICU patients. However, the association with relevant clinical outcomes is weak. Further analysis is needed to assess MAPSE's clinical utility in critical care.

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Topic: Imaging in intensive care.

001447

Risk factors associated with the occurrence of tonsillar necrotizing fasciitis: emphasis on prior medication use and underlying (unrecognized) immunosuppression

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Introduction: Cervical necrotizing fasciitis (CNF) is a rare but life-threatening condition that may complicate tonsilitis. To date, literature on CNF is very scarce, in particular no study evaluated host and pathogen factors associated with CNF as compared to peritonsillar abscess. In this perspective, we sought to investigate risk factors for the development of CNF, with the aim of improving early diagnosis and management.
Methods: We conducted a retrospective monocentric study in Lariboisière Hospital, Paris, France, between January 1st, 2017 and December 31st, 2024. All adult patients hospitalized for tonsillar disease requiring surgical intervention were included. Patients were excluded if their hospital stay was shorter than 48 h. Patients with uncomplicated peritonsillar abscess were compared to patients with tonsil-related CNF. Our primary objective was to identify risk factors associated with CNF. Secondary objectives included description of CNF population, microbiology and outcomes, and the identification of underlying conditions that could predispose patients to CNF.
Results: 169 patients were included in our analyses. Among them, 84 patients suffered from tonsil-related CNF, while 85 suffered from peritonsillar abscess. Patients suffering from CNF were significantly older ($p < 0.0001$) had more history of alcohol use disorder ($p = 0.005$), and prior use of non-steroidal anti-inflammatory drugs (NSAIDs) ($p < 0.0001$) or steroid use ($p = 0.03$). Patients with CNF showed significantly lower diastolic blood pressure ($p < 0.001$) on admission, higher oxygen requirement as demonstrated by lower PaO_2/FiO_2 ratio ($p < 0.001$). Biologically, those patients demonstrated higher neutrophil count ($p = 0.037$), lymphopenia ($p < 0.001$), and more elevated C-reactive protein (CRP) ($p < 0.001$). Microbiological analyses revealed a higher prevalence of *Staphylococcus* spp., *fusobacterium* spp., and Gram-negative bacilli in CNF cases, whereas Epstein–Barr virus (EBV) was more commonly associated with uncomplicated phlegmons. After adjustment for cofounding variables, factors independently associated with the development of CNF were age, male sex, history of NSAIDs use (aOR 8.45), and Steroid use (aOR 3.42). Interestingly, among patients admitted for CNF with no history of immunosuppressive comorbid condition, systematic screening revealed that 42% of patients had previously unrecognized diseases, such as diabetes, solid and hematological malignancies, or chronic viral infections (HIV or C hepatitis).
Conclusions: This study identifies several independent risk factors strongly associated with CNF: older age, alcohol use disorder, and use of NSAIDs and steroids prior to admission. In addition to outlining the clinical and biological profile of this under-studied population, our findings highlight a high prevalence of underlying disease, suggesting that systematic screening should be considered in CNF patients.

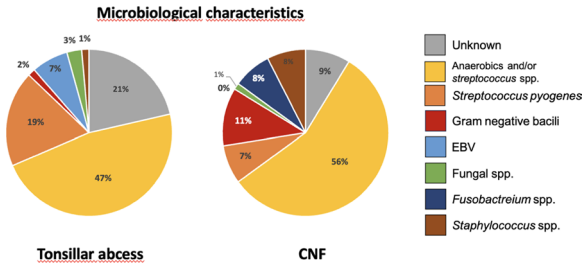
Variable[1]	Fasciitis				p
	No		Yes		
Number	85	84			
Sexe - Male	37	(43.5)	23	(27.4)	0.042
Age (years) [2]	38.72	(15.03)	51.67	(17.16)	<0.001
BMI (kg/m^2) [2]	24.15	(4.59)	25.43	(5.28)	0.109
Comorbidity					
Diabetes	5	(5.9)	13	(15.5)	0.076
Betalactamine allergy	5	(5.9)	3	(3.6)	0.730
Alcohol disorder	1	(1.2)	21	(25.0)	<0.001
Tobacco ("*pack years*") [2]	0.22	(0.42)	0.46	(0.50)	0.001
Drug disorder	4	(4.7)	8	(9.5)	0.358
Solid cancer	3	(3.5)	3	(3.6)	1.000
Hemopathy	0	(0.0)	0	(0.0)	NA
Chronic heart failure	0	(0.0)	7	(8.3)	0.020
High blood pressure	6	(7.1)	19	(22.6)	0.008
Chronic respiratory disease	4	(4.7)	14	(16.7)	0.023
Hepatocellular insufficiency	0	(0.0)	2	(2.4)	0.472
Chronic viral disease	0	(0.0)	2	(2.4)	0.472
HIV	0	(0.0)	1	(1.2)	0.995
Gammopathy	0	(0.0)	1	(1.2)	0.995
NSAIDs use	10	(11.8)	28	(33.3)	0.002
Steroid use	8	(9.4)	19	(22.6)	0.033
Delay between first symptoms and surgery (days) [2]	6.48	(9.05)	6.74	(9.95)	0.862
Antibiotics prior to admission	30	(35.3)	48	(57.1)	0.007
Pathogen family					<0.001
None	15	(21.4)	7	(8.8)	
Streptococcus spp and anaerobics	13	(18.6)	11	(13.8)	
Anaerobics	3	(4.3)	2	(2.5)	
Gram negative bacilli	1	(1.4)	9	(11.2)	
EBV	5	(7.1)	0	(0.0)	
Fungal spp	2	(2.9)	1	(1.2)	
Fusobacterium spp	0	(0.0)	6	(7.5)	
Staphylococcus spp	1	(1.4)	6	(7.5)	
Streptococcus pyogenes	13	(18.6)	6	(7.5)	
Streptococcus spp	17	(24.3)	32	(40.0)	
Clinical and biological characteristics on admission [2]					
PaO_2/FiO_2 (mmHg)	620.28	(220.58)	413.05	(194.14)	<0.001
Systolic BP (mmHg)	123.81	(17.80)	128.06	(21.87)	0.191
Diastolic BP (mmHg)	79.39	(12.67)	71.48	(12.87)	<0.001
Mean BP (mmHg)	93.56	(13.41)	88.79	(13.47)	0.030
Heart Rate (bpm)	92.76	(18.43)	96.56	(21.83)	0.242
Temperature (°C)	37.31	(0.74)	37.54	(0.91)	0.268
Lactate (mmol/L)	1.41	(0.86)	1.81	(2.60)	0.688
White Blood Cells (G/L)	14.87	(5.16)	16.15	(6.75)	0.184
Neutrophils (G/L)	11.94	(4.79)	13.79	(5.79)	0.034
Lymphocytes (G/L)	1.57	(0.68)	1.13	(0.70)	<0.001
Eosinophiles (G/L)	0.06	(0.07)	0.06	(0.09)	0.763
Platelets (G/L)	269.05	(74.53)	263.65	(130.04)	0.749
Bilirubin (mmol/L)	13.32	(9.92)	15.47	(12.41)	0.399
Creatinine (µmol/L)	70.47	(18.06)	92.27	(80.90)	0.020
CRP (mg/L)	189.88	(101.76)	308.55	(151.73)	<0.001
Natremia (mmol/L)	138.60	(3.13)	137.49	(3.92)	0.053
Glycemia (mmol/L)	7.57	(3.77)	8.27	(3.24)	0.472

[1] Variables are reported as n (%) unless stated otherwise
[2] Reported as mean (standard deviation).

Table of baseline characteristics of patients with cervical fasciitis and tonsilar abcess.

Variable	aOR	IC 95%
Age (+1 year)	1.05	1.02-1.08
Sex - Female	0.44	0.20-0.96
Hypertension	0.66	0.25-3.15
Diabetes	2.05	0.57-7.88
NSAID use	8.45	3.33-23.5
Steroid use	3.42	1.21-10.4

Multivariate analysis of factors associated with cervical necrotizing fasciitis as compared to peritonsillar abcess.



Pie-chart of microbiological documentation of cervical necrotizing fasciitis (CNF) ant tonsillar abcess.

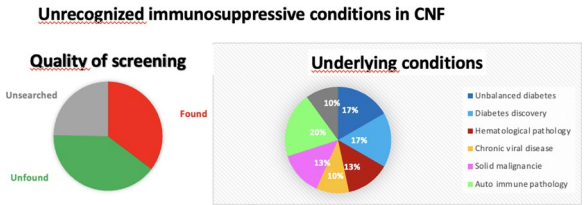


Figure of unrecognized underlying predisposing conditions revealed among patients with cervical necrotizing fasciitis.

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6. none

Topic: Sepsis.

001448

Introducing vasopressin in a general ICU: clinical impact in high-dose norepinephrine septic shock

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Intensive Care Medicine Experimental 2025,* 13(1)*:001448

Introduction: Septic shock requiring high-dose norepinephrine (NE) remains a clinical challenge, often associated with high mortality and prolonged vasopressor dependency. Vasopressin is recommended as an adjunct vasopressor in cases of refractory shock, yet its impact remains variable, especially in units, where vasopressin is not consistently available.
Objectives: This study aims to evaluate the clinical impact of introducing vasopressin in the management of septic shock with high-dose NE, based on a structured ICU protocol, comparing patients treated before and after its implementation.
Methods: This retrospective observational study was conducted in a medical–surgical ICU and included patients admitted with a diagnosis of septic shock requiring norepinephrine (NE) > 1 mcg/kg/min. The group without vasopressin comprised patients treated in 2023 when vasopressin was not available. The vasopressin group included patients treated in 2024, following the implementation of an ICU protocol guiding the initiation and titration of vasopressin as part of vasopressor management. Collected variables included demographics, ICU length of stay, type of admission (medical vs. surgical), lactate levels, NE dosing, and mortality. In the vasopressin group, NE was recorded at multiple timepoints over 24 h after vasopressin initiation.
Results: The group without vasopressin included 22 patients with a mean age of 63.3 years, while the vasopressin group comprised 26 patients with a mean age of 66.7 years. Although not statistically significant, a higher proportion of surgical patients was observed in the vasopressin group. ICU mortality was 81.8% in the group without vasopressin and 65.4% in the vasopressin group ($p = 0.33$). The use of vasopressin was associated with a significant reduction in norepinephrine dose over the first 24 h ($p < 0.00001$), indicating improved hemodynamic control. However, no significant differences were observed in initial ($p = 0.99$) or final ($p = 0.11$) lactate levels between groups.
Conclusions: The protocolized introduction of vasopressin in a general ICU was associated with a significant reduction in norepinephrine requirements during the first 24 h of septic shock. However, this hemodynamic benefit did not translate into improved lactate kinetics or correlate with ICU mortality. These findings highlight the complexity of septic shock and support further prospective evaluation of vasopressin's role in perfusion-targeted strategies.

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Topic: Sepsis.

001449

Vitamin-K-dependent matrix Gla protein and pulmonary damage during severe COVID-19

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Intensive Care Medicine Experimental 2025,* 13(1)*:001449

Introduction: Activated matrix Gla protein (MGP) is required to protect against pulmonary and vascular elastic fibre degradation. Activation is vitamin K-dependent and vitamin K deficiency leads to the accumulation of inactive MGP (dp-ucMGP). In observational studies, patients with severe COVID-19 had high levels of inactive MGP, which was associated with increased levels of biomarkers associated with inflammation and elastic fibre damage, and poorer clinical outcome [1]. This warrants further investigation as we recently demonstrated in an RCT that vitamin K administration improves MGP activation in COVID-19 patients in a safe and feasible manner [2].
Objectives: To further examine the role of Matrix Gla Protein in protection against pulmonary damage in severe COVID-19 using functional respiratory imaging and lung histology, and the effects of vitamin K supplementation on these parameters.
Methods: Observational cohort: A total of 60 patients with severe COVID-19 (invasive ventilation and/or death) were compared to 75 hospitalized COVID-19 patients that did not need invasive ventilation and 184 controls. Intervention study: In a single-centre, double-blind,

randomized, placebo-controlled trial, 40 hospitalized COVID-19 patients were randomly assigned in a 1:1 ratio to receive 999 mcg of vitamin K2—menaquinone-7 (MK-7)—or a placebo daily. In both the observational cohort and the clinical trial, we determined levels of inactive MGP, and markers of inflammation and elastic fibre degradation. We also performed pulmonary CT scans at admission (observational cohort and intervention study) and 5 days after admission (intervention study only). We used functional respiratory imaging coupled with automated algorithms to map airways and pulmonary vasculature on the CT scans. Finally, we studied MGP in lung biopsies from deceased COVID-19 patients.
Results: Lung biopsies from COVID-19 patients showed a marked loss of active MGP in areas of inflammation and damage. CT scans demonstrated that patients with severe COVID-19 had decreased blood volume in small pulmonary vessels with a diameter of < 5 mm ($p < 0.01$). In contrast, airway volume appears relatively spared. Higher levels of inactivated MGP were associated with more severe CT scan defects ($p < 0.01$). Final results from the intervention study are currently being analyzed.
Conclusions: Loss of active MGP and accumulation of inactive MGP are associated with increased pulmonary and vascular damage, and poor outcome in patients severe COVID-19. It may be modified by increased vitamin K supplementation. These findings warrant further study to determine whether this improves clinical outcomes and—perhaps more importantly—whether this is relevant for patients with other severe lung infections and ARDS.

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Topic: Acute respiratory failure and mechanical ventilation.

001451

Is pendelluft during spontaneous breathing trial a potential predictor of reintubation?

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Intensive Care Medicine Experimental 2025, **13(1)**:*001451*

Introduction: Pendelluft, the movement of gas from non-dependent to dependent lung regions, is present in active breathing patients of ARDS. However, pendelluft during spontaneous breathing trial (SBT) is not well-known and whether it is associated with post-extubation outcomes has not been investigated.
Objectives: We investigated the occurrence of pendelluft during SBT in patients who succeeded SBT and whether the pendelluft during SBT can predict reintubation.
Methods: This study was a prospective observational study in a single center in Japan. All patients over 18 years who were mechanically ventilated and passed SBT using a mode of pressure support (PS) ventilation (PS 5 cmH2O, PEEP 5 cmH2O) were included. After enrollment, patients were monitored with an EIT system. We recorded in the last 3 min of SBT and pendelluft was measured. We defined pendelluft volume as the sum of the volumes of gas inspired from the dependent lung region during expiration and the volume of gas expired from the non-dependent lung during inspiration. The primary outcome of this study was reintubation.
Results: A total of 102 mechanically ventilated patients were included. Twelve patients had reintubation within 72 h. Pendelluft tended to be greater in patients who were reintubated than in those who were not, but the difference was not significant (6.6 vs. 4.6 ml, $p = 0.11$). The area under the receiver operating characteristic curve (AUC) for the pendelluft during SBT to predict reintubation was 0.643.
Conclusions: Pendelluft can be measured in patients who succeeded SBT, but its volume was small. Pendelluft during SBT is not a potential predictor of reintubation.

Topic: Acute respiratory failure and mechanical ventilation.

001452

Implementation of sustainability initiatives in ICUs in the netherlands: a survey of the green ICU

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Intensive Care Medicine Experimental 2025, **13(1)**:*001452*

Introduction: ESICM aims to reduce the impact of ICU activities [1]. This goal is reflected in the Netherlands, where 'The Green ICU' was established in 2022 as a collaborative network of ICUs. The Green ICU network collects and shares sustainability initiatives and best practices enabling ICUs in making their ICUs more sustainable [2]. Still, while sharing green initiatives is valuable, it does not necessarily translate into implementation or environmental improvements. On a nation level, monitoring, encouraging effective action, and identifying which green ICU initiatives have been implemented—and where—is crucial in the development of the Green ICU network and in decreasing the ICU's footprints.
Objectives: To investigate which sustainability initiatives of The Green ICU have been implemented in Dutch ICUs from 2022 to 2024.
Methods: A questionnaire was sent to 72 ICUs in the Netherlands in May 2024 and contained 24 questions encompassing all sustainability initiatives of the Green ICU. The initiatives were divided into seven themes: general, waste management, metal reuse, isolation gowns, mats (absorption pads), medication, and other. The number of beds of the participating ICU was also queried to determine the size of the ICU. The data analysis included frequency counts to evaluate how often each sustainability initiative was implemented, and mean scores were calculated per thematic category to identify overall implementation trends. Participants had the opportunity to provide an explanation or an alternative answer through open text space, which was analyzed qualitatively.
Results: In total, 46 ICUs (64%) have opened the questionnaire, of whom 28 ICUs (response rate 39%) rated all sustainability initiatives. Based on the questionnaire, we have detailed information on the implementation frequency of 50 + sustainability initiatives. Some of the widely implemented initiatives were: 'The establishment of a Green Team' (implemented by 100% of responding ICUs), 'Not routinely replacing the CVL, only if there is suspicion of infection' (93%), and 'Using ultrasound for line insertion' (89%). Some of the less commonly implemented initiatives were: 'Using NaCl for the ultrasound instead of gel' (0%), 'Measure vancomycin sustainably via blood gas analysis' (4%), and 'Use a sleeve to cover the blade of a video laryngoscope' (14%). Figure 1 provides an overview of several widely implemented sustainability initiatives across Dutch ICUs. Figure 2 provides an overview of several sustainability initiatives that are less commonly implemented by Dutch ICUs.
Conclusions: Our questionnaire concerning ICU sustainability initiatives facilitates the identification of implemented actions and focus areas in Dutch ICUs. The results also provided insight into the differences between ICUs. This can serve as a starting point for further research into aspects contributing to successes and obstacles of the implementation of sustainability initiatives.

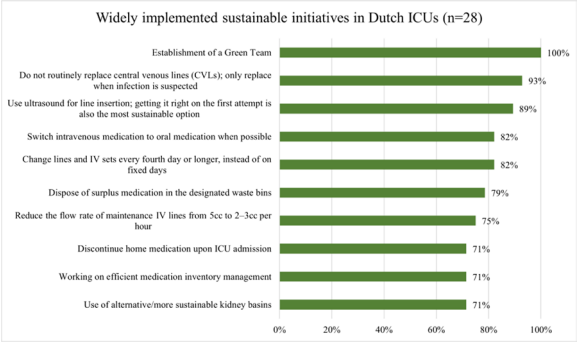


Figure 1 Overview of widely implemented sustainability initiatives in Dutch ICUs
(100% indicates that all responding ICUs have implemented the respective initiative).

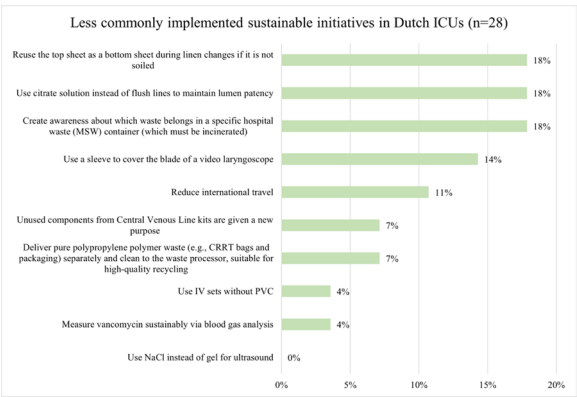


Figure 2 Overview of less commonly implemented sustainability initiatives in Dutch ICUs
(0% indicates that none of the responding ICUs have implemented the respective initiative).

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Topic: Health Services Research and Outcome.

001454

Prediction of disability at ICU discharge and possibilities for improving recovery: the SelfCare@Home project

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Introduction: Hospitalization in intensive care units (ICU) is associated with the development of long-term sequelae that have a negative impact on functionality, cognition, family and social participation, and quality of life, known in the literature as PICS (post-intensive care syndrome). Although the epidemiological results of PICS are scarce, it is estimated that half of survivors will suffer from one of its components. Given these implications, predicting the development of disability on discharge from the ICU using machine learning tools, can alow programming early interventions capable of mitigate the development of sequelae. Simultaneously, even though an optimal model of outpatient ICU follow-up care remains uncertain, models of post-icu care witthout in-person attendence at the hospital have potential to higher recruitment, intervention delivery succes, and participants retention. Therefore, the incorporation of new/emerging technologies such use of "apps" could be considered adjunct therapies to improve patient recovery.
The SelfCare@home project aims to develop new models for providing care to critically ill patients, to integrate new technologies, to develop predictive models that make possible to anticipate healthcare needs, and to develop applications that make easier for patients to participate in their recovery process.
To achieve these goals, we began collecting data from critically ill patients to train prediction models using machine learning algorithms and develop an app that allows patients to follow a therapeutic regimen and interact with healthcare professionals.
The results of the follow-up of the first 40 patients are presented, as the project is currently undergoing.
Methods: A longitudinal study was carried out, collecting and analyzing data consecutively from 40 patients on admission and discharge from the ICU and 1, 3, and 6 months after discharge.
This study was approved by the board of directors, the local ethics committee, the service director, and the nurse manager. Informed consent was obtained from the participants.
Results: The average age of the participants was 57.8 years (41–83 years), 24 men and 16 women. The mean SAPSII score was 31.85 (SD 13.89), and the mean SOFA score was 4.15 (SD 2.74). The average number of days of sedation was 6.25 (SD 12.72), and delirium was diagnosed in 27.5% of the patients. The average number of days under invasive mechanical ventilation was 7.53 (SD 14.85). On average, patients spent 7.53 days (SD 16.29) and 28.53 (SD 26.44) in hospital.
On discharge from the ICU: 25% of participants needed help with self-care activities (hygiene, dressing/undressing, grooming, transferring, and walking), 25% needed help taking medication, 40% had respiratory problems, 7.5% had urinary incontinence, 85% had reduced strength, 27.5% reported pain, and 17.5% had swallowing problems.
Some patients recovered over time and 6 months after discharge: 7.5% of participants needed help with self-care activities, 17.5% needed help with medication, 27.5% continued to have respiratory problems (1 patient still needed CPAP), 5% continued to have urinary incontinence, 30% continued to have reduced strength, 2.5% continued to report pain, and 1% continued to have swallowing problems. There were also three patients who remained in rehabilitation programs.
Conclusions: On discharge from the ICU, several patients had disabilities that affected their autonomy and recovery. Six months after discharge, although some patients had recovered, others remained disabled in terms of self-care, strength, and breathing, indicating the need for further support and rehabilitation care. As more data are collected and analyzed, relationships between problems at ICU discharge and their long-term prevalence can be clarified. The use of new technologies can help to improve the continuity of care.

Topic: Information systems and Data Science.

001457

Effectiveness of basal cisternostomy in treating intracranial hypertension: a case series

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Introduction: Intracranial hypertension [ICH—when intracranial pressure (ICP) exceeds 20–22 mmHg] complicates common causes of acute brain injury, such as traumatic brain injury (TBI) or spanteneous intracranial hemorrage (ICH). The pathophysiology of secondary brain injury is complex and multifactorial but increased ICP, not only is part of the problem, but is a potentially treated complication. A stepwise approach for increased ICP is recommended, with decompressive craniectomy and thiopental perfusion being reserved for the most refractory cases. Both these treatments have high rates of complication. Recently, basal cisternostomy has been proposed as an alternative strategy to control ICP. This technique consists of drainage of cerebrospinal fluid from the basal cisterns, by introducing a catheter in this location.
Objectives: Report of a case series of use of cisternotomy to treat increased ICP refractory to medical treatment.
Methods: Description of a series of cases of cisternotomy in increased ICP and identification of demographics, etiology, complications, length of ICU stay, intrahospital mortality, and functional disability at-discharge [defined as a modified Rankin Scale (mRS) score].
Results: Four patients were submitted to cisternotomy, all male, with a mean age of 29 years (range 19–60). Three patients were admitted in the ICU for severe TBI and 1 for spontaneous acute subdural hematoma. Initial Glasgow Coma Scale (GCS) was between 4 and 7. Patients became refractory to medical treatment between the second and fourth days, and all started thiopental perfusion. Two TBI patients underwent frontal contusectomy in addition to basal cisternostomy. ICP control with cisternotomy was achieved in three patients, with the other patient requiring further decompressive craniectomy. It was possible to progressively reduce thiopental, with its suspension between the first and second post-surgical day and the suspension of sedation between the second and fifth post-surgical day (on average on the 3.25th day). All patients survived, and a median period of ICU stay was 21 days. Only one patient had a mRS score higher than 4 at 3 months.
Conclusions: Basal cisternostomy is a promising treatment for refractory increased ICP in acute brain injury, allowing patients to avoid more aggressive treatments like descompressive craniectomy.

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Topic: Neurointensive care.

001458

Neurological complications after orthotopic liver transplantation: focus on metabolic encephalopathy

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Introduction: Orthotopic liver transplantation (OLT) greatly improves survival in end-stage liver disease, yet it is frequently complicated by neurological issues, especially metabolic encephalopathy. Despite advancements in surgical techniques and immunosuppressive therapy, these complications persist as a significant challenge. Mental status changes affect up to 70% of liver transplant recipients in the early postoperative period, resulting in prolonged hospitalizations and higher mortality rates. Early identification of risk factors and preoperative neurological assessments is essential for recognizing high-risk patients and optimizing outcomes. (1)(2).
Objectives: To assess the incidence of metabolic encephalopathy in our cohort of liver transplanted patients, focusing on the etiology of neurological signs and syndromes.
Methods: Pre-operative, intraoperative, and post-operative factors were analyzed, with outcomes, including hospital/ICU stay, complications, rehabilitation needs, and mortality. Ethical approval and informed consent were obtained, and descriptive statistical analysis was performed.
Results: Delirium and metabolic encephalopathy occurred in up to 53 ($p = 0.6053$) patients, especially in the males subgroup (69%).
Among the preoperative factors, the incidence of episodes of PSE (portosystemic encephalopathy) was found in almost half of the subjects.
Moreover, an higher prevalence of chronic renal impairment ($p = 0.0147$), smoking ($p = 0.9611$), and severe ascites before transplant ($p = 0.0564$) were highlighted. On the other hand, possible risk factors such as HCV and HBV etiology were correlated with a lower probability to develop NC, with an incidence inferior of 28% ($p = 0.0427$; OR = 0.6) and 11% ($p = 0.5662$) in both cases.
Between the peri-operative variables, it appears that 46% of the patients had higher sodium plasma concentrations (3), with immediate acute renal impairment in 45.6% ($p < 0.0001$; OR = 3.74) of the cases and continuous renal replacement therapy (CRRT) in 65.8% ($p < 0.0001$; OR = 7.1), respectively.(4) (5).
Moreover, patients with metabolic encephalopathy have shown longer in-hospital length of stay (36% of the cases, $p < 0.0001$; OR = 1.04), with higher incidence of readmissions in ICU (53%, $p < 0.0001$; OR = 6.65), while the necessity of rehab after discharge emerged only in a third of the population considered.
Conclusions: Identifying the risk factors and managing them appropriately in the preoperative and perioperative phase represents a key strategy for reducing postoperative risk. This approach could serve as the focus of future prospective studies.

Pre-operative Risk Factors	Peri-operative Risk Factors	Post-operative Scenario
Severe **ascites** (p<0.05)	Peri-operative renal impairment (p<0.0001)	Longer **in-hospital stay** (p<0.001)
Pre-transplant **K+ concentration** (p<0.05)	Continuous renal replacement therapy - **CRRT** (p<0.001)	Longer ICU stay (p<0.01)
Chronic renal insufficiency - CRI (p<0.05)	**Post-operative infections** (p<0.001)	Higher likelihood of **ICU readmission** (p<0.0001)
Portosystemic encephalopathy - **PSE** (p<0.0005)	**Graft rejection** (p=0.001)	Need for **rehabilitation** after discharge (p<0.05)
Critical condition before transplant (p=0.001)	>3 post-operative complications (p<0.0001)	
Higher **MELD** score (p<0.01)		
Higher **Na+** concentration at POD2		

Summary of relevant risk factors in developing metabolic encephalopathy and related consequences.

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Topic: Metabolism, endocrinology, liver failure and nutrition.

001459

Is admission lactate a predictor of outcome in trauma patients admitted to the intensive care unit?

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Introduction: Early identification of trauma severity is critical to guide timely and appropriate clinical interventions. Serum lactate levels are an important biomarker in trauma, reflecting the severity of the injury and predicting the outcome of treatment. Elevated lactate levels are associated with increased mortality and organ failure.
Objectives: This study aimed to evaluate the predictive value of lactate levels upon admission to the emergency room (ER) for key clinical outcomes, including mortality and lengh of stay (LOS), in a cohort of adult trauma patients.
Methods: This retrospective cohort study was conducted at a secondary care hospital. The study included all trauma patients who were admitted to the Intensive Care Unit (UCI) between October 1st and December 31st, 2024. However, patients under the age of 18 were excluded from the study. Data were collected by reviewing individual electronic medical records. The initial lactate values were obtained from arterial blood gas analyses that were performed in the emergency room. The variables were analyzed using the statistical software R and the significance level was 0.05.
Results: The study included 36 patients, of whom 25 had an Injury Severity Score (ISS) $\geq$ 9. The baseline characteristics are described in Table 1.

Characteristic	
Male, *n* (%)	28 (78)
Age (years, mean ± SD)	55 ± 17
Clinical Frailty Score > 2	6 (17)
Length of stay in ICU (days, mean ± SD)	7 ± 12
Total hospital length of stay (days, mean ± SD)	30 ± 20
ISS (mean ± SD)	15 ± 8
SAPS II (mean ± SD)	26 ± 15
ICU mortality	2 (6)
In-hospital mortality	4 (11)

In a linear regression model evaluating the association between admission lactate levels and ICU length of stay, no statistically significant relationship was found: F (1, 6) = 0.302, p = 0.602. Admission lactate explained only a small proportion of the variance in ICU length of stay (R^2 = 0.048), indicating that it is not a relevant predictor in this cohort. The standardized beta coefficient was 0.219, indicating a small effect size. A logistic regression model was performed to evaluate whether lactate levels at ER admission predicted hospital mortality. The model was not statistically significant (χ^2 = 0.613, p = 0.432) and explained only 4.1% of the variance in outcomes (Nagelkerke R^2 = 0.041). The Hosmer–Lemeshow test suggested adequate model fit (p = 0.557), but the model failed to correctly predict mortality cases (0%).
Conclusions: In this small cohort of critically ill trauma patients, serum lactate levels at admission to the ER did not show a statistically significant correlation with ICU LOS or in-hospital mortality. Although lactate is a biologically plausible marker of injury severity, its prognostic value may be limited when used as a standalone indicator in this population. Further research involving larger sample sizes and additional clinical variables is necessary to fully understand lactate's role in early risk stratification of trauma patients.

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Topic: Trauma.

001460

Measuring satisfaction levels of healthcare staff and families in a post-pandemic open ICU setting

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Introduction: Meeting the needs of patients' families is a key responsibility for ICU physicians and nurses, aiming to alleviate their distress. Equally, staff satisfaction is vital for delivering quality care and maintaining a harmonious work environment.
Our ICU has upheld an open visitation policy for over a decade. However, post-pandemic restructuring, while maintaining this policy, has led to staff discomfort. This study aims to assess current satisfaction levels among family members and ICU staff.
Objectives: 1. To evaluate family member satisfaction using the Critical Care Family Needs Inventory (CCFNI).
2. To assess job satisfaction among general practitioners (GPs), nurses, and non-physician staff using the Safety Attitudes Questionnaire (SAQ) and the Warr–Cook–Wall (WCW) Job Satisfaction Scale.
Methods: Cross-sectional study conducted over 6 months in a medical-surgical ICU. Family satisfaction was assessed using the short version of the Critical Care Family Needs Inventory (CCFNI), comprising 11

items rated on a four-point Likert scale yielding total scores ranging from 11 to 44. Responses were analyzed both globally and by individual item. Questionnaires were distributed to family members upon patient discharge, provided that the patient had been admitted for more than 2 days.
Job satisfaction among physicians, nurses, and non-physician staff was evaluated using the 15-item Warr-Cook-Wall (WCW) Job Satisfaction Scale, which employs seven-point Likert responses. In addition, the short version of the Safety Attitudes Questionnaire (SAQ) was used to assess Teamwork Climate and Safety Climate domains, using a five-point Likert scale. SAQ scores were transformed to a 0–100% scale, with < 50% indicating poor, 50–79% average, and ≥ 80% excellent perceptions.
We compared job satisfaction across professional groups using both instruments. Data are presented as N (%), mean ± SD, or median (25th–75th percentile). Differences among staff categories were evaluated using one-way ANOVA with Bonferroni correction; a p-value < 0.05 was considered statistically significant.
Results: Out of 233 surveys distributed to families, 97 were completed (42% response rate). The respondents' relationships to the patients were: spouses (23, 24%), children (29, 30%), parents (17, 18%), siblings (13, 13%), and friends/others (15, 15%). The majority of respondents were female (75, 77%), with a mean age of 44 ± 13 years. Patients mean age 50 ± 21 years; 42 (44%) were female.
The mean score on the Critical Care Family Needs Inventory (CCFNI) was 34 ± 4, with a median item score of 3 [interquartile range: 3–4], indicating a high level of family satisfaction.
Among the 160 healthcare staff members surveyed, 146 responded (91% response rate), with 34 physicians, 81 nurses, and 31 non-physician staff members, including physical therapists, occupational therapists, and speech-language pathologists. The SAQ revealed: Teamwork Climate scores: overall staff 71 ± 17, physicians 77 ± 13, nurses 65 ± 18*, and non-physician staff 80 ± 9 (*p < 0.01). For the Safety Climate domain, the mean scores were: overall 65 ± 20, physicians 64 ± 24, nurses 62 ± 19, and non-physician staff 76 ± 12* (*p < 0.01). Figure 1 illustrates the Warr–Cook–Wall (WCW) Job Satisfaction Scale.
Conclusions: Among families, there was a high level of satisfaction, indicating strong approval of the open ICU policy and the overall care received.
- Among staff members, while an acceptable level of job satisfaction was observed across the evaluated SAQ domains, opportunities for improvement were identified in the safety climate domain. Significant differences were noted in both the teamwork and safety climate domains for nursing staff and in the safety climate domain for physicians.
- Based on the findings from the Warr–Cook–Wall (WCW) Job Satisfaction Scale, several items exhibited low performance, highlighting the need to continue with existing policies while seeking strategies to enhance staff satisfaction. This is particularly crucial given the current health crisis affecting the region and specialty, which requires urgent attention.

WCW item	Physicians N 34	Nurses N 81	Non-physicians N 31	p value
1.Physical working condition	3 ±1.8	4.7 ±1.6	5.5 ± 0.8	< 0.01
2.Freedom of working method	5.5 ± 0.8	5.5 ± 1.7	4.9 ±1.6	<0.05
3.Colleagues and fellow workers	5.8 ± 1.6	5.3 ± 1.4	6.4 ±0.6	<0.05
4.Recognition for work	4.7 ± 1.5	3.9 ± 1.8	5.6 ±1.1	< 0.01
5. Your immediate supervisor	5.5 ± 1.2	5.3 ± 1.5	5.6 ±1.1	0.49
6. Amount of responsibility	5.6 ± 1.5	5.2 ± 1.6	6.2 ±0.4	<0.05
7. Income	2.3 ± 1.5	3 ± 2.1	3.4 ±1.3	0.08
8. Opportunity to use abilities	5.4 ± 1.3	5.2 ± 1.6	5.9 ±0.8	0.08
9. Relations between Management and Employees	3.5 ± 1.8	3.8 ± 2.2	5.03 ±1.1	< 0.01
10. Opportunity to progress	4.7 ± 1.8	4.3 ± 2.0	5.8 ±0.8	< 0.01
11.Hospital administration system	3.5 ± 1.8	3.8 ± 1.9	5.2 ±1.1	< 0.01
12. The consideration of your suggestions	4.6 ± 1.4	4.6 ± 1.7	5.4 ±0.8	<0.05
13. Hours of work	5.0 ± 1.3	5.3 ± 1.6	5.8 ±0.9	0.11
14. Amount of variety in job	5.0 ± 1.7	5 ± 1.6	5.9 ±0.7	<0.05
15. Job stability	5.8 ± 1.4	5 ± 1.9	6.1 ±0.7	<0.05

Possible score for each item between 1 (extremely dissatisfied) and 7 (extremely satisfied).

Figure 1 Job satisfaction scale

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Topic: Health Services Research and Outcome.

001461

Early diastolic blood pressure and outcome in hemodynamically unstable trauma patient

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Introduction: The assessment of hemodynamic status is essential in the management of patients with severe trauma. The value of early diastolic blood pressure (DBP) has been little studied, and its utility in hemodynamically unstable patients remains unknown.
Objectives: To evaluate the impact of diastolic blood pressure (DBP) on clinical outcomes and resource utilization in hemodynamically unstable patients with severe trauma.
Methods: A prospective cohort study including patients consecutively admitted to a Trauma and Neurocritical Care Unit between June 2023 and December 2024. We analyzed patients with severe trauma and initial hemodynamic unstability, defined as a shock index (SI) > 0.9. The cohort was stratified into three groups according to DBP at the start of initial management: < 60 mmHg, 61–80 mmHg, and > 80 mmHg. Demographic variables, trauma severity, resource use, and complications were analyzed. The primary outcome was ICU mortality. Secondary outcomes included red blood cell (RBC) transfusion, activation of the massive transfusion protocol (MTP), hospital mortality, and length of stay in both ICU and hospital. Categorical variables were expressed as counts and percentages and compared using the χ^2 test or Fisher's exact test. Continuous variables were reported as median and interquartile range (IQR) and compared using the Kruskal–Wallis test or ANOVA, as appropriate. A two-sided p value < 0.05 was considered statistically significant. Statistical analysis was performed using STATA version 13® (StataCorp LLC).
Results: A total of 83 patients were included, with a median age of 47 years (IQR 26–63); 69.8% were male (n = 58), and the most common cause of trauma was traffic accidents (48.19%, n = 40), with no significant differences between groups.
The group with a DBP < 60 mmHg showed lower Revised Trauma Score (RTS) values (6.2 [3.5–7.1] vs. 7.8 [6.4–7.8]; p = 0.007), as well as other parameters reflecting hemodynamic status (lower systolic and mean arterial pressures, reduced Diastolic Pressure Time Index values, and higher shock indices) (Table 1). However, no significant differences were observed in ICU or hospital mortality, length of stay, need for red blood cell transfusions, norepinephrine requirement, or activation of the massive transfusion protocol. Nevertheless, patients with lower DBP did exhibit a higher incidence of trauma-associated coagulopathy (TIC) within the first 24 h (Table 2).
Conclusions: In patients with severe trauma and hemodynamic instability, lower diastolic blood pressure (DBP) was not associated with increased mortality or greater resource utilization. As expected, other hemodynamic parameters indicative of instability were also altered, suggesting that DBP may provide limited prognostic information in this context, beyond its potential utility as an early indicator of trauma-associated coagulopathy (TIC).

Table 1 Hemodynamic status at initial assessment

Parameter	DBP < 60 mmHg (n=47)	DBP 60–80 mmHg (n=25)	DBP > 80 mmHg (n=11)	Total (n=83)	p-value
Shock Index, median (IQR)	1.32 (1.06-1.62)	1.05 (0.98-1.25)	1 (0.93-1.23)	1.2 (1-1.4)	< 0.001
Systolic BP (SBP), mmHg, median (IQR)	87 (78-95)	109 (100-105)	111 (108-126)	98 (85-110)	< 0.001
Diastolic BP (DBP), mmHg, median (IQR)	50 (44-56)	69 (66-75)	86 (83-90)	60 (50-70)	< 0.001
Mean Arterial Pressure (MAP), mmHg, median (IQR)	63 (47-68)	83 (79-87)	97 (93-102)	72 (60-86)	< 0.001
Diastolic Pressure Time Index (DPTI), points, median (IQR)	15.1 (11.8-21.5)	21 (16.1-22.8)	25.5 (23.9-32.13)	18.2 (14-24)	<0.001
DPTI/SPTI > 1, n (%)	34	44	72.7	42.2	0.063

Table 2 Outcomes and resource utilization

Parameter	DBP < 60 mmHg (n=47)	DBP 60–80 mmHg (n=25	DBP > 80 mmHg (n=11)	Total (n=83)	p-value
Resource Use					
Norepinephrine use during initial management, %	59,1	40	3,3	48,8	0,349
Lowest Hb within 24h, g/dL, median (IQR)	8,85 (8,7-9)	14,3 (14,3-14,3)	11,3 (10,1-12,8)	10,7 (9-12,8)	0,117
Tranexamic acid administration, %					
1 g dose	29,8	26	27,2	25,3	
2 g dose	25,3	28	27,3	26,5	0,784
Massive Transfusion Protocol (MTP) activation, %	45,8	50	22,2	41,9	0,396
RBC transfusion required, %	57,6	29	27,3	51,6	0,203
RBC volume transfused, mL, median (IQR)	4 (0-500)	250 (0-750)	0 (0-500)	2 (0-656)	0,315
Trauma-induced coagulopathy within 24h, %					
Thrombocytopenia	37,8	20	9,1	28,4	
INR > 1.4	4,4	0	9,1	3,7	0,044
Crystalloids in first 24h, mL, median (IQR)	4975 (4000-6370)	4500 (2250-7750)	5250 (2750-10000)	4875 (3125-7095)	0,841
>5 L crystalloids in 24h, %	50	40	66,7	50	0,766
Outcomes					
ICU length of stay, days, median (IQR)	4 (1-19)	6 (2-11)	15 (1-26)	6 (1-18)	0,512
Hospital length of stay, days, median (IQR)	12 (2-32)	12 (6-30)	23 (3-42)	14 (3-32)	0,792
ICU mortality, %	30	25	10	25,7	0,431
Hospital mortality, %	35	25	20	30	0,551

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Topic: Trauma.

001462

Acute alpha-chloralose poisoning: clinical aspects, management, complications and outcome in a Tunisian medical intensive care unit

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Intensive Care Medicine Experimental 2025,* 13(1)*:001462

Introduction: In Tunisia, suicide attempts using alpha-chloralose remain a major concern due to the widespread availability of the toxic substance to the general population, and the lack of an appropriate surveillance system. In European countries, chloralose poisoning is mainly encountered in animals (1, 2, 3).
Objectives: The aim of the study was to describe the epidemiological characteristics, clinical aspects, biological features, management, and outcome of patients admitted to the Medical Intensive Care Unit of a Tunisian University hospital for acute alpha-chloralose self-poisoning.
Methods: This was a descriptive, observational, single-center, retrospective study conducted in a Tunisian Medical Intensive Care Unit, from January 1, 2011, to December 31, 2016. Data collection was conducted retrospectively, including social and demographic characteristics, previous medical history, clinical, biological, radiological, toxicological data, severity scores, ICU management, and outcome.
Results: The population included 74 patients with a mean age of 27 ± 9 years, with a female predominance: 57 women (77%) and 17 men (23%), 10 of whom (13.5%) had a history of psychiatric disorders. Only 15 patients were from an urban area, and 59 were from a rural area. The presumed ingested dose averaged 3.36 ± 1.3 g. The time from ingestion to the first medical examination averaged 118 ± 65 min. Medical transport was ensured in 25 patients (33.8%). In the ICU, the severity scores were: APACHE II at 14 ± 2 and SAPS II at 37 ± 6. On examination, all patients were unconscious (GCS less than 8), 31 patients (41.9%) had bilateral mydriasis, myoclonus was present in all patients, and 11 patients had acute circulatory failure. Almost all patients (95.96%) required the use of invasive mechanical ventilation with a mean duration of 22.81 ± 10.54 h. The biological abnormalities encountered included hyperleukocytosis in 25% of patients, hypokalemia in 26% of patients, hyponatremia in 4.1%, relative hypoglycemia in 70.3% of patients, and acute rhabdomyolysis in 27.1% of patients. The main arterial blood gas abnormalities included low bicarbonate level in 39.72% of cases and hypoxemia (PaO2/FiO2 < 300) in 23.28% of patients. Aspiration pneumonia was found in 57 patients (77%). The poisoning was confirmed in all cases by toxicological analyses which showed the presence of alpha-chloralose in gastric content and urine. The median length of stay in ICU was 50 h (20–144 h). The outcome was favorable, and all patients were discharged from the ICU without sequelae.
Conclusions: Acute alpha-chloralose self-poisoning is a common condition in Tunisian intensive care units, affecting a young population. Despite the severity of the initial clinical presentation, the outcome was favorable in all cases. Psychiatric care was provided for all patients.

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Topic: Pharmacology and Toxicology/Poisoning.

001464

Percutaneous dilatational tracheostomy in intensive care: a decade-long review in a tertiary single center

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Intensive Care Medicine Experimental 2025,* 13(1)*:001464

Introduction: Percutaneous dilatational tracheostomy (PDT) has become the preferred alternative to traditional surgical tracheostomy (ST) in intensive care units (ICU) due to lower complication rates and operational efficiency. PDT has been associated with a lower incidence of wound infections. PDT is classically indicated to facilitate weaning

of mechanical ventilation, to protect airways in patients at risk of aspiration, and to minimize sedation requirement.
Objectives: This retrospective study aims to provide valuable insights into the treatment strategies and complications of PDT, to enhance patient care, and to refine therapeutic approaches. Evaluating the safety of PDT in critically ill patients, discussing its indications and complications, and reviewing PDT techniques are among the main objectives.
Methods: Retrospective data were collected from our Intensive Care Department over a period of 10 years. Five hundred thirty-four patients were included. Demographic data, indications for the PDT, techniques used, duration of mechanical ventilation, ventilatory parameters, and associated complications were determined.
Results: Most patients were male (63.5%), with a mean age of 57 years (range 18–94 years). Indications for tracheostomy were airway protection (54.5%) and prolonged mechanical ventilation (41.2%). The main diagnoses identified were traumatic brain injury (19.7%), acute respiratory failure (13.8%), non-traumatic central nervous system hemorrhage (13.5%), and ischemic stroke (10.3%). Other diagnoses leading to the indication for the procedure included critical illness myopathy, anoxic encephalopathy, non-convulsive status epilepticus, and polytrauma patients. The Ciaglia technique was the most commonly employed (91.4%), followed by the Griggs technique (8.4%), both performed electively. The mean duration of invasive ventilation was 14 days (range: 0–46 days). Bronchoscopic guidance was used in 85.6% of cases and ultrasound assistance was applied in 91.6%, reflecting a minimally invasive and guided approach. Immediate complications had a low incidence of 7.0%, with hemorrhage being the most prevalent. No cases of pneumothorax or pneumomediastinum were reported.
Conclusions: Percutaneous tracheostomy has proven to be a safe and effective procedure for critically ill patients, with a low rate of severe complications. Proper patient selection and the adoption of auxiliary techniques, such as bronchoscopy and ultrasound, significantly contribute to procedural success. The optimal technique should be chosen based on individual expertise. The literature supports that standardized tracheostomy care protocols and a structured decannulation process are crucial aspects of patient management, contributing to reduced hospital stays. Further prospective studies are recommended to evaluate the long-term impact of these approaches on clinical outcomes.

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Topic: Neurointensive care.

001467

Enhancing pediatric burn management: critical care strategies and severity assessment tools

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Intensive Care Medicine Experimental 2025,* 13(1)*:001467

Introduction: Background: Effective critical care management of pediatric burn patients in a burns center requires a thorough understanding of specific parameters and the utilization of severity assessment tools. Incorporating scores such as PRISM III (Pediatric Risk of Mortality III) and PELOD II (Pediatric Logistic Organ Dysfunction II) aids in risk stratification and optimizing care delivery.

Objectives:
To evaluate the critical care management strategies employed in pediatric burn patients admitted to a specialized burns ICU, focusing on fluid resuscitation, infection control, pain management, respiratory support, and nutritional care.
To assess the utility of PRISM III and PELOD-II scoring systems in the early identification of illness severity and risk stratification in pediatric burn patients.
To analyze the relationship between organ dysfunction scores, complication rates (including sepsis, MODS, and AKI), and patient outcomes such as ICU length of stay and mortality.
To determine whether the integration of illness severity scores can inform clinical decision-making and contribute to the standardization and optimization of pediatric burn critical care protocols.
Methods: A retrospective analysis was conducted on pediatric patients admitted to the burns intensive care unit (ICU) of a burns center between April 2022 and March 2025. A detailed analysis of fluid resuscitation, pain management, infection control, nutritional support, and respiratory care insights into illness severity score (PRISM III) and pediatric logistic organ dysfunction (PELOD-II) on day 1 subsequently.
Results: The study included 574 pediatric patients with burn injuries admitted to the burns ICU. Inhalation injuries were present in 8.78 of cases, necessitating intubation and mechanical ventilation. A total of 22.86% of patients developed complications the leading causes being infections/sepsis (62.65%), multi-organ dysfunction syndrome (MODS) (27.71%), and acute kidney injury (AKI) requiring renal replacement therapy (RRT) (4,0.82%). The complication rates were higher in patients with higher PRISM III and PELOD II scores. The utilization of severity assessment tools such as PRISM III and PELOD II scores facilitates risk stratification and informs treatment decisions, enhancing patient care and prognostication.
Conclusions: Higher resuscitation requirements with higher organ dysfunction scores may predict mortality in pediatric burns warranting further study for standardization of care.
Applicability in clinical practice: In a burns center setting, the integration of critical care parameters and severity assessment tools is integral to optimize outcomes for pediatric burn patients. Continuous refinement of critical care protocols and utilization of appropriate severity assessment tools contribute to improved patient outcomes and resource utilization.

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Topic Trauma.

001468

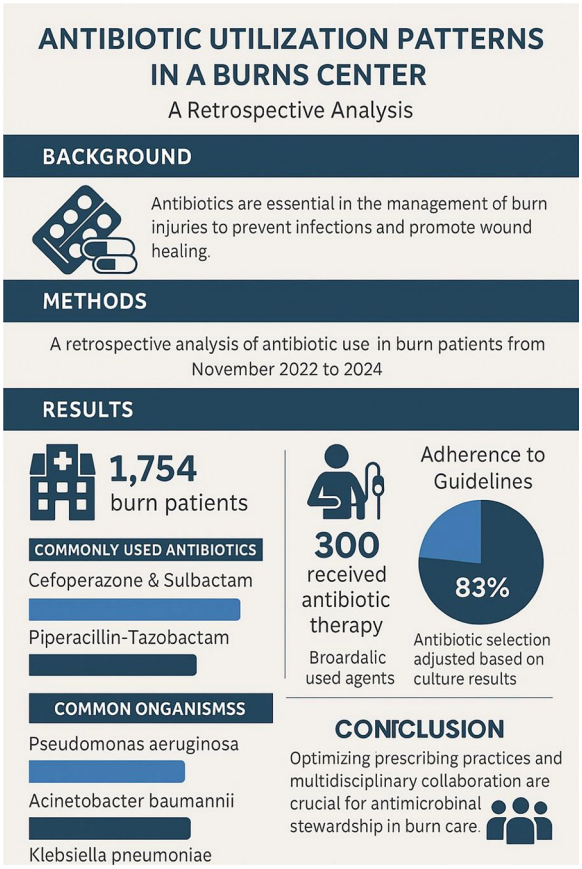
Antibiotic utilization patterns in a burns center: a retrospective analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001468

Introduction: Antibiotic therapy is pivotal in managing burn patients due to their high risk for infections and sepsis. However, inappropriate antibiotic use may contribute to antimicrobial resistance. Analyzing utilization patterns can inform stewardship strategies tailored to burn-specific clinical scenarios.

Objectives:
To analyze the patterns of antibiotic prescribing in patients admitted to a specialized burns intensive care unit (ICU), including the selection, timing, and duration of therapy.
To identify the most commonly isolated pathogens in culture-positive burn patients and evaluate the appropriateness of antibiotic selection based on sensitivity profiles.
To assess the level of adherence to institutional antibiotic stewardship guidelines and examine reasons for deviations from recommended protocols.
To evaluate the impact of clinical factors such as burn severity, inhalation injury, and immunosuppression on antibiotic use and treatment outcomes.
To provide evidence for the development and implementation of antimicrobial stewardship initiatives specifically tailored to the needs of burn patients.
Methods: A retrospective observational study was conducted at a tertiary burns ICU from November 2022 to March 2025. Patient records were reviewed for demographics, indications for antibiotic initiation, choice and duration of therapy, culture results, and adherence to institutional antibiotic prescribing guidelines. Empirical and targeted therapy approaches were compared.
Results: Of 1754 burn patients admitted during the study period, 300 (17.1%) received systemic antibiotic therapy. Broad-spectrum antibiotics, including cefoperazone–sulbactam and piperacillin–tazobactam, were the most commonly used agents, primarily for prophylactic purposes. Of the 250 patients with positive cultures, *Pseudomonas aeruginosa* was the most frequently isolated pathogen, followed by *Acinetobacter baumannii* and *Klebsiella pneumoniae*. Antibiotic regimens were adjusted based on culture and sensitivity in 83% of cases. Therapy duration was influenced by burn severity, presence of inhalation injury, and immunocompromised status. Adherence to institutional guidelines was noted in the majority of cases, with deviations typically occurring during empiric treatment prior to microbiological confirmation.
Conclusions: Antibiotic use in burn patients requires a delicate balance between timely prophylaxis and targeted treatment. Culture-guided therapy and standardized protocols enhance therapeutic efficacy while reducing the risk of resistance. The development and implementation of antimicrobial stewardship programs specifically adapted to the burn population are essential.

Relevance to Clinical Practice
Burns ICUs present unique challenges for antibiotic stewardship due to high infection risk and complex microbial profiles. Multidisciplinary stewardship models—integrating burn surgeons, intensivists, infectious disease specialists, and clinical pharmacists—are key to optimizing antimicrobial use, preventing resistance, and improving outcomes in burn patients.



Antibiotic utilization patterns in a burns center: a retrospective analysis

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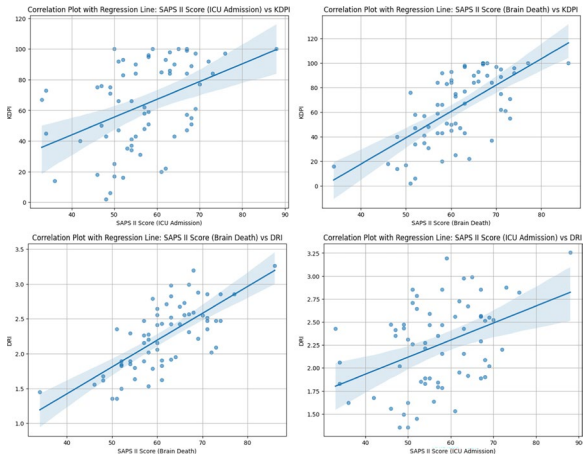
TopicTrauma.

001469

"Correlation between SAPS II and KDPI for kidney transplantation and dri for liver transplantation: a single-center retrospective database analysis"

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Introduction: The assessment of potential organ donors is crucial for optimizing transplant outcomes. Among the various tools employed, the Kidney Donor Profile Index (KDPI) and the Donor Risk Index (DRI) stand out as significant prognostic scores. These indices integrate a range of donor characteristics to predict graft survival and recipient outcomes following kidney and liver transplantation, respectively. By quantifying donor risk, KDPI and DRI aid in informed decision-making during organ allocation. This allows transplant centers to balance the risks and benefits for individual recipients, ultimately aiming to improve patient survival and graft function. Their broad implementation reflects the growing recognition of standardized risk assessment as a cornerstone of effective organ transplantation practices.
Objectives: While KDPI and DRI are not routinely calculated for every potential donor, the Simplified Acute Physiology Score II (SAPS II) is a standard assessment performed upon admission to the Intensive Care Unit (ICU). Given the availability of SAPS II data, the objective of this data analysis is to evaluate whether a statistically significant correlation exists between SAPS II scores and the KDPI and DRI values in potential organ donors.
Methods: This study, authorized by local Ethic Committee, involved a retrospective analysis of patients who underwent brain death determination according to clinical criteria. Patients were enrolled from those admitted to the Intensive Care Unit (ICU) of Gaetano Martino University Hospital of Messina, between January 2019 and March 2024. 65 patients underwent in brain death diagnosis criteria were enrolled. We excluded: 18 patients because of lack some of clinical or laboratory parameters and 7 patients, because were included in some other clinical studies. The mean ICU length of stay is 7.14 days. Causes of brain death, including: traumatic brain injury (18 patients, 27.69%); sub-arachnoid hemorrhage (9 patients, 13.85%); ischemic stroke (11 patients, 16.92%); hemorrhagic stroke (18 patients, 27.69%); post-anoxic encephalopathy (2 patients, 3.08%); and brain tumor (6 patients, 9.23%). We calculated the SAPS II score on the day of the patient's admission to the ICU and on the day of brain death diagnosis. These values were then correlated with the corresponding KDPI and DRI values using Pearson's correlation coefficient, implemented with the SciPy library in the open-source programming language Python.
Results: The results of our analysis revealed the following Pearson correlation coefficients: SAPS II Score at ICU admission showed a weak positive correlation with KDPI ($r = 0.428$, $p < 0.001$) and a weak positive correlation with DRI ($r = 0.412$, $p = 0.001$). The SAPS II score at the time of brain death diagnosis demonstrated a moderate positive correlation with KDPI ($r = 0.658$, $p < 0.001$) and a strong positive correlation with DRI ($r = 0.709$, $p < 0.001$).
Conclusions: Our analysis shows a association between the SAPS II score and the KDPI and DRI, suggesting that the SAPS II score, due to its straightforward and routine calculation in ICU settings, could potentially serve as a predictor for KDPI/DRI values. It is important to acknowledge that the current sample size is a limitation, and future studies with larger and more diverse cohorts are essential to validate these preliminary findings and explore their clinical implications.



Correlation Plot with Regression Line, n. 4 Graphs.

Table 1 Demographic characteristics

Parameter	Value	Standard Deviation/%
Number of Patients Enrolled	65 Patients	N/A
Male Patients (%)	35 Patients	55.38%
Female Patients (%)	29 Patients	44.62%
Mean Age (years)	56.32 y	14.9
Mean Length of Stay (days)	7.14	6.8
Mean GCS (Admission)	4	1.83
Mean SAPS II (Admission)	57.37	10.44
Mean SOFA Score (Admission)	12.4	2.32
Mean P/F Ratio (Admission)	310	118.7
Mean pH (Admission)	7.36	0.11
MAP > 70 mmHg (Admission)	4 Patients1	N/A
MAP < 70 mmHg (Admission)	2 Patients	N/A
Norepinephrine Infusion < 0.1 mcg/kg/min (Admission)	9 Patients	N/A
Norepinephrine Infusion > 0.1 mcg/kg/min (Admission)	n. 13	N/A
Mean Urinary Output (Admission, ml/kg/4h)	9.21	N/A
Mean Serum Creatinine (Admission, mg/dl)	1.36	N/A
Mean SAPS II (Diagnosis)	61.4	9.07
Mean SOFA Score (Diagnosis)	10.17	2.52
Mean P/F Ratio (Diagnosis)	274	94.03
MAP > 70 mmHg (Diagnosis, no vasopressors)	11 patients	N/A
MAP < 70 mmHg (Diagnosis)	2 patients	N/A
Norepinephrine Infusion < 0.1 mcg/kg/min (Diagnosis)	9 patients	N/A
Norepinephrine Infusion > 0.1 mcg/kg/min (Diagnosis)	13 patients	N/A
Mean Urinary Output (Diagnosis, ml/kg/4h)	9.23	N/A
Neurosurgical Intervention	24 Patients	36,92%
External Ventricular Drainage	15 Patients	23,08%
Anti-edema Therapy (Mannitol 18%)	40 Patients	61,54%
Anti-edema Therapy (NaCl 3%)	4 Patients	6,15%
Enteral Nutrition	32 Patients	49,23%

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Topic: Brain death, organ donation, and transplantation.

001471

Outcomes of liver transplantation in acute liver failure

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Introduction: Acute liver failure (ALF) is a rapidly progressive condition with high mortality, requiring urgent liver transplantation (LT) in up to 50% of cases. This accounts for approximately 8% of all liver transplants. Factors that have been associated with higher mortality include non-paracetamol etiologies; organ failure with the need for mechanical ventilation, renal replacement therapy (RRT) or vasopressors, and donor factors.
Objectives: This study aims to explore the outcomes of LT in patients with ALF, focusing on the impact of their clinical status on hospital mortality.
Methods: We conducted a retrospective analysis of LT motivated by ALF, including patients submitted to LT in this context between 2020 and 2023. Data were extracted from hospital records, and statistical analysis was performed using SPSS v27 with a significance level of 0.05.
Results: Of the 312 LTs conducted between 2020 and 2023, 24 were due to ALF (7.7%) and, therefore, included. Patients had a mean age of 42.5 years (SD 12.877), 54.2% were female, and 45.8% had blood group O. Concerning the subclasses of ALF, 45.8% were hyperacute, 37.5% were acute, and 16.7% were subacute. The most prevalent cause was toxicity (33.3%), which was due to a variety of agents (only one paracetamol-related ALF). Other causes included post-procedural ALF (20.8%), mainly after high-risk abdominal surgery or TIPS. The mean SOFA score was 8.8 (SD 4.70) at admission and 13.1 (SD 5.09) at LT, with an average delta-SOFA of 4.3 (SD 3.97). The mean donor age was 57.05 (SD 18.365), with no live donors and only one with circulatory death. Three (12.5%) were ultimately submitted to retransplant. Survival to discharge was 79.2%, and 1-year survival was 70.8%. Factors that significantly impacted hospital mortality (p value < 0.05) included donor age > 75, hepatic encephalopathy grade (West-Haven), need for vasopressor or RRT, total bilirubin before LT, SOFA score at LT, units of packed red blood cells during LT, and length of hospital stay. There was also a tendency for statistical significance (p value < 0.10) for active infection and the number of fresh frozen plasma units during LT. We built a logistic regression model using the most significant variables, which showed that for each one-point increase in SOFA at LT, the mortality increased by 69%. Of the 17 1-year survivors, 15 had registries about their current performance status, which was mostly good, with half of them specifying that they had returned to work.
Conclusions: Our results build upon the existing evidence that pre-LT organ dysfunction and advanced donor age are critical determinants of post-transplant outcomes in ALF. Therefore, strategies to mitigate these risks, such as prompt referral and timely transplantation, are crucial. Optimizing donor selection, potentially prioritizing younger donors when feasible, and aggressively managing multiorgan failure may further improve survival in this challenging patient population.

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Topic: Metabolism, endocrinology, liver failure, and nutrition.

001474

Metabolic disorders following electrical injuries: overview and prognosis

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Introduction: Electrical injury, especially involving high-voltage currents, can cause life-threatening complications due to severe metabolic disorders.
Objectives: The aim of this study was to identify metabolic disorders following electrical injuries and their impact on prognosis of these patients.
Methods: A retrospective descriptive study was conducted in the intensive burn care department in Tunisia over a period of 5 years, from January 1st 2018 to December 31st 2022. Electrical burned patients required hospitalization was included. Biological data were collected.
Results: During the study period, 223 patients were victims of electrical burns (10.5%). The average age was 35 ± 15 years with a male predominance (96.4%). It was mainly a high voltage electrical injury (83.9%). Rhabdomyolysis was frequently observed (n = 169; 75.8%), particularly in cases of high-voltage electrical injuries (n = 154, 69%). The median levels of creatinine phosphokinase (CPK) and lactic dehydrogenase (LDH) were 7670 [3586–30121] UI/l and 658 [432–1351] UI/L, respectively. Hemoconcentration was also common (n = 106; 47.5%) with an average hemoglobin level of 16.6 ± 1.33 g/dl and an average hematocrit of 47.9 ± 4%. Acute renal failure (ARF) was noted in 40 patients: on admission in 30 cases (13.5%), especially following high-voltage electrical injuries (n = 29; 96.7%), and during hospitalization at day 3 in 10 cases (4.5%). The average urea and creatinine levels were 10.2 ± 0.8 mg/l and 153.4 ± 20.1 µmol/l, respectively. ARF was functional in 25 cases (62.5%) and organic in 15 cases (37.5%). Renal replacement therapy (RRT) was required in nine cases (22.5%). Metabolic acidosis was observed in ¼ of patients (n = 50, 22.4%). The mean pH was 7.32 ± 0.09 [6.90–7.35]. Hyperlactatemia was observed in 13.5% of cases (n = 30). Hepatic cytolysis was observed in 1/3 of patients (n = 65; 29.1%). All metabolic disorders were significantly associated with mortality except for hepatic cytolysis (Table 1). In multivariate analysis, lactatemia higher than 3 mmol/l was predictive of mortality (p = 0.000 AUC = 0.75, Se = 72%, Sp = 72.7%, and CI 95% = 0.635–0.871).
Conclusions: Metabolic disorders following electrical injury are common and severe. Early management and close monitoring of these disorders are crucial to limit their complications and improve prognosis of patients.

Table 1 Metabolic disorders associated with mortality in electrical injuries

Metabolic disorders	Groupe 1 (Survivors) (n=187)	Groupe2 (Dead patients) (n=36)	P
Hemoconcentration (n, %)	79 (42,2)	27 (75)	**0,000**
Metabolicacidosis (n, %)	29 (15,5)	21 (58,3)	**0,000**
Lactatemia (mmol/L) Mean, standard deviation	1,4±0,6	3,7±2,3	**0,000**
Rhabdomyolysis (n, %)	138 (73,8)	31 (86,1)	**0,03**
Maximum CPK (UI/L) Median, interquartile range	7 735 (1070-24729,2)	11 325 (3409-38769,5)	**0,000**
Maximum LDH (UI/L) Median, interquartile range	500 (324,1046)	979 (561,5-2076,5)	**0,000**
Acute renal failure: n (%)	16 (8,6)	24 (66,7)	**0,000**
Renal replacement therapy : n (%)	4 (2,1)	5 (13,9)	**0,005**
Hepatic cytolysis : n (%)	56 (30)	20 (55,6)	0,07

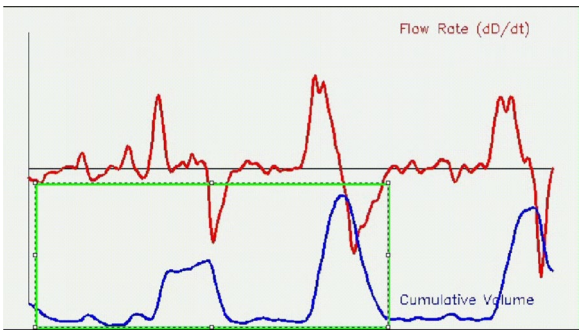
Topic: Trauma.

001475

Detection of patient–ventilator asynchrony in the ICU using computer vision

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Intensive Care Medicine Experimental 2025,* 13(1)*:001475

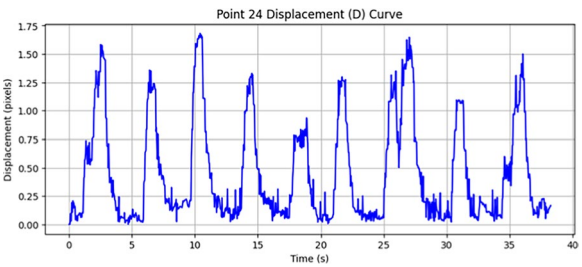
Introduction: Patient–ventilator asynchrony occurs when a patient's breathing efforts are not properly synchronized with the mechanical ventilator, potentially leading to discomfort, impaired gas exchange, and prolonged ICU stays. Detecting this asynchrony is especially important in the ICU, where timely intervention can significantly improve patient outcomes. Non-invasive monitoring of respiratory patterns offers the potential for real-time detection of ventilation abnormalities.
Objectives: This project aims to develop and evaluate a computer vision system that analyzes motion signals from ICU video footage to automatically detect patient–ventilator asynchrony. The objective is to assess the utility of this contactless approach for detecting patient–ventilator asynchrony episodes and improving real-time respiratory monitoring in critical care settings.
Methods: Two 4-h ICU simulation videos of a mannequin connected to a ventilator were analyzed. Each breath was manually annotated as normal, abnormal (asynchrony), or unsure. Feature point detection and optical flow algorithms were applied to track motion in the chest region. From the resulting displacement time series, two respiratory signals were derived: Flow, indicating the rate of chest movement, reflecting breathing dynamics, and volume, calculated by integrating flow over time, approximating lung inflation and deflation. The time-series data were segmented using a sliding window of 256 frames (~ 8.5 s at 30 frames per second). Each window was labeled according to the presence of normal or abnormal breathing events, with windows containing uncertain labels excluded from the training set. For classification, each segment was transformed into the frequency domain using the fast Fourier transform (FFT), and the magnitude spectrum was used as input features. These features were then input into a multi-layer perceptron (MLP) classifier trained to distinguish between normal and abnormal breathing patterns.
Results: The accuracy of the extracted flow and volume signals was validated by overlaying the derived volume curve onto the original video footage and visually confirming its close agreement with ventilator-provided waveforms. For model evaluation, the data set was divided into training (first 60% of each 4-h video), validation (next 20%), and test (final 20%) sets. On the test set, the MLP classifier achieved an accuracy of 98.3%, demonstrating its effectiveness in detecting abnormal respiratory events directly from ICU video data.
Conclusions: This study demonstrates that a video-based, AI-powered system can accurately and non-invasively detect respiratory abnormalities, offering a promising supplementary tool for ICU monitoring, especially in settings, where contactless methods are preferred. Further validation in human subjects is needed to confirm its clinical utility.



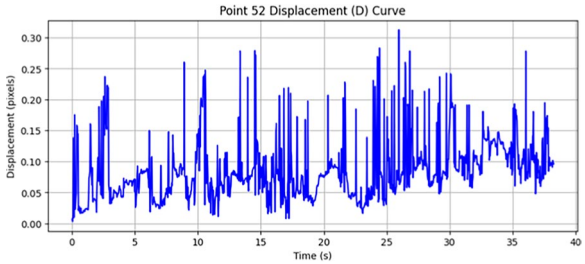
Displacement curve.



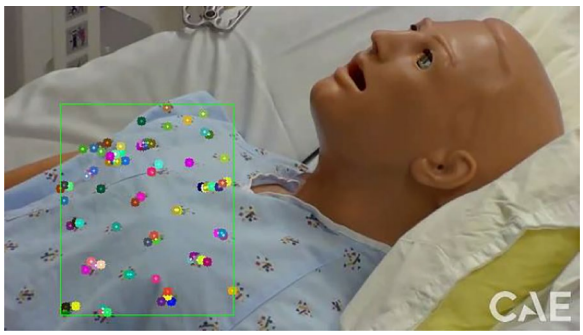
Ventilator waveforms.



Normal point.



Outlier point.



Corner detection.

Topic: Information systems and Data Science.

001476

A wearable, ocular ultrasound-based system for non-invasive diagnosis and monitoring of intracranial pressure (ICP)

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Intensive Care Medicine Experimental 2025,* 13(1)*:001476

Introduction: Elevated intracranial pressure (ICP) can threaten lives in traumatic brain injury patients. Ventriculostomy is the standard method for monitoring and managing ICP. Due to risks of infections and bleeding, extraventricular drain (EVD) placement occurs in about 3% of patients at risk for elevated ICP post-injury. There is a need for innovative, non-invasive technology to enhance ICP monitoring access, reduce complications, and improve outcomes. Ocular ultrasound, measuring the optic nerve sheath diameter (ONSD), shows strong potential in detecting elevated ICP. However, its application varies among providers and cannot currently estimate absolute ICP quantitatively.
Objectives: To develop and validate a machine learning (ML) algorithm for automatic segmentation and interpretation of ultrasound images of the optic nerve sheath and surrounding structures while standardizing the image acquisition technique for high-quality input data.
Methods: In this study, healthy individuals were recruited to obtain ultrasound images of the eye. Examinations were conducted in a simulation and procedure training lab at UCLA.
Blood pressure and heart rate were measured and recorded in addition to demographic data. A faculty ophthalmologist completed a visual examination, which covered visual acuity, visual field confrontation, extraocular muscle activity, and pupillary response. The investigator conducted this examination before and after ultrasound imaging collection.
The operator performed one sweep of the eye from top to bottom using a custom 3D-printed headframe placed on the patient's face (Fig. 1). A clean dressing and ultrasound gel were applied to each eye for imaging. The probe was positioned for optimal ONSD measurement, continuously imaging for 15 s, generating a "cine" file of images with measured heart rate. These data were analyzed for quality, as described by Padayachy et al. This was done in four positions: upright, semi-recumbent at 30 degrees, supine, and 15 degrees Trendelenburg, with heart rate measurements repeated for each position.
The continuous, steady insonation in the optimal plane was phase-synchronized to the patient's heart rate by employing temporal (resampling and peak detection) and spectral (Fourier transform) techniques to identify temporal trends related to arterial pulsations within the eye.
Results: 128 distinct images were collected for 12 subjects. CranioView's ML auto-segmentation algorithm measured ONSD with an accuracy of up to 97% compared to expert measurements. CranioView also demonstrated a decrease in motion artifacts with the wearable device and the accurate identification of dynamic brain tissue motions.
Conclusions: The CranioView wearable device enhances image stability during prolonged insonation. Paired with CranioView's processing method, it accurately detects dynamic signals in ultrasound videos. CranioView is advancing ML techniques for auto-segmentation and hands-free extraction of variables from structures surrounding the optic nerve.

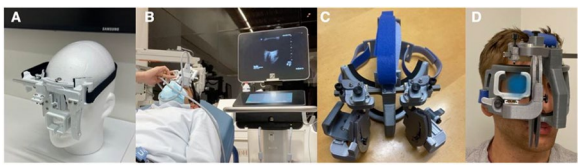


Figure 1 *Custom headframe was developed to stabilize the ultrasound probe for optic nerve sheath diameter (ONSD) measurement. The headframe consists of a head brace and probe holder with passive hinges to allow probe positioning. (**a**) Version 1 prototype headframe, (**b**) optic nerve during active data collection with version 1 prototype, (**c**) assembled headframe prototype version 2 for bilateral probes, and (**d**) version 2 prototype donned.*

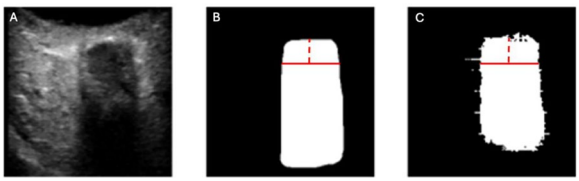


Figure 2 *(**a**) Real-time ultrasonography of a subject's eye and optic nerve sheath [indicated by arrow]; (**b**) "ground truth" identification of optic nerve sheath [white] and diameter [solid red] as measured 3 mm behind the eye [dashed red]; (**c**) mask image of optic nerve sheath as predicted by CranioView ML auto-segmentation algorithm.*

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Topic: Neurointensive care.

001477

Enhancing antibiotic therapy in the semi-ICU: a randomized controled trial of clinical pharmacist impact

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Intensive Care Medicine Experimental 2025,* 13(1):*001477

Introduction: Optimizing antibiotic therapy in sepsis is crucial to improving clinical outcomes. Clinical pharmacists can play a significant role in antibiotic stewardship, potentially enhancing patient outcomes. However, existing evidence on the impact of pharmacist interventions in critical care settings is inconsistent. This study focuses on semicritical units, hypothesizing that antibiotic interventions may play a more central role in patients with less severe illness.
Objectives: To evaluate whether clinical pharmacist intervention improves optimal antibiotic therapy at day 4 and clinical response at day 7 in septic patients treated in semicritical units.
Methods: A randomized controlled trial was conducted, including 200 adult septic patients (100 per arm), randomized into pharmacist intervention, or standard care groups. Data on demographic, clinical, and therapeutic variables were collected. Primary outcomes included optimal antibiotic therapy at day 4 (defined by coverage, dosage, frequency, route, and duration adjustments) and favorable clinical response at day 7. Descriptive statistics, chi-square tests, and logistic regression analyses were performed to evaluate group differences and outcome predictors.
Results: Groups were comparable in age (mean 62.9 ± 19.0 vs. 61.7 ± 20.5 years), gender (44% vs. 53% male), BMI, comorbidities, and previous hospitalizations. Pharmacist intervention significantly increased optimal antibiotic therapy at day 4 ($p = 0.003$) and clinical response at day 7 ($p = 0.018$). Logistic regression showed pharmacist intervention independently predicted optimal antibiotic therapy at day 4 (OR = 2.94, 95% CI 1.50–5.75, $p = 0.002$). Optimal antibiotic therapy at day 4 strongly predicted favorable clinical outcomes at day 7 (OR = 15.16, 95% CI 5.00–45.97, $p < 0.001$).
Conclusions: Clinical pharmacist involvement significantly improves antibiotic optimization by day 4 and subsequently enhances clinical outcomes by day 7 in septic patients treated in semicritical units. This underscores the importance of pharmacist-led interventions, particularly in less critically ill populations, to enhance antibiotic stewardship and patient outcomes.

Table 1 Patient's characteristics

Variable	Control (mean±SD or %)	Intervention (mean±SD or %)	p-value
Age	62.91 ± 18.95	61.70 ± 20.49	0.681
BMI	27.16 ± 5.64	25.18 ± 5.50	**0.018**
Number of Comorbidities	2.27±1.36	2.22±1.48	0.615
SOFA score Day 1	1.20 ± 1.67	0.86 ± 1.25	0.119
SOFA score Day 7	0.81 ± 1.49	0.66 ± 1.22	0.445
Delta SOFA	-0.39 ± 1.16	-0.20 ± 0.95	0.233
Male gender	44.4%	53.3%	0.297
Antibiotic allergies	12.2%	3.3%	0.051
Transferred patients	36.7%	35.6%	1
Previous hospitalization	57.8%	64.4%	0.445
Previous cultures	90.0%	95.6%	0.249

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Topic: Infections and prevention.

001478

Evaluation of the relationship between nutritional status scoring system and prognosis scoring systems in pediatric intensive care unit

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Intensive Care Medicine Experimental 2025,* 13(1):*001478

Introduction: Nutritional problems, including malnutrition, are an important issue in intensive care units. The rate of malnutrition ranges from 8.1% to 71.7% in critically ill children. Early detection and prevention of malnutrition are crucial in reducing morbidity and mortality. Most societies recommend using a rapid and simple screening tool after the first 24 h to identify patients at risk for malnutrition.
Objectives: To evaluate the relationship between nutritional screening tools and critically ill children's morbidity and mortality.
Methods: We used a database generated from the electronic health records of patients aged 2–16 who were admitted to our 18-bed tertiary care Pediatric Intensive Care Unit (PICU) between February 2023 and January 2024. Demographical data and calculated values of Pediatric Nutritional Risk Score (PNRS), Pediatric Yorkhill Malnutrition Score (PYMS), Screening Tools for Risk of Nutritional Status and Growth (STRONGkids), Screening Tool for the Assessment of Malnutrition in Pediatrics (STAMP), Pediatric Risk of Mortality 3 (PRISM-3), Pediatric Logistic Organ Dysfunction-2 (PELOD-2), Pediatric Index of Mortality (PIM2), and Pediatric Sequential Organ Failure Assessment (pSOFA) after 24 h of admission were recorded. The prognostic nutritional index (PNI), computed as albumin level (g/L) + 0.005 × lymphocyte count (μL), assesses nutritional and immunological status concerning morbidity and mortality.
Results: A total of 415 children were admitted to the PICU during the study period, and 169 children (69 girls, 100 boys, median 87 months; IQR 24–192 months) were included. 37.8% ($n = 64$) were previously healthy children. The reason for admission to the PICU was medical (81.6%; $n = 138$). Lower respiratory tract infections (26.6%) are the most common diagnosis at admission, followed by neurological diseases (17.7%). The median length of stay in PICU was 3 days (IQR, 1–188 d). Malnutrition was detected in 16.5% ($n = 28$) of the patients, and 11.2% ($n = 19$) had chronic malnutrition. Overall, the PICU mortality rate was 10%. All nutritional screening tools and PICU prognosis scores were correlated with mortality, PICU LOS, and the number of days on mechanical ventilation. A statistically significant difference was detected when all nutritional screening tools, and PICU prognosis scores of non-survivors were compared with those who survived ($p < 0.001$ for all). With logistic regression analysis, the highest correlation was found with PYMS ($p < 0.001$). ROC analysis revealed that mortality and all nutritional screening tools had low sensitivity but high specificity. PYMS has the highest prediction accuracy among the scores. Mortality risk was higher in patients who began enteral feeding later or were not fed at all. The PNI values were statistically significantly lower in non-survivors than in the survivors (median 36.5; IQR 20.3–54.7 vs. median 50.2; IQR 26.7–93.2; $p = 0.001$).
Conclusions: This study is the first pediatric study to demonstrate the relationship between nutritional screening tools and the PRISM

3, PELOD-2, PIM2, and pSOFA scores, which are commonly used in the PICU to predict mortality risk, especially for PYMS. PNI is also a valuable biomarker for assessing mortality risk in PICU patients.

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Topic: Metabolism, endocrinology, liver failure and nutrition.

001479

Precision hemodynamics: digital twin-guided fluid and vasopressor strategies in shock

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Intensive Care Medicine Experimental 2025,* 13(1)*:001479

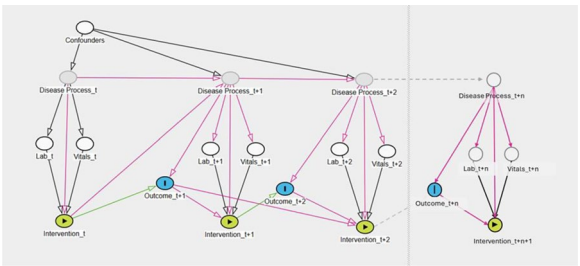
Introduction: Shock is a life-threatening syndrome characterized by inadequate tissue perfusion, necessitating precise hemodynamic monitoring and patient-specific therapeutic adjustments to prevent irreversible organ damage and mortality. Considerable heterogeneity remains in fluid resuscitation and vasopressor titration practices across ICUs. Current fixed treatment algorithms fail to adequately address the dynamic alterations in cardiac output, vascular resistance, and microcirculation observed in shock progression. This mismatch highlights the critical need for responsive, physiology-driven treatment strategies capable of rapidly adapting to evolving clinical states and preventing multiorgan failure.

Objectives: To develop and evaluate a predictive and prescriptive digital twin utilizing deep learning and reinforcement learning to optimize personalized fluid and vasopressor therapy in shock management.

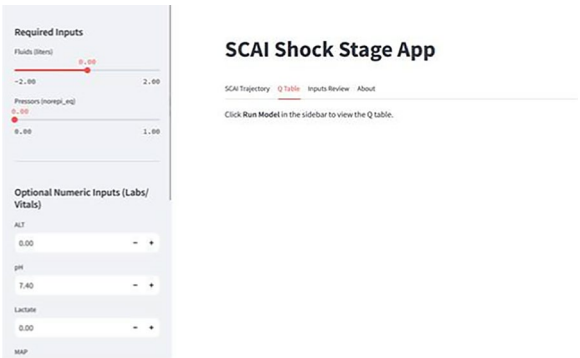
Methods: This study utilized electronic medical record (EMR) data—including demographics, comorbidities, hourly vitals, and laboratory values—to build a digital twin-based decision support system. Patients were categorized into five clinical states: hypotension without shock (SCAI A/B), shock (SCAI C/D), refractory shock (SCAI E), discharge, and death. A long–short-term memory (LSTM) model was developed for real-time prediction of shock state transitions within a 2-h prediction window. A directed acyclic graph (DAG) modeled causal relationships between fluid and vasopressor interventions and shock progression. A Q-learning reinforcement learning model was employed to optimize fluid and vasopressor strategies for each clinical state, with interventions adaptively adjusted based on patient responses. An interactive simulator was created, enabling visualization and manipulation of interventions and observing consequent *Q* value changes.

Results: In this retrospective study, data from 2061 ICU patients admitted to Amsterdam University Medical Center were analyzed; patients with EMR data under 24 h were excluded. The digital twin LSTM model showed strong predictive performance, with AUROC values highest for refractory shock (Stage E, AUROC = 0.96) and lower for Stages A (0.85), B (0.81), C (0.82), and D (0.75). Q-learning analysis highlighted that optimal interventions varied according to shock severity and patient subgroup. In general shock states, neutral fluid balance combined with low-dose vasopressors consistently provided optimal outcomes across most cohorts. In refractory shock (extremis shock), cohort-specific strategies emerged; neutral fluid balance with low-dose vasopressors was optimal for cardiac and cardiothoracic surgery patients, while negative fluid balance combined with high-dose vasopressors proved most effective in surgical patients.

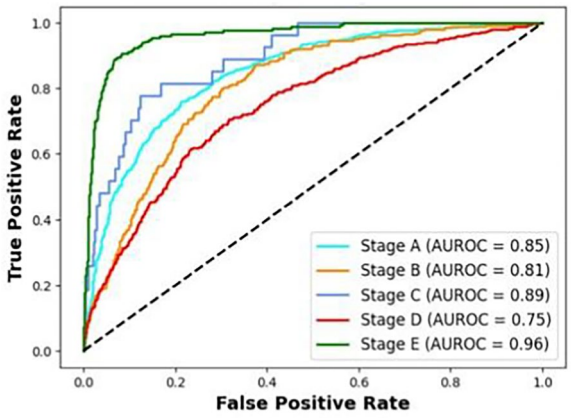
Conclusions: This study establishes the feasibility and potential clinical value of a digital twin system integrating deep and reinforcement learning for real-time shock trajectory prediction and optimization of fluid and vasopressor management. Future studies will validate this approach across broader patient cohorts and explore advanced reinforcement learning techniques to enhance personalized ICU care.



Causal directed acyclic graph representing the evolving disease process and clinical decision-making in an ICU setting.



A dynamic graphical user interface for real-time clinical decision support, allowing the clinician to modify treatment interventions and observe their predicted effects on key physiological variables over time.



Receiver operating characteristic (ROC) curves comparing the prediction performance of five Society for Cardiovascular Angiography and Interventions (SCAI)classification stages (A–E).

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Topic: Information systems and Data Science.

001480

Hiding in plain sight: how baseline kidney function may hold the key to hydrocortisone efficacy in septic shock–post hoc analysis of VANISH trial

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Intensive Care Medicine Experimental 2025,* 13(1)*:001480

Introduction: Hydrocortisone has been studied for decades as an adjunctive therapy in septic shock, yet large scale RCTs have yielded ambiguous and often conflicting results [1]. Heterogeneity of treatment effect (HTE) has been proposed as a key driver, arising from the syndromic nature of sepsis itself, highlighting the need for trial enrichment strategies to identify the responsive critical ill patients while minimizing harmful side effects. Until now, patient stratification based on renal function has not been explored. Given the kidney's pivotal role in sepsis pathophysiology and corticosteroid metabolism, we hypothesize that baseline renal function, assessed using the novel kidney function biomarker Proenkephalin A in plasma, may determine hydrocortisone efficacy.
Objectives: To evaluate whether baseline kidney function modifies the efficacy of hydrocortisone in patients with septic shock, with a focus on survival and renal failure.
Methods: We conducted a post-hoc analysis of a subgroup of patients (n = 173) enrolled in the VANISH trial [2], for whom plasma was available for the measurement of Proenkephalin A (penKid) at baseline. VANISH was an NIHR-funded RCT using a two-factorial design (first stratum: noradrenaline vs. vasopressin, second stratum: placebo vs. low-dose hydrocortisone) in 409 patients with septic shock. The additional penKid measurements were performed using an IVD-certified chemiluminometric immunoassay (sphingotest penKid, SphingoTec GmbH, Germany) in an experimenter-blinded manner. Biomarker results were analysed together with other characteristics of renal function and severity of illness [e.g., serum creatinine (sCr), lactate, and APACHE II score] and associated with the primary endpoint 28-day mortality in this study as well as renal-failure free days (within 28 days) the primary outcome of the trial. For penKid, a concentration of 89 pmol/L was set as a cutoff to define abnormal kidney function at higher levels. For sCr, gender-specific cutoffs of 84 mmol/L in females and 104 mmol/L in males was used. Analysis was performed using logistic regression models and the aligned rank transform test.
Results: A total of 173 patients were available for this post-hoc analysis, with no major imbalances compared to the full study. Proenkephalin A independently predicted 28-day mortality, even after adjusting for serum creatinine, renal failure (according to AKIN stage 3), lactate, and APACHE II, which all remained significant. Patients with elevated penKid at baseline had a 28-day mortality of 39% vs. 16% in those with low levels.
The penKid–treatment interaction (n = 111) was not significant (p = 0.14), possibly due to sample size, but a trend emerged: patients with impaired kidney function had higher mortality with hydrocortisone vs. placebo (50% vs. 32%), while those without kidney dysfunction showed a reversed trend (14% vs. 24%, HC vs. placebo).
A significant interaction existed for renal failure-free days (p = 0.008), with 11 (0–26) vs. 26 (15–28) days in elevated penKid patients treated with HC or placebo, respectively. Serum creatinine as a grouping variable did not yield a significant interaction (p = 0.2), with 20 (0–28) vs. 26 (14–28) days in patients with elevated sCr and HC or placebo, respectively.
Conclusions: This post-hoc analysis highlights penKid as a promising biomarker for patient enrichment in septic shock. Our findings suggest that kidney function may serve as a key determinant for individualized adjunctive treatment, warranting further research to refine precision medicine in sepsis.

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Biomarker measurements were contributed from SphingoTec GmbH.

Topic: Sepsis.

001481

Hypocalcemia as a predictor of mortality and vasopressor requirement in trauma patients: a retrospective analysis

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Introduction: Trauma remains one of the leading causes of potentially preventable death in adults, despite the implementation of trauma protocols [1, 2]. In trauma patients, calcium plays a significant role in platelet aggregation, the coagulation cascade, cardiac contractility and vasoconstrictive capacity, the latter of which contributes to worsening acidosis [2, 3]. Over half of trauma patients are hypocalcemic upon arrival at the emergency department, even before receiving any blood products [2, 4]. Although there is no current consensus on the optimal timing or degree of calcium repletion in trauma care, clinicians should be aware of the associated morbidity and mortality and be prepared to treat hypocalcemia.
Objectives: To compare overall in-hospital mortality between trauma patients presenting with hypocalcemia ($Ca^{2+} < 1.2$ mmol/L) and those with normocalcemia ($Ca^{2+} \geq 1.2$ mmol/L) upon emergency department admission.
Methods: We performed a retrospective comparative analysis including trauma patients admitted to the emergency department over a 6-month period. Two groups were created: Group 1 (G1) with $Ca^{2+} < 1.2$ mmol/L and Group 2 (G2) with $Ca^{2+} \geq 1.2$ mmol/L. Serum calcium levels were measured upon admission using routine blood analysis. Patients without documented calcium levels at admission were excluded. Levene's test was used to assess group homogeneity. The chi-square test and ANOVA were used for group comparisons.
Results: We included 27 patients (G1: n = 12, 83% male, median age 66.7 ± 19, average Charlson score 3.17 ± 2.16; G2: n = 15, 66.7% male, median age 62.5 ± 20.5, and average Charlson score 2.80 ± 2.5). The majority of injuries were due to blunt trauma (88.9%), mostly from traffic accidents (40.7%) and high-energy falls (29.6%). The most common trauma type was thoracic (44.4%), with pulmonary contusion being the most prevalent (25.9%). Traumatic brain injury (TBI) occurred in 25.9%, with subdural hematoma (SDH) being the most frequent (22.2%). Mechanical ventilation was required in 40.7%, and 33.3% required vasopressor support and surgery. ICU admissions accounted for 37% (n = 10), with a median ICU length of stay of 14.67 ± 15.2 days (range: 2–43). A total of 44.4% of patients were transferred to a tertiary hospital. The overall median in-hospital length of stay was 19.63 ± 20.6 days (range: 1–68). Trauma scores were compared between G1 (RTS: 2.68 ± 1.47, range: 2.63–7.84; ISS: 23 ± 17.50, range: 9–61; TRISS survival: 77.4 ± 27.9%, range: 4.40–99.4%) and G2 (RTS: 6.99 ± 1.23, range: 4.09–7.84; ISS: 14 ± 11.3, range: 1–41; TRISS survival: 87.3 ± 22.3%, range: 22.2–99.8%). Hypocalcemia was significantly associated with increased vasopressor support (G1: 58.3% vs. G2: 13.3%; $\chi^2 = 6.075$, $p = 0.014$) and in-hospital mortality (G1: 50% vs. G2: 6.7%; $\chi^2 = 6.51$, $p = 0.011$).
Conclusions: In this sample, hypocalcemia (serum $Ca^{2}+ < 1.20$ mmol/L) was associated with increased need for vasopressor support and higher in-hospital mortality. Such associations were not observed in patients with higher calcium levels, highlighting the potential prognostic value of early calcium assessment and correction in trauma care.

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Topic: Trauma.

001482

Limited progress in the operationalization of artificial intelligence in intensive care units over recent years

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Intensive Care Medicine Experimental 2025,* 13(1)*:001482

Introduction: Artificial intelligence (AI) presents transformative opportunities to address the global healthcare challenges, particularly in data-intensive environments like intensive care units (ICUs). A systematic review published in 2021 revealed that less than 5% of AI applications in the ICU had reached clinical operationalization [1]. Since then, there has been growing interest in leveraging AI for healthcare. Continued monitoring of AI's transition from development to implementation is essential to monitor its progress and impact.
Objectives: To systematically evaluate AI system's operationalization in the ICU, focusing on the AI field's progress over time, technical maturity, and risk of bias.
Methods: This systematic review used the PRISMA guideline and was registered in the PROSPERO database (CRD4202341913). We continued a previous search [1], transforming this in an AI-ICU living systematic review. The search was continued in five databases (Embase, MEDLINE ALL, Web of Science Core Collection, Cochrane Central Register of Controlled Trials, and Google Scholar) from July 28, 2020 to June 10, 2024. Eligible studies focused on AI applications intended for the use within adult ICUs (≥ 16 years) and utilized data collected during ICU stays. Two reviewers independently assessed eligibility of all titles and abstracts. Disagreements were resolved by a third reviewer. Data extraction included AI application aims, type of data set, Technology Readiness Level (TRL) classification [2], and the use of reporting standards. Risk of bias was assessed using the PROBAST method [3].
Results: Out of 17,401 screened records, 1263 studies met the inclusion criteria. The majority of studies (74%) were classified as early-stage development or initial validation (TRL 4 or below). Among these, 37% utilized internal data sets, 46% used MIMIC (Medical Information Mart for Intensive Care) data sets, and 6% used the open-source eICU Collaborative Research Database (eICU-CRD). 24% of the studies achieved external validation (TRL 5). Only 2% progressed to clinical integration (TRL ≥ 6), with no studies realizing full implementation (TRL 9). Similar findings were described in 2021 (Fig. 1) [1]. In addition, only 16% of studies referred to the use of reporting standards, with reference modestly increasing from 14% in 2021 to 23% in 2024. In 53% of the studies, a high risk of bias was identified, primarily explained by methodological issues in the PROBAST analysis domain.
Conclusions: Despite the steep growth in AI research within intensive care in recent years, the growth continues to be largely driven by retrospective studies and the progress toward clinical operationalization

remains limited with little progress over time. These findings emphasize the urgent need for a paradigm shift in the ICU AI literature, one that moves beyond retrospective validation toward the operationalization and prospective testing.

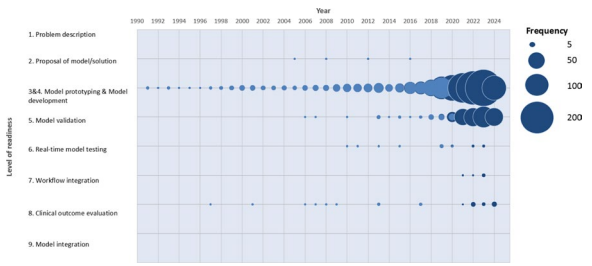


Figure 1 Number of studies according to their TRL and year of publication

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4. There were no funding sources.

Topic: Information systems and Data Science.

001483

Prevalence and early outcomes of coma in Latin American critical care units: a multinational observational snapshot

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Intensive Care Medicine Experimental 2025,* 13(1)*:001483

Introduction: Coma is a frequent yet under-reported condition in intensive care, particularly in resource-limited regions. We aimed to characterize its prevalence, etiologies, management, and short-term outcomes across Latin American critical care units.
Objectives: To describe the burden of coma across adult intensive care units in Latin America and identify factors associated with short-term outcomes.
Methods: A multinational, cross-sectional point prevalence study was conducted on May 28, 2024, involving adult patients in 392 hospitals across 19 Latin American countries. Inclusion was based on the COME-TOGETHER consensus definition of coma. Data were collected through a standardized electronic questionnaire and included demographics, etiology, resource availability, complications, and 14-day outcomes. Multivariate logistic regression and random forest models were applied to assess predictors of mortality and care limitations.
Results: Out of 8385 critically ill patients, 1170 met coma criteria (13.9%), with national prevalence ranging from 6% to 25%. The most frequent individual cause was traumatic brain injury (24.9%), followed by hypoxic–anoxic injury (14.6%) and intracerebral hemorrhage (13.5%). Cardiovascular-related causes, as a group, were predominant (48.6%). The median age was 55 years; 64.1% were male. Short-term mortality at 14 days (available for 50% of the cohort) was 29.2%, and 32.3% of survivors remained comatose. Higher coma case volume per center and cardiovascular comorbidities were associated with increased mortality in random forest analysis. Staffing ratios were independently associated with decisions to limit life-sustaining therapies.
Conclusions: Coma represents a significant portion of critical care occupancy in Latin America, with wide etiological diversity and variable outcomes. Findings highlight the need for prevention strategies and the development of specialized neurocritical care resources. Institutional experience and staffing appear to influence patient outcomes, underscoring potential benefits from system-level interventions in coma care.

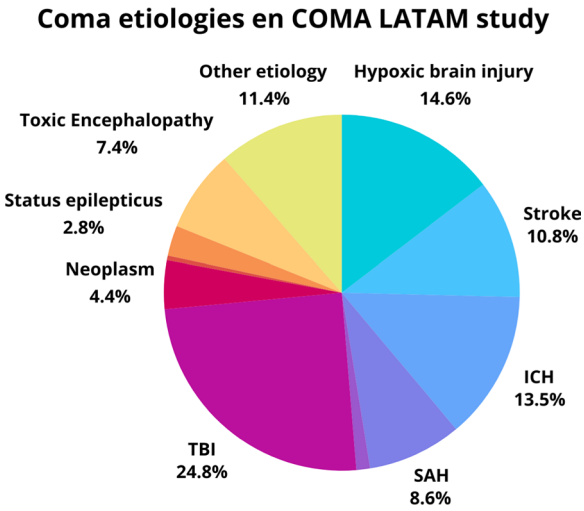


Figure 1 Coma etiologies

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3. None

Topic: Neurointensive care.

001484

Reduction of greenhouse gas emissions through inhaled sedation with sevoflurane for 48 h instead of isoflurane (Sevo-48)

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Introduction: Volatile anesthetics are potent greenhouse gases (GHG). Sevoflurane is less harmful to the climate than isoflurane and has been recommended for long-term sedation up to 72 h [1]. Some studies have shown an impairment of renal integrity with long-term use of sevoflurane. [2].
Objectives: The aim was to quantify reductions in GHG emission by replacing isoflurane with sevoflurane for 48 h. We also assessed if sevoflurane is non-inferior to isoflurane in long-term sedation regarding renal integrity.

Methods: After introducing a new sedation protocol, patients with an indication for inhaled sedation received sevoflurane for 48 h followed by isoflurane as long as needed (Sevo-48). For administration, the Sedaconda® system (Sedana Medical, Danderyd, Sweden) was used. In a retrospective analysis, we compared these patients with those who only had received isoflurane (Iso-only). GHG emissions of both drugs were assessed according to their global warming potential over 20 years (1 g sevoflurane/isoflurane equivalent to 440/1800 g CO2). Renal integrity was assessed by comparing daily plasma creatinine, sodium, urea, urine output, fluid balance, AKIN stages, and requirement for renal replacement therapy (RRT) over 10 days from start of inhaled sedation. Patients on RRT were not considered for plasma levels, urine output, and fluid balance.
Results: During 1 year of observation (AUG 23–JUL 24), 111 patients had received inhaled sedation. Characteristics of patients in group Sevo-48 (n = 94) and Iso-only (protocol violators, n = 17) were comparable (Table 1). The mean hourly infusion rates of sevoflurane were 7.0 mL compared to 4.6 mL isoflurane (Fig. 1A). Total GHG-emissions during this year amounted to 137 t CO2. If all patients had received isoflurane, only this would have been 169 t CO2. Thus, a reduction of 32t or 19% could be realized (Fig. 1B). Within the 10-day observation period, we did not find significant group differences in AKIN stages (Fig. 2), creatinine and urea levels. On individual days, we found short-lived statistically significant differences in plasma sodium, urine output, and fluid balance without clinical relevance (Fig. 3).
Conclusions: By implementation of the new sedation protocol, we could realize a reduction in GHG emissions equivalent to a car journey of 141.000 km [4] [5] or 3.5 times surrounding the world. We did not find evidence for impaired renal integrity with sevoflurane sedation up to 48 h compared to isoflurane only. Therefore, we support the recommendation of the S1 guideline on sustainability in intensive care and emergency medicine [1] to use sevoflurane instead of isoflurane during the first days of inhaled sedation.

Table 1 Patient biometrics. Data as mean ± SD or quantity (percentage)

	Sevo (n = 94)	Iso only (n = 17)
Age [years]	62 ± 14	67 ± 13
Height [cm]	174 ± 9	173 ± 8
Weight [kg]	87 ± 27	91 ± 25
Female	25 (26.6%)	6 (35.3%)

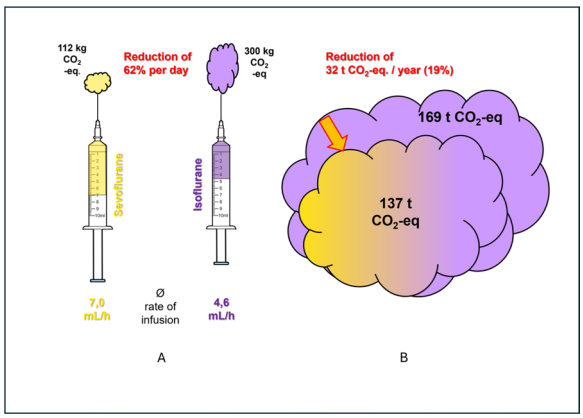


Figure 1 Green house gas emissions per 1 day of inhaled sedation (A) and during the observation year (B) calculated with *GWP-20.* **CO2 eq = CO2 equivalents**

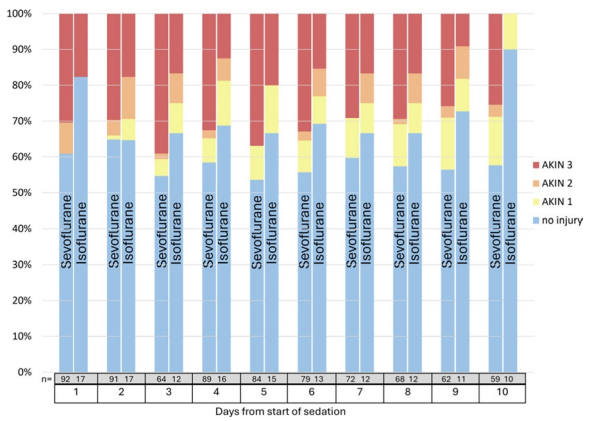


Figure 2 *Renal injury classified as AKIN stages.*
There were no significant differences (chi-square test) on individual days.

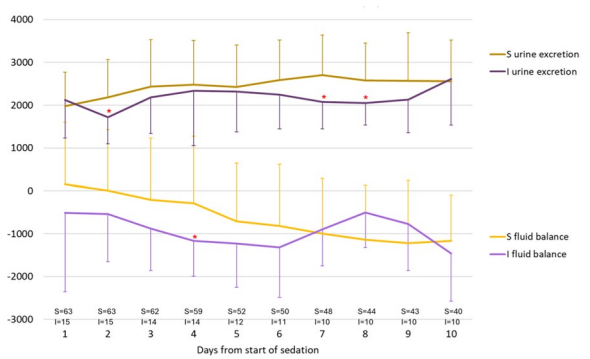


Figure 3 Fluid balance and urine output
S = sevoflurane, I = isoflurane. *significant difference to the Sevo-48 group (p < 0.05).

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Topic: Sedation, analgesia and delirium.

001485

Critical care resource availability for coma management in Latin America: insights from a multinational observational study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001485

Introduction: Effective management of coma requires multidisciplinary teams and access to specialized monitoring and therapeutic resources. However, in low- and middle-income regions, data on the availability and variability of such resources remain scarce.
Objectives: To assess the availability of human and technological resources for coma care across Latin American critical care units and explore associations with patient outcomes and institutional practices.
Methods: As part of a broader multinational point prevalence study of coma conducted on May 28, 2024, we analyzed data from 392 hospitals in 19 Latin American countries. Participating units reported availability of neuromonitoring modalities, critical care staffing ratios, and rehabilitation services using a standardized electronic questionnaire. We explored associations between resource availability, coma prevalence, and 14-day mortality using descriptive statistics and machine learning approaches.
Results: Most centers (98.9%) reported the availability of at least one neuromonitoring modality beyond clinical examination. The most frequently available tools were optic nerve ultrasound (69.3%) and intracranial pressure monitoring (60.5%), while advanced techniques such as brain tissue oxygenation (17%) and NIRS (10.6%) were limited. Only 37.1% of centers had dedicated neurocritical care nursing. The median nurse-to-patient ratio was 1:2; the physician-to-patient ratio was 1:6. Allied rehabilitation services were inconsistently available, with physical and respiratory therapy present in 57.2% and 51.7% of centers, respectively.
Centers with higher coma volumes tended to have better neuromonitoring capacity and lower 14-day mortality. Random forest analysis identified center coma volume and resource availability as key determinants of survival. Logistic regression showed that lower physician staffing was independently associated with higher likelihood of limitations in life-sustaining therapies (OR 0.84, 95% CI 0.74–0.96).
Conclusions: Substantial heterogeneity exists in the availability of critical care resources for coma management in Latin America. While basic neuromonitoring tools are widespread, access to advanced monitoring and specialized personnel remains limited. These disparities likely influence outcomes and care practices. Investment in training, equipment, and neurocritical infrastructure is urgently needed to improve equity and effectiveness in coma care across the region.

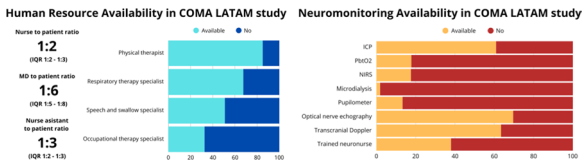


Figure 1 Resource availability

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3. None

Topic: Neurointensive care.

001486

An association between clinical frailty score, cognitive status and inflammatory markers and in the early perioperative period in patients after urynary bladder tumor surgery

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Intensive Care Medicine Experimental 2025,* 13(1)*:001486

Introduction: Bladder cancer is one of the most common tumors in the world, with a growing prevalence worldwide. This patient population has certain common characteristics, such as smoking or exposure to common risk factors for the development of bladder cancer, such as aniline dyes and solvents. These substances are also associated with the development of neurodegeneration and oxidative stress. Circulating indicators of inflammation, including S100B, NSE, IL-4, and IL-6, may be correlated with the clinical frailty score (CFS) and the patient's cognitive status.
Objectives: An aim of this preliminary study is to evaluate correlations of CFS, cognitive status and inflammatory markers in the perioperative course in the urologic patients.
Methods: After an Ethical Committee approval was obtained, 28 adult patients of both sexes have signed written informed consent and were included in the prospective observational study (> 18–80 years). Biomarkers analyzed were S100B, NSE, "IL-6, IL-4, CBC, HbA1c, preoperatively, and 24 h after surgery. The assessment of the patients' health condition was done using ASA, CFS scale, hand grip test, mini-mental score examination (MMSE), and Montreal cognitive Assessment (MoCA) tests preoperatively and 24 h after surgery.
Results: A statistically significant correlation was observed between CFS and MoCa in all measurements ($r = -0.619$, $P = 0.001$), IL-6 after 24 h ($r = 0.432$; $P = 0.028$), and erythrocyte values ($r = -0.411$; $P = 0.33$). A negative correlation was observed between CFS and handgrip strength in all measurements ($P < 0.05$). No statistically significant association was confirmed between preoperative CFS and MMSE, s100b, cholinesterase, CRP, urea, creatinine, and other laboratory markers. Body mass index was also positively correlated with MoCA ($R = 0.432$; $P = 0.024$), with frail patients showing worse results on cognitive assessments.
Conclusions: This study has confirmed that preoperative clinical frailty score is a risk factors for the development of clinically measurable impairment in patients' cognitive functions and increase in the IL-6 levels after transurethral resection of the urinary bladder. In a bigger study, these data may serve as a starting point for research into possible interventions that can reduce the increase in inflammatory markers and new cognitive deficits.

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3. None

Topic: Perioperative care.

001487

Risk factors and outcomes of leukopenic patients in the surgical intensive care unit

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Intensive Care Medicine Experimental 2025,* 13(1)*:001487

Introduction: Leukopenia in surgical patients in the intensive care unit (ICU) may be associated with drug use, viral and bacterial infections, or other comorbid conditions. Leukopenic patients are often immunocompromised and have been reported to have poorer treatment outcomes.
Objectives: The aim of this study was to examine the incidence of leukopenia in surgical patients in the ICU, to compare their comorbidity, mechanical ventilation (MV), and length of stay in the ICU with a control population of surgical patients. Their early recognition and diagnostics could improve their treatment outcomes.
Methods: After an Ethical Committee approval was obtained, a retrospective analysis of an electronic database of laboratory findings over a 2.5-year period. Leukopenia was defined as a white blood cell count < 4 × 10 9/L in blood samples taken during treatment in the ICU. Comorbidity, prior chemoradiotherapy, duration of mechanical ventilation, and length of ICU stay were analyzed in patients with leukopenia ($N = 78$, total 3.2% of ICU patients), and the results were compared with a control group ($N = 262$) of consecutive surgical patients treated in the ICU. Data were compared using the Mann–Whitney U test or the $\chi 2$ test.
Results: The mean age of leukopenic patients was 66 [58–73.75] vs. 69 [60–77 years], ($P = 0.041$), and 83% of leukopenic patients vs. 47% of controls were emergency patients. There was no difference in the incidence of cardiovascular, renal, neurological, or metabolic diseases between leukopenic patients and controls. Leukopenic patients significantly more often had previous respiratory diseases (38:18%, $P < 0.001$), gastrointestinal (74:52%, $P = 0.003$), chemoradiotherapy (21:10%, $P = 0.038$), sepsis (41:15%, $P < 0.001$), and pneumonia (33:17%, $P = 0.008$) compared to controls. In the group of leukopenic patients, 48% were reoperated vs. 15% in the control group. The average length of MV was 47 [8.25–96]: 9 [2–47.25] h, and the length of ICU was 6 [3–14] vs. 3 [2–5 days] in the group of leukopenic and control, respectively.
Conclusions: Risk categories of patients for the development of leukopenia are patients with chronic lung diseases, patients with endocrine diseases, previous chemoradiotherapy, and the elderly with abdominal sepsis and pneumonia upon admission. Due to the high frequency of infections, these patients require prompt microbiological diagnosis and isolation.

Topic: Perioperative care.

001488

From collapse to critical care: ICU outcomes after out-of-hospital cardiac arrest

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Introduction: Out-of-hospital cardiac arrest (OHCA) is a global leading cause of death, challenging public health policies. The difficulty lies in obtaining comprehensive epidemiological data on OHCA patients, with literature varying widely in terms of incidence, patient characteristics, and outcomes.
Objectives: Characterize the population and outcomes of OHCA.
Methods: Retrospective, observational, single-center study on patients admitted to an ICU unit of a tertiary hospital following OHCA between 2017 and 2019. Data were collected from clinical registries. Follow-up was obtained by contacting the surviving patients or families.
Results: Out of the 78 patients included in the study, 32.9% were female, exhibiting an average age of 59.3 ± 15.1. Only two patients had a history of family sudden death.
The most common arrest sites were at home (39.2%) and at the street (20.3%). A significant proportion of OHCA was observed by witnesses (84.8%), and basic life support was provided in 72.2% of instances. Notably, only 25.3% of these interventions incorporated the use of an automated external defibrillator. Mean no-flow time was 4.1 ± 3.1 min, and low-flow-time was 22.7 ± 12.3 min. 51.9% had a shockable rhythm. Arrest rhythm is displayed in Ch@art 1 and cause of OHCA in Table 1. Out of the patients with a cardiac cause, 50.9% were due to acute coronary syndrome. Mean left ventricle ejection fraction at 48 h was 38.9 ± 14.2%.
A total of 59 patients (74.7%) died during follow-up (FUP). Mean FUP time in surviving patients was 3.9 years. The majority of the patients died in the ICU (57%) and 67.1% during hospital stay. The main cause of death was anoxic encephalopathy (55.7%).
Neuroprognostication applied to 79.7% revealed: 71.2% considered deceased, 15.2% recovered (Glasgow Coma Score > 9), and 6.3% had unclear prognosis. Of five unclear cases, four died during admission.
Regarding neurological outcomes, the cerebral performance category (CPC) was calculated. At discharge from ICU, the median CPC was 2 and 1 at discharge from hospital. Median CPC at follow-up was 1, and median ECOG performance status was 2. Two patients had a CPC score of 4 at FUP.
Conclusions: This study reveals that our survival rate aligns with previously documented rates in the literature. Our results emphasize that the prognosis for these patients is established early in the hospital admission process. Those who survive until discharge exhibit a positive prognosis, often without significant neurological impairment.

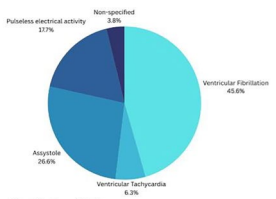


Chart 1: Arrest Rythm

Presumed cause of OHCA	N
Cardiac	53 (67.9%)
Respiratory	12 (15.4)
Trauma	3 (3.8%)
Metabolic	2 (2.6)
Neurological	2 (2.6%)
Unknown	6 (7.7%)

Table 1: Presumed cause of OHCA

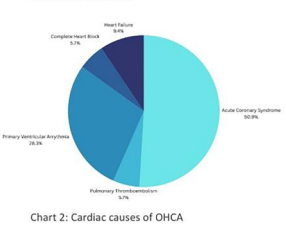


Chart 2: Cardiac causes of OHCA

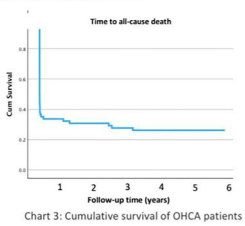


Chart 3: Cumulative survival of OHCA patients

Chart 1: Arrest Rythm; Chart 2: Causes; Chart 3: Survival of OHCA; Table 1: Causes of OHCA;

Topic: Cardiac arrest.

001489

The added value of unstructured data in sepsis detection: a subanalysis from the bialert sepsis model

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Introduction: Sepsis is a time-sensitive, heterogeneous syndrome, where early detection is critical to improve patient outcomes. While machine learning (ML) models are increasingly used to support early identification, they often rely solely on structured data, overlooking the rich clinical content embedded in unstructured text.
Objectives: To evaluate the contribution of unstructured clinical data from the 48 h preceding expert-validated diagnoses of sepsis, as part of the development of the BiAlert Sepsis detection model.
Methods: This subanalysis used data from 218,715 hospital episodes (2014–2018) involving patients aged ≥ 14 years. A total of 11,864 sepsis cases were prospectively validated in real time by a dedicated multidisciplinary team using modified Sepsis-2 criteria. From the 48-h window prior to validation, 2829 clinical variables were initially extracted. After feature selection, 229 variables were retained in the final model, of which approximately 167 (73%) came from unstructured sources (e.g., clinical notes, triage summaries, and narrative impressions), processed through Natural Language Processing (NLP). Structured variables were coded and classified according to ICD-9-CM, with those related to clinical symptoms (e.g., fever and hypotension) and anatomical focus (e.g., lung and abdomen) being particularly relevant.
Results: Unstructured variables—such as "clinical deterioration," "early antibiotic escalation," and "unknown source of infection"—often appeared earlier than measurable physiological changes. Structured ICD-9-coded data also contributed, particularly symptom-based and organ-specific entries. The final model, combining both data types, achieved an AUC-ROC of 0.95, with sensitivity of 0.93 and specificity of 0.84.
Conclusions: Prior studies have shown that integrating unstructured data through NLP improves the performance of AI models in sepsis prediction. While this subanalysis does not compare performance with and without unstructured data, the high diagnostic accuracy achieved by the BiAlert model may in part be attributed to the early and systematic incorporation of NLP-extracted variables during model construction. These findings support continued exploration of hybrid data models in the development of clinical decision support tools.

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3. Instituto de Salud Carlos III through the project PI20/00538 (Co-funded by European Regional Development Fund/European Social Fund "A way to make Europe"/"Investing in your future").

Topic: Sepsis.

001490

Structured variables beyond conventional scores: a subanalysis of the bialert sepsis model

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Intensive Care Medicine Experimental 2025,* 13(1)*:001490

Introduction: Conventional sepsis and ICU scores—such as SIRS, SOFA, and APACHE—use a limited number of structured variables to identify critically ill patients. However, the expansion of electronic health records and machine learning (ML) techniques allows for the incorporation of a broader range of structured data in predictive models. Understanding how these data-driven variables overlap—or diverge—from traditional score components may inform the evolution of early sepsis detection strategies.
Objectives: To analyze the structured variables retained in the BiAlert Sepsis model and compare them with the components of classical sepsis scoring systems.
Methods: This subanalysis is based on the BiAlert Sepsis data set, which includes 218,715 hospital episodes and 11,864 sepsis cases validated in real time by expert clinicians between 2014 and 2018. From 2829 candidate variables, 229 were selected for the final model. We identified the 62 structured variables among them and compared their content with those included in widely used sepsis and ICU scores (SIRS, SOFA, APACHE-II, and SAPS-II). Variables were categorized and analyzed based on clinical function: vital signs, laboratory markers, symptoms, and metabolic indicators.
Results: Of the 229 variables selected for the final BiAlert Sepsis model, 62 were structured variables. Among these, 20 variables (32.3%) were included in at least one conventional scoring system for sepsis or critical illness (e.g., APACHE-II, SOFA, SAPS-II, SIRS, and SEPSIS.2/3). The remaining 42 variables (67.7%) were not present in any of the evaluated clinical scores.
Variables included in conventional scores comprised: temperature, heart rate, systolic blood pressure, diastolic blood pressure, respiratory rate, white blood cell count, creatinine, sodium, potassium, bilirubin, urea, hematocrit, and others.
Structured variables not included in traditional scores but retained in the model included: RDW, eosinophils, basophils, platelecrit, monocytes, neutrophils, lymphocytes, calcium, chloride, CRP, ALT, AST, alkaline phosphatase, and fibrinogen.
All 62 variables were present in over 60% of sepsis-confirmed episodes, with 39 variables (62.9%) present in more than 90% of episodes.
Conclusions: This subanalysis demonstrates that modern ML-based sepsis detection models can identify structured variables of clinical importance that extend beyond the scope of traditional scoring systems. Incorporating these variables into future models may enhance sensitivity and clinical applicability, supporting a transition from expert-defined scores to data-driven detection frameworks.

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2. Instituto de Salud Carlos III through the project PI20/00538 (Co-funded by European Regional Development Fund/European Social Fund "A way to make Europe"/"Investing in your future").

Topic: Sepsis.

001491

Comprehensive driving assessment to determine driving-related impairments and driving resumption in adults recovering from critical illness: a prospective cohort study

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Introduction: Driving resumption remains a largely unexplored component of recovery after critical illness.1, 2 Unlike other health conditions, there is no mandated formal testing of driving ability following critical illness. Furthermore, relevant guidance from regulatory bodies such as the Driver and Vehicle Licensing Agency (DVLA) in the United Kingdom is lacking.1
Objectives: Our primary objective was to determine the frequency and type of driving-related impairments in adults recovering from critical illness, via a comprehensive driving assessment conducted 2 months after hospital discharge. Our secondary objectives were to measure patient reported time to driving resumption, to identify factors associated with driving outcome, and to assess participant acceptability of the comprehensive driving assessment.
Methods: We conducted a UK multi-centre prospective cohort study recruiting participants from six hospitals. We included adult ICU survivors who had (i) received mechanical ventilation and/or extracorporeal membrane oxygenation (ECMO) for $\geq$ 72 h; (ii) held a UK driving licence and driven a car in the 12 months preceding admission, (iii) intended to resume or already resumed driving; and (iv) were able and willing to travel to the driving assessment centre. Participants completed a comprehensive assessment of driving ability at 2 months following hospital discharge including physical review, cognitive battery, evaluation of driving ability on a simulator, in-car assessment on a private track, and in-car on-road assessment. Acceptability was assessed with bespoke questionnaires.
Results: We recruited 40 participants with 33 participants completing the driving assessment, median age 53 years, 68% ($n = 27$) male. The proportion of participants with driving-related impairments at 2 months was 18% ($n = 6$) with 50% ($n = 3$) experiencing physical impairments and 50% ($n = 3$) cognitive/psychological impairments. The proportion of participants who had not resumed driving at 2, 3, 6 and 12 months after hospital discharge was 55% ($n = 18$), 38% ($n = 13$), 18% ($n = 6$) and 9% ($n = 3$), respectively. Time to resumption ranged from 7 to 274 days following hospital discharge. Reasons for not resuming driving at the 2-month assessment included physical/mobility concerns (67%, $n = 12$), no need to drive (50%, $n = 9$), reduced confidence (33%, $n = 6$), anxiety (28%, $n = 5$), and family member concerns (17%, $n = 3$), and not being aware driving resumption was an option (17%, $n = 3$). The acceptability of the driving assessment was high, with all participants rating as very good or excellent.
Conclusions: In this cohort of adults recovering from critical illness, despite only a fifth having driving related impairments on formal assessment, more than half had not resumed driving 2 months after hospital discharge. Driving resumption rates increased over the 12-month time-period in line with predicted recovery after critical illness.

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3. This study was funded by a grant from the Guy's & St Thomas' Charity

Topic: Nursing care and physiotherapy.

001494

Diagnostic accuracy of variation of artery peak velocity for prediction of fluid responsiveness in critically ill patients: a systematic review and meta-analysis

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Introduction: Dynamic parameters used for predicting fluid responsiveness require special equipment and are minimally invasive. Interest in the use of artery peak velocity variation (ΔVpeak) measured by ultrasound has grown. We performed this systematic review and meta-analysis to assess the ability of ΔVpeak to predict fluid responsiveness in critically ill patients.
Methods: We conducted a systematic review and meta-analysis of studies published until Jan 2025, using MEDLINE, Embase, SinoMed, and Cochrane databases. Studies were included if they assessed ΔVpeak in critically ill adult patients and reported its ability to predict fluid responsiveness. Data were extracted and analyzed using a bivariate random-effects model to calculate pooled sensitivity, specificity, and area under the summary receiver operating characteristic curve (AUSROC). Subgroup analyses were performed to explore factors influencing ΔVpeak accuracy.
Results: In total, 26 studies involving 1385 patients were included. The pooled sensitivity and specificity of ΔVpeak for predicting fluid responsiveness were 79% (95%CI 75%-82%) and 82% (95%CI 76%-86%), respectively, with an AUSROC of 0.84 (95%CI 0.80–0.87). Subgroup analysis revealed good diagnostic accuracy in studies using ΔVpeak during the passive leg raising (PLR) test (AUSROC = 0.91, 95%CI 0.88–0.93); in mechanically ventilated patients (AUSROC = 0.86, 95%CI 0.83–0.89) compared to spontaneously breathing patients (AUSROC = 0.81, 95%CI 0.77–0.84) ($p = 0.034$). No significant difference in accuracy was observed between carotid and femoral artery measurements ($p > 0.05$). Diagnostic accuracy was lower in ICU settings (AUSROC = 0.78) compared to the OR (AUSROC = 0.88, $p < 0.001$). Studies using stringent criteria for fluid responsiveness ($\geq$ 15% increase in stroke volume or cardiac output after 500 mL crystalloid infusion) demonstrated higher accuracy (AUSROC = 0.90 vs. 0.84, $p < 0.001$).
Conclusions: The ΔVpeak is a moderately accurate predictor of fluid responsiveness in critically ill patients, with higher diagnostic accuracy in mechanically ventilated patients and those undergoing the PLR test. However, its performance varies across clinical settings and patient populations, emphasizing the need for further validation.

Topic: Cardiovascular issues in ICU.

001496

Effects of volume expansion on mean systemic pressure and venous return in patients with acute circulatory failure: a pooled retrospective analysis of multicenter cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001496

Introduction: Venous return (VR) is determined by three principal factors: mean systemic filling pressure (Pmsf), central venous pressure (CVP), and resistance to venous return (RVR). The driving pressure for VR is defined by the gradient between Pmsf and CVP, while RVR modulates the flow through this pressure gradient. This study aimed to investigate the fluid-induced changes in the Pmsf − CVP gradient and in RVR in patients identified as fluid responders or non-responders following volume expansion (VE).
Methods: This was a pooled retrospective analysis of 24 individual studies conducted across multiple centers between 2012 and 2024, involving patients with acute circulatory failure who received VE (500-mL fluid bolus of crystalloids). Pmsf was estimated mathematically using Perkin's formula. RVR was estimated from Pmsf, CVP and cardiac output. Fluid responsiveness was defined as an increase in cardiac index (CI) ≥ 15% following VE.
Results: Of 1156 patients screened, 750 were excluded due to CVP data unavailable. The remaining 406 patients (age 63 ± 13 y.o, 71% with septic shock, 82% receiving norepinephrine, and 93% under mechanical ventilation) were eligible for assessment and were subsequently included in the final analysis. Following VE, 209 patients (51%) were identified as fluid responders (FR +). Before VE, CVP, Pmsf, and the Pmsf − CVP gradient were significantly lower in FR + compared to FR −. During VE, Pmsf increased to a similar extent in FR + and FR- patients (FR + : 15.7 ± 4.4–18.7 ± 4.6 mmHg (+ 3.0 ± 2.5 mmHg), FR − : 17.3 ± 4.7–19.9 ± 5.0 mmHg (+ 2.6 ± 2.3 mmHg), $p = 0.08$). However, CVP increased less in FR + than in FR- patients (FR + : + 1.3 ± 2.3, FR-: + 2.4 ± 2.2 mmHg, $p < 0.01$). As a result, during VE, the Pmsf-CVP gradient increased to a large extent in FR + than in FR- patients (FR + : + 1.7 ± 0.9, FR-: 0.2 ± 0.6 mmHg, $p < 0.01$). RVR changed neither in FR + nor in FR- patients during VE.
Conclusions: In fluid responders, the VE-induced increase in VR was primarily attributed to a substantial elevation in the Pmsf–CVP gradient. The difference between fluid responders and non-responders is mainly driven by a smaller increase in CVP in responders than in non-responders.

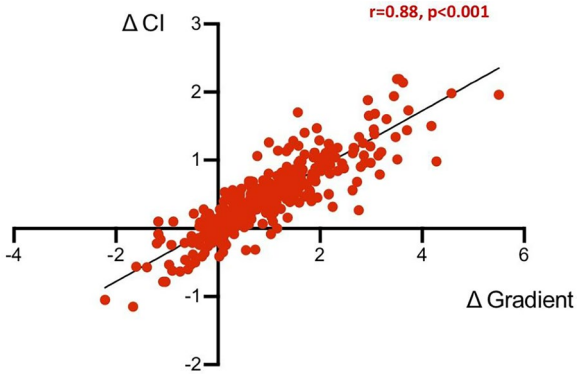


Figure 1 Correlation between the changes in cardiac index (CI) and changes in (Pmsf − CVP) gradient after 500 mL of volume expansion. ($r = 0.88$, $p < 0.001$)

Topic: Cardiovascular issues in ICU.

001497

Fluid responsiveness and venous congestion evolution during volume expansion in patients with acute circulatory failure: a multicenter prospective observational study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001497

Introduction: Fluid responsiveness assessment is essential for optimizing fluid resuscitation in circulatory failure, while the prevention of venous congestion has gained increasing attention to avoid potential adverse effects of fluid therapy. However, their relationship during fluid resuscitation remains poorly explored. This study aimed to delineate the dynamic behaviour of fluid responsiveness and venous congestion during a fluid challenge.
Methods: This multicentre, observational study was conducted in three medical–surgical intensive care units (ICUs) and enrolled patients with acute circulatory failure for whom fluid expansion was deemed necessary by attending clinicians. In patients who received a 500-mL fluid challenge over 15 min as a part of current care, in whom cardiac index (CI) was measured by calibrated pulse contour analysis (PiCCO2) and in whom VExUS had been measured before and after the fluid challenge, we retrospectively collected the change (Δ) in CI, central venous pressure (CVP), venous excess ultrasound (VExUS), and global end-diastolic volume index (GEDVI) induced by the fluid challenge. Fluid responsiveness was defined as a ≥ 15% increase in CI following fluid expansion. VExUS was quantified by grades and by the total number of points recorded at each site (IVC < 2 cm: 0, ≥ 2 cm: 1 point, other sites: normal: 0, mildly abnormal: 1 points, and severely abnormal: 2 points). The fluid-induced ΔCI/ΔGEDVI and ΔVExUS/ΔGEDVI ratios were calculated.
Results: We enrolled 64 patients, of whom 42 were fluid responders (FR +), while 22 were non-responders (FR −). Before the fluid challenge, VExUS grades and VExUS points were comparable between groups (Grade 0: 62% vs. 55%, $p = 0.82$; congestion points: 1.0 [0.0, 2.3] vs. 2.0 [1.0, 3.0], $p = 0.05$). Following fluid administration, VExUS grade deterioration ≥ 1 grade occurred in 5% of FR + vs. 73% of FR − patients ($p < 0.01$). Post-fluid, abnormal VExUS grades were significantly more prevalent in FR − than in FR + (91% vs. 43%, $p < 0.01$), and VExUS points were higher (4.0 [3.0, 5.0] vs. 1.5 [1.0, 3.0], $p < 0.01$). The fluid-induced ΔCI/ΔGEDVI slope was steeper in FR + than in FR − (0.77 [0.39, 1.0] vs. 0.08 [− 0.63, 0.33], $p = 0.01$). Conversely, FR + had flatter slopes for ΔVExUS/ΔGEDVI (0 [0, 0.2] vs. 4.7 [1.7, 9.0], $p < 0.01$) and ΔCVP/ΔGEDVI (1.6 [0.5, 2.7] vs. 4.2 [1.5, 17.8], $p < 0.01$).
Conclusions: In patients with acute circulatory failure, venous congestion was prevalent among FR + and FR- patients, with no significant baseline differences. However, following a 500-mL fluid challenge, FR + patients exhibited better fluid tolerance, as reflected by a lower worsening of venous congestion. In contrast, FR- patients were more vulnerable to a deterioration in venous congestion.

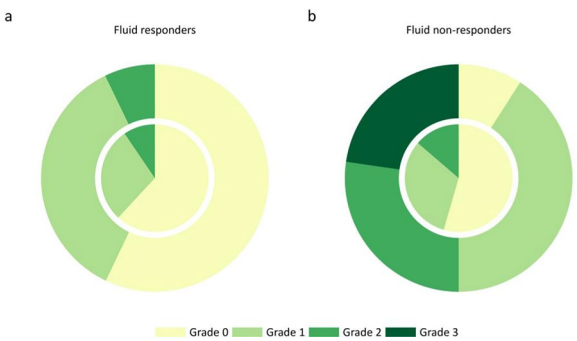


Figure 1 Comparison of VExUS grading and its dynamic changes following a fluid challenge in FR + (**a**) and FR- (**b**) patients. The inner circle represents pre-fluid challenge VExUS grade, and the outer circle represents post-fluid challenge grade. (**a**) FR + : pre- vs. post-, $p = 0.758$; (**b**) FR-: pre- vs. post-, $p = 0.003$. Inner circle: FR + vs. FR-, $p = 0.82$; outer circle: FR + vs. FR-, $p < 0.001$

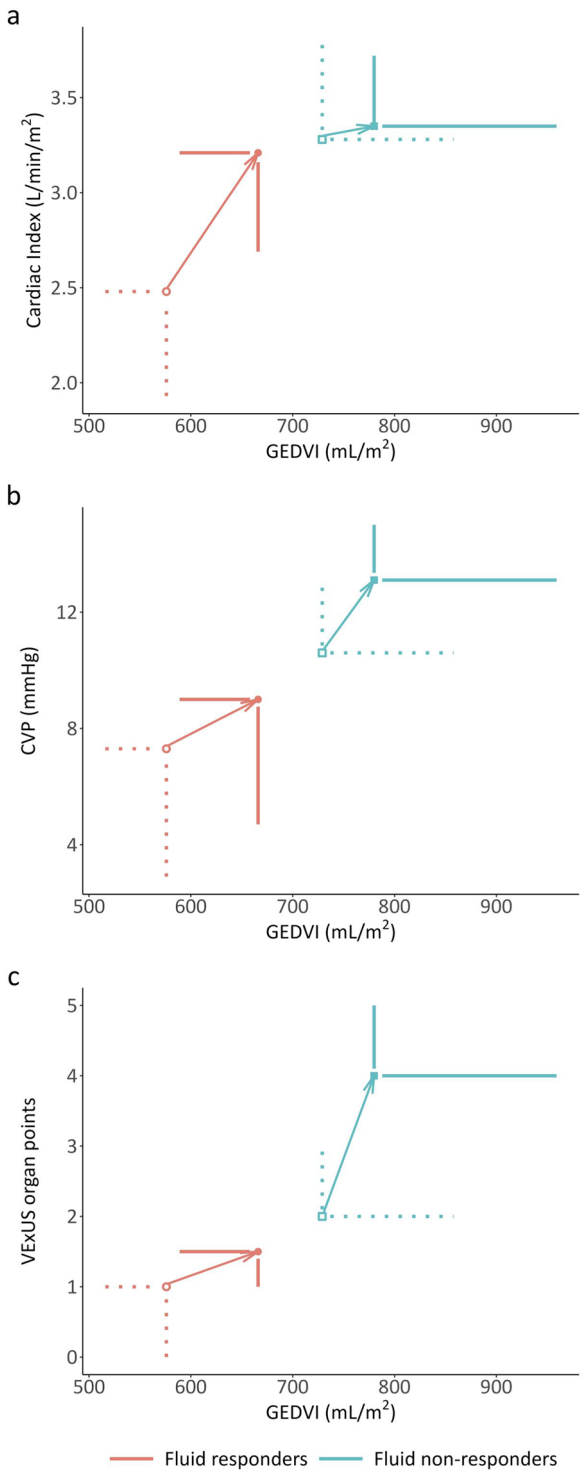


Figure 2 Relationship between fluid responsiveness and fluid tolerance during volume expansion. (**a**) Response slope of ΔCI to ΔGEDVI in FR + and FR − , (**b**) response slope of ΔCVP to ΔGEDVI in FR + and FR − , (**c**) response slope of Δ VExUS to ΔGEDVI in FR + and FR − .
Topic: Cardiovascular issues in ICU.

001498

Effect of methylene blue therapy in adult patients with septic shock: an updated meta-analysis with trial sequential analysis of randomized controlled trials

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Intensive Care Medicine Experimental 2025,* 13(1)*:001498

Introduction: Although methylene blue (MB) has been increasingly studied as a potential therapy for adult patients with septic shock, it remains unclear whether the current evidence is strong enough to support its routine use in clinical practice. One major limitation of existing reviews is the lack of attention to the variability in MB dosing strategies, which likely contributes to the inconsistent findings across trials.
Objectives: This study aimed to evaluate the impact of methylene blue on clinical outcomes in adult patients with septic shock by synthesizing an updated meta-analysis from randomized controlled trials. We performed trial sequential analysis (TSA) to assess the strength and conclusiveness of the evidence and conducted subgroup analyses based on methylene blue dosing strategies to identify potential sources of heterogeneity and determine optimal therapeutic approaches.
Methods: We conducted a systematic review and meta-analysis of RCTs on methylene blue in adult septic shock, following PRISMA 2020 and PROSPERO registration. Searches were conducted in MEDLINE, Embase, Cochrane CENTRAL, and grey literature through January 2024. Eligible studies compared intravenous MB with placebo or standard care.
Two reviewers independently screened and extracted data, resolving discrepancies with a third reviewer. Outcomes included short-term mortality, MAP, vasopressor duration, ventilation days, and ICU/hospital stay. Meta-analysis was performed using a random-effects model; heterogeneity was assessed by I^2.
TSA was apllied assessed evidence sufficiency by RTSA package in R. Subgroup analyses examined MB initiation timing, total dose, duration, bolus use, and risk of bias. Publication bias was evaluated using funnel plots and Egger's test.
Results: From 3728 records, 12 randomized controlled trials met the inclusion criteria, and 10 were included in the meta-analysis (n = 608). MB significantly reduced short-term mortality compared to control (RR: 0.71; 95% CI 0.56–0.88; I^2 = 0%). Trial sequential analysis confirmed the conclusiveness of this finding (adjusted RR: 0.69; p = 0.0031), with the required information size achieved and no statistical heterogeneity.
MB also significantly shortened the duration of vasopressor use (MD: − 24.56 h; 95% CI − 37.21 to − 11.90). Non-significant trends toward reduced days on mechanical ventilation (MD: − 0.81; 95% CI − 1.68–0.07), and ICU length of stay was observed (MD: − 2.11; 95% CI − 4.81–0.58). MB administration was associated with increased mean arterial pressure (MAP) at both 24 and 48 h, supporting its vasopressor-sparing effect.
Subgroup analyses showed greater benefits with a trend in early MB administration (within 24 h of septic shock onset) in short-term mortality, 24-h MAP, and cumulative doses ≥ 5 mg/kg in shorter hospital stay (interaction p value < 0.05). Sensitivity analyses excluding studies at high risk of bias yielded consistent findings. Funnel plot symmetry and Egger's test indicated low risk of publication bias.
Conclusions: Methylene blue administration in adult septic shock appears to reduce short-term mortality and improve key clinical outcomes, including vasopressor duration and ventilator days. The TSA demonstrates that this mortality benefit is both statistically and sequentially significant, with low heterogeneity, indicating robust and conclusive evidence.

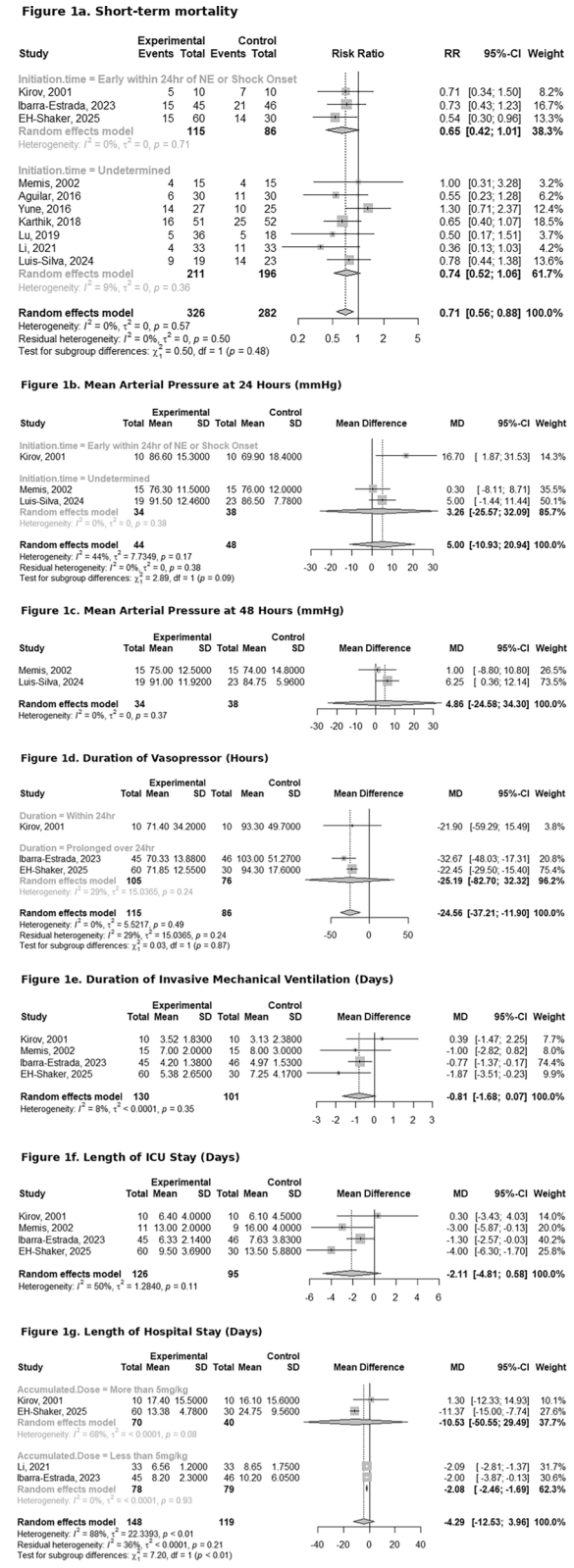


Figure 1 Forest plot for clinical outcomes

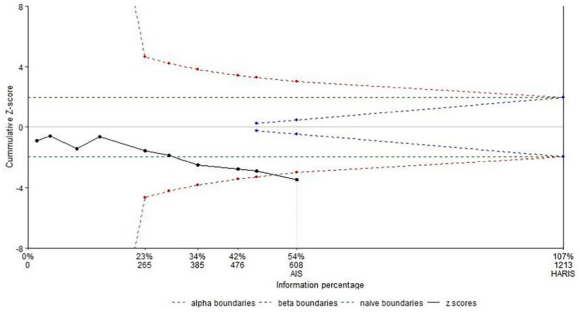


Figure 2 TSA for septic shock mortality

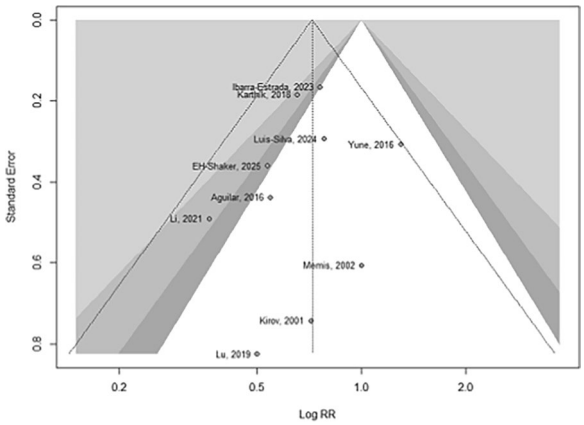


Figure 3 Funnel plot for short-term mortality

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Topic: Sepsis.

001499

Follow-up of tracheostomized intensive care patients: from tracheostomy to decannulation

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Intensive Care Medicine Experimental 2025,* 13(1)*:001499

Introduction: Tracheotomy is essential in intensive care unit (ICU) for patients requiring prolonged mechanical ventilation due to respiratory failure, neurological conditions, or upper airway obstruction. It helps manage secretions and supports ventilation weaning. Postoperative care is crucial to monitor respiratory, functional, and nutritional status to avoid long-term complications. However, follow-up data for tracheotomized patients in Tunisia are limited.
Objectives: Assess the follow-up of tracheostomized patients.
Methods: A descriptive, single-center analysis conducted at ICU of Zaghouan's regional hospital, focusing on patients who underwent tracheotomy between January 2018 and December 2023. Inclusion criteria comprised patients discharged with a tracheostomy tube and complete medical records. Exclusion criteria involved patients with pre-existing tracheostomies, incomplete records, or those decannulated during their ICU stay. The primary endpoint was the success of decannulation. Data were collected retrospectively from archived medical records using a standardized study form.
Results: A total of 28 patients were included, with a median age of 41 years. Gender ratio was 3:1. The most common comorbidities were chronic renal failure (6 patients), COPD (5), and diabetes mellitus (3). The primary reasons for hospitalization were acute brain injury (10 patients), polytrauma (11 patients), and acute respiratory failure (7 patients).
Tracheotomy was performed for failure of spontaneous ventilation and delayed awakening in 14 patients each. The procedure was done surgically, with 5 patients receiving early tracheotomy (< 10 days) and 23 patients undergoing late tracheotomy (> 10 days). Post-tracheostomy complications included tracheal granulomas and stenosis were identified in two patients.
The median ICU stay was 38 days, with no significant difference between early and late tracheotomy groups. The median post-tracheostomy stay was 26 days. Twelve patients were discharged under oxygen therapy at home and three required mechanical ventilation at home. Five patients needed nasogastric tube at discharge due to swallowing difficulties. Regarding mobility, 16 patients were able to walk at discharge, while 12 had reduced mobility.
Median time to the first outpatient consultation after ICU discharge was 18.5 days [14–28].
Fourteen patients underwent decannulation, with a median decannulation time of 110 days [63.15–280.70]. All patients underwent a predecannulation evaluation and were referred to a physiotherapist and speech therapist. No complications occurred post-decannulation.
Conclusions: This study provides valuable insights into the clinical course and outcomes of tracheotomized patients in a Tunisian ICU setting. The results emphasize the importance of timely tracheotomy and comprehensive post-operative management, including rehabilitation, to ensure successful weaning and decannulation.

Topic: Acute respiratory failure and mechanical ventilation.

001503

Current practice of physiotherapy in italian intensive care units: a survey-based analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001503

Introduction: Critically ill patients are highly susceptible to complications resulting from prolonged immobilization, including ICU-acquired weakness, respiratory dysfunction, and cognitive impairment. Early physiotherapy interventions have been shown to reduce the incidence and severity of post-intensive care syndrome [1].
Objectives: This study aimed to explore current physiotherapy practices, intervention modalities, and their frequency in Italian ICUs. A secondary objective was to identify the training needs of physiotherapy staff working in high-intensity care settings.
Methods: This post-hoc observational study was based on a survey designed by a group of healthcare professionals and disseminated across European ICUs via e-mail and social media. The questionnaire was translated into Italian by two independent translators and reviewed by three native speakers. It remained open for 5 months, allowing one response per ICU.
Results: Responses were collected from 33 Italian ICUs, including 16 physiotherapists and 17 intensivists. A majority (54.5%) were university-affiliated hospitals treating adult patients. Most ICUs were mixed medical-surgical (42.4%) or multidisciplinary (27.3%).
Physiotherapists were present in 93.9% of ICUs, but only 16.1% worked exclusively or mostly within ICU settings. In 22.6%, general physiotherapists intervened as needed. In 64.5% of ICUs, physiotherapy interventions required a formal referral, most commonly from intensivists (81.8%) or other physicians (63.6%).
Positioning to optimize ventilation/perfusion (V/Q) was performed regularly in 31.4%, with 7.7% nurse-led. Percussions (84.6%), airway suctioning (92.3%), and manual hyperinflation (84.6%) were regularly performed.
Tracheostomy management was regularly performed in 76.9% of ICUs, while endotracheal tube removal was reported as routine in 61.5%.
Regarding mobility, a passive in-bed range of motion exercises was regularly performed in 30.8%, active in 23.1%, and not performed in 61.5%. Passive/active cycling was regularly implemented in 38.5%, passive verticalization in 71.4%, and transfer to rehab chairs in 57.1%. Mechanical lift transfers were regularly used in 28.6%. Neuromuscular electrical stimulation (NMES) was applied regularly in 28.6% and occasionally in 42.9%.
Assistance with sitting on the bed's edge was regular in 12.1%, standing in 15.2%, sit-to-stand transitions in 3.0%, and assisted walking in 24.2%. Results are shown in Table 2.
Conclusions: The findings highlight a significant variability in physiotherapy interventions and protocols across Italian ICUs. This heterogeneity underscores the need for standardized, evidence-based practices and targeted training to ensure consistent, effective care for critically ill patients in line with current guidelines and scientific literature.

Table 1 Characteristics of physiotherapists in Italy

Category	Details	Count	Percentage
Current Titles	Physiotherapists	14	42.4%
	Physicians/Intensivists/Medical Doctors	17	51.5%
	Respiratory Therapists	2	6.1%
Years of Experience as Physiotherapist	1-5 years	3	21.4%
	6-10 years	2	14.3%
	11-20 years	6	42.9%
	21-30 years	3	21.4%
Experience in Intensive Care	Less than 1 year	1	7.1%
	2 years	3	21.4%
	3 years	2	14.3%
	6 years	2	14.3%
	7 years	1	7.1%
	8 years	1	7.1%
	10 years or more	4	28.6%
Highest Academic Degrees	Physiotherapy Diploma	3	21.4%
	Bachelor's Degree	4	28.6%
	Master's Degree	6	42.9%
	Other	1	7.1%
Additional Education/Training for ICU	Attending short ICU-specific courses	4	12.1%
	Completing accredited cardio-respiratory/ICU physiotherapy specialization	4	12.1%
	Completing an academic post-graduate course in cardio-respiratory/critical care physiotherapy	8	24.2%
Attendance at Conferences (Last 3 Years)	National Conferences	7	50%
	International Conferences	5	35.7%
	Did not attend any	2	14.3%

Table 2 Assessment and practices

Assessment Type	% Participants Trained	% Regularly Perform	% Occasionally Perform	% Never Perform	% Not Applicable (Never Perform)	% Performed by Medical Doctors or Specialists
Respiratory Assessment	42.4%	85.7%	14.3%	50%	39.4%	61.5%
Thoracic Ultrasound	57.1%	7.1%	28.6%	50%	30.8%	61.5%
Muscle Ultrasound	21.4%	14.3%	7.1%	50%	53.8%	23.1% and 15.4% handled by trained professionals
Joint Range of Movement / Muscle Strength	92.9%	64.3%	35.7%	0%	92.3%	0%
ICU-Acquired Weakness Assessment	92.9%	85.7%	14.3%	0%	92.3%	0%
Delirium Assessment	71.4%	64.3%	14.3%	7.1%	61.5%	30.8%
Dysphagia Assessment	57.1%	28.6%	35.7%	21.4%	76.9%	23.1%

Assessment Type	% Regularly Perform	% Occasionally Perform	% Never Perform	% Not Applicable (Never Perform)	% Performed by Medical Doctors or Specialists
Mechanical In-exsufflation (MIE)	76.9%	7.7%	7.7%	69.2%	-
Airway Suctioning (ET/Tracheostomy Tube)	92.3%	0%	7.7%	38.5%	7.7%
Manual Techniques (Percussion/Shaking)	84.6%	0%	7.7%	76.9%	15.4%
Saline Instillation in Artificial Airway	76.9%	0%	7.7%	30.8%	23.1%
Manual Hyperinflation (MHI/Bagging)	84.6%	7.7%	0%	23.1%	23.1%
Ventilator Hyperinflation (VHI)	76.9%	7.7%	7.7%	23.1%	38.5%
Manually Assisted Cough (MAC)	69.2%	7.7%	7.7%	30.8%	46.2%
Manual Recruitment Maneuvers (ELTGOL/LEGOS)	69.2%	7.7%	7.7%	38.5%	61.5%
Mechanical Recruitment Maneuvers	92.3%	0%	0%	38.5%	61.5%
Weaning from Mechanical Ventilation	84.6%	7.7%	0%	69.2%	15.4%
Respiratory Muscle Training (RMT)	76.9%	7.7%	7.7%	69.2%	23.1%
Spontaneous Breathing Trials	76.9%	0%	0%	30.8%	0%

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Topic: Nursing care and physiotherapy.

001504

Anticoagulation after hemorrhagic transformation in acute cardioembolic ischemic stroke

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Intensive Care Medicine Experimental 2025,* 13(1)*:001504

Introduction: To evaluate the safety and efficacy of anticoagulation in patients with cardioembolic acute ischemic stroke (CES) who develop hemorrhagic transformation (HT), assessing its impact on neuroimaging and functional outcomes.
Methods: This retrospective study enrolled patients presenting with cardioembolic AIS within 48 h at a tertiary stroke center between January 2011 and August 2023. Patients who developed HT during hospitalization and underwent follow-up imaging within 1 week were included, focusing on those with hemorrhagic infarction or parenchymal hematoma type 1. Primary outcomes were HT exacerbation on follow-up imaging and 3-month modified Rankin Scale (mRS) distribution shift, comparing anticoagulation therapy (AC), antiplatelet therapy (APT), and drug discontinuation (NM). The safety outcome was symptomatic intracerebral hemorrhage (sICH) occurrence.
Results: Among 763 patients with HT (age 74.6 ± 8.9 years, 48.1% male), AC was associated with a higher incidence of HT exacerbation compared to APT (adjusted OR 0.48, 95% CI 0.29–0.80, p value = 0.005). AC demonstrated improved 3-month mRS vs. APT (adjusted OR 0.63, 95% CI 0.43–0.92, p value = 0.017) and NM (adjusted OR 0.38, 95% CI 0.26–0.55, p value < 0.001). sICH occurred in 5%, with rates of 1.5%, 2.1%, and 11.7% in the AC, APT, and NM groups, respectively (adjusted OR for NM vs. AC: 3.93, 95% CI 1.18–13.16, p value = 0.026).
Conclusions: In CES patients with HT, anticoagulation may lead to radiological exacerbation without increasing sICH risk while potentially improving functional outcomes. These findings suggest that the presence of HT should not necessarily preclude the use of anticoagulation therapy in this patient population.

Topic: Neurointensive care.

001505

Exploring experiences of physiotherapists accredited in lung ultrasound within the United Kingdom: a national survey

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Introduction: Physiotherapists in the United Kingdom (U.K.) are increasingly adopting lung ultrasound (LUS). However, the background, training, and utilization experiences of the 200 + LUS accredited physiotherapists remains unknown. The aims of this study were to establish their clinical background, explore their training experiences, and understand how LUS is being used.
Methods: This study adopted a closed cross-sectional survey design on U.K. physiotherapists accredited in LUS with ethical approval from Coventry University (P176673). The survey was designed, piloted, and administered using the JISC online survey system and was open for a 4 weeks in January 2025. Known eligible participants received an email invitation and gave consent prior to completion. Questions covered participant demographics, training, and utilization experiences. Analysis was completed using content coding with results presented descriptively.

Results: Of the 223 invitations, 168 were returned (75% response rate). Respondents were typically in a static (87%), Band 7 (61%) role at the time of accreditation and mainly worked in a "hyper-acute" (intensive care) area (64%), primarily covering respiratory (83%), medical (57%), or surgical (49%) specialities (Fig. 1).
Almost all (99%) gained accreditation through the Intensive Care Society's training programmes, with 52% completing it within 12 months. Fifty-six (33%) have become approved mentors.
Most (60%) reported performing 1–2 scans per week, with reported indications being; increased oxygen requirement, an unclear chest radiograph (CXR) or complications during mechanical ventilation (MV). Frequently identified pathologies were consolidation (pneumonia), consolidation (atelectasis), and transudative pleural effusion (Fig. 2).
Conclusions: Only anecdotal evidence existed on which physiotherapists learnt LUS or how they trained. We now have a stronger understanding of the LUS accredited physiotherapy workforce.
One training provider was favoured by most physiotherapists wanting to gain LUS accreditation. However, as the LUS training pathway is heavily dependent on mentorship, having a third of respondents as approved mentors supports the future growth of LUS.
With 1–2 scans being performed per week, most respondents do not scan daily. Indications including signs of patient deterioration (increased oxygen), suboptimal assessments (CXR), and to monitor interventions (MV) could all be explained by the presence of the most frequently reported pathologies, consolidation (pneumonia or atelectasis), and pleural effusion (transudative). The indications and pathologies being reported here hint at the wide range of possible uses of LUS at multiple points within a patient's clinical pathway.
This survey shows the typical background of those that have gained their LUS accreditation alongside how often they scan, why they scan and what they find. This information will allow more informed decisions about LUS service design from managerial, logistical, and clinical perspectives.

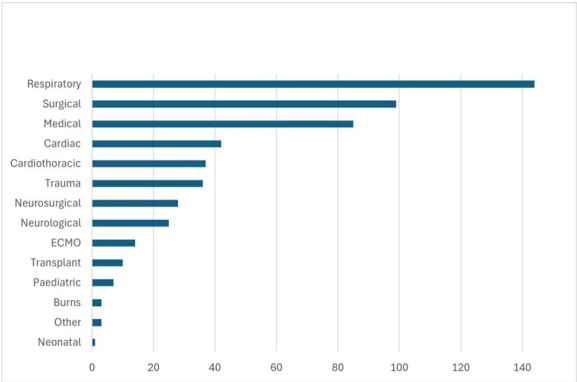


Figure 1 Number reporting specialist area, where LUS being used

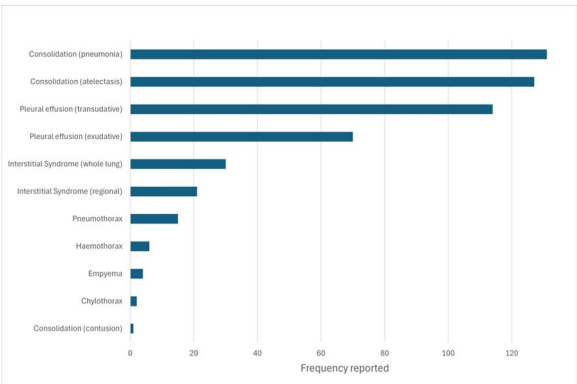


Figure 2 Most frequently reported pathologies identified with LUS

Topic: Imaging in intensive care.

001506

High renin levels are associated with acute kidney injury and liver dysfunction in septic shock

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Introduction: Restoring and maintaining adequate tissue perfusion is paramount in septic shock. However, the selection and titration of vasopressors require careful consideration of individual patient factors, including hemodynamic parameters, comorbidities and potential adverse effects. Current evidence suggests that a subgroup of patients, i.e., those with high renin levels, might particularly benefit from treatment strategies (1) that include angiotensin II (2) and probably also fludrocortisone (3).
Objectives: As renin levels are usually not readily available in standard routine laboratories, understanding typical patient characteristics associated with hyperreninemic hypoaldosteronism becomes crucial for identifying appropriate patients for these targeted therapies. Therefore, the aim of this study was to investigate typical patient characteristics associated with high renin levels in patients with septic shock.
Methods: In this post-hoc analysis, data from two prospective studies were evaluated, comprising 29 healthy controls (HC) and 89 patients with septic shock admitted to a tertiary ICU. Renin concentrations were measured by ELISA on ICU days 1 through 5 and related to SOFA scores, parameters of organ dysfunctions, disease severity and mortality using generalized estimation equations (GEE) models, Spearman's rank-order test, Kruskal–Wallis, and Mann–Whitney *U* tests. Quantitative data are presented as median and 25th–75th quartiles.
Results: Renin levels were significantly higher in patients with septic shock compared to HC (1979 [1105–3464] vs. 475 [376–594] pg/ml, $p < 0.001$) on day 1. High renin levels were particularly related to high SOFA scores ($b = 1.92$ [1.1–2.6], $p < 0.001$), lactate levels ($b = 0.293$ [0.2–0.4], $p < 0.001$), and vasopressor inotropic scores (VIS) ($b = 0.424$, $p < 0.001$) in patients with septic shock. Patients with acute kidney injury (AKI) stage 3 had significantly higher renin levels on day 1 compared to patients with AKI stage 0 (2453 [1682–6660] vs. 1356 [835–2394] pg/ml, $p = 0.04$). Particularly, patients who received renal replacement therapy (RRT) during the study period had higher peak levels of renin compared to patients without RRT (3505 [1706–12989] vs. 2140 [1350–3578] pg/ml, $p = 0.007$). Furthermore, elevated renin concentrations were strongly associated with higher bilirubin levels ($b = 0.375$ [0.20–0.50], $p < 0.001$), a relationship that was already evident on ICU day 1 ($r = 0.30$, $p = 0.004$).
Conclusions: This is the first study to systematically investigate the relationship between renin levels and organ dysfunctions in patients with septic shock. We show that AKI stage 3, requirement for RRT, high vasopressor dose, and liver dysfunction are associated with high renin levels in septic shock patients. These findings highlight the potential of renin as a biomarker for identifying individuals at risk of adverse outcomes and organ dysfunction. Moreover, our data reveal a pattern of organ dysfunctions that might help to identify the subset of patients with hyperreninemic hypoaldosteronism, which is the subset that might benefit from targeted treatment strategies such as angiotensin II or fludrocortisone in septic shock.

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Topic: Sepsis.

001507

An agreement study of quantitative nuclear magnetic resonance with tandem liquid chromatography for therapeutic drug monitoring of piperacillin in intensive care patients

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Introduction: In intensive care medicine, therapeutic drug monitoring (TDM) of β-lactam antibiotics is receiving much attention for the treatment of patients suffering from severe infections. In clinical practice, β-lactam concentrations are determined by in-house developed assays based on chromatographic methods such as liquid chromatography coupled with tandem mass spectrometry (LC–MS/MS). These assays involve drug specific setups and batch measurements limiting availability. Quantitative nuclear magnetic resonance spectroscopy (qNMR) is becoming an emerging technique in clinical sciences. Due to recent improvements in technology, such as sensitivity gains, optimized automatic analysis algorithms and sample handling, qNMR is suited for random access without the need for sample specific isotopically labeled reference substances. qNMR allows for the simultaneous identification and quantification of selected substances in their native environment with preservation of the sample for further studies.
Here, we demonstrate the applicability of qNMR for TDM of β-lactam antibiotics in patients in critical care. As a proof of principle, we developed a qNMR assay to determine the concentration of piperacillin (PIP) in deproteinized human plasma. We further gained plasma samples from critical care patients treated with PIP and determined the concentration of PIP using the newly developed qNMR method and, as reference, an established LC–MS/MS assay.
Methods: This study was approved by the Institutional Review Board (IRB) of the University of Regensburg (23-3311_3-101). Since no personal data of subjects was recorded, informed consent was waived by the IRB. Validation of the qNMR assay was performed on plasma samples collected from healthy volunteers and spiked with PIP according to the guideline of the European Medicines Agency. Leftover material from routine blood sampling from patients who received PIP at the surgical intensive care unit of the University Hospital Regensburg between January 2024 and May 2024 were used. Blood samples were centrifuged and stored at − 80 °C until analysis. PIP was quantified in each sample by qNMR and LC–MS/MS without repeat measurements of the same sample. For qNMR, blood samples were deproteinized and diluted with a buffer solution containing deuterated methanol and pyrazine as internal standard. Final qNMR samples were measured on a 600 MHz Bruker Avance NEO® NMR spectrometer. PIP was quantified within the range of 10–350 mg/L using the triplet resonances at 1.22 ppm with the proprietary "Therapeutic Drug Profiler" software by Lifespin GmbH, Regensburg. For LC–MS/MS, blood samples were deproteinized and diluted with an internal standard solution containing d5-PIP. PIP was quantified within the range of 1.75–100 mg/L as described previously. Results were compared by concordance correlation, Bland–Altman analysis, and Passing-Bablok regression.
Results: A total of 117 specimen were collected from 8 patients at timepoints determined by clinical needs and unrelated to the administration of the antibiotic. Samples outside of the respective limits of quantification for either LC–MS/MS or qNMR were excluded from analysis (n = 67), resulting in an effective range of 10 mg/L LLOQ to 100 mg/L ULOQ.
Results of PIP quantification were higher by LC–MS/MS (median 38.65, IQR 25.73–46.71 mg/L than by qNMR (median 34.09, IQR 18.53–45.70 mg/L). The concordance correlation coefficient was 0.926 (95%-CI 0.895–0.948). Passing-Bablok regression yielded a slope of 1.13 (95%-CI 0.99–1.28) and an intercept of -5.81 (95%-CI − 0.44 to − 12.53) mg/L (Fig. 1). Bland–Altman analysis showed a mean bias of + 1.90 mg/L with limits of agreement from -14.17 mg/L to + 17.97 mg/L (Fig. 2).
Conclusions: This study demonstrates the potential of qNMR as a viable alternative to LC–MS for TDM, with levels of agreement that support further validation across broader patient cohorts.
While liquid chromatography-based methods remain industry standards—e.g., due to their superior sensitivity, commercial kit availability, and established ring trials—qNMR presents several potential advantages. These include minimal sample preparation, random-access analysis, and inherent multi-analyte detection capabilities.
These features support further investigation of its clinical utility in TDM and potentially other applications.

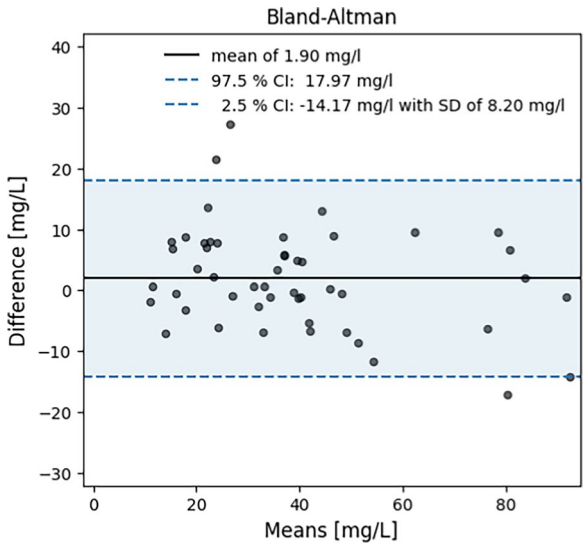


Figure 2. Concentration of piperacillin in human plasma determined by LC–MS/MS and NMR spectroscopy analyzed by Bland–Altman Plot. CI denotes confidence interval, SD standard deviation.

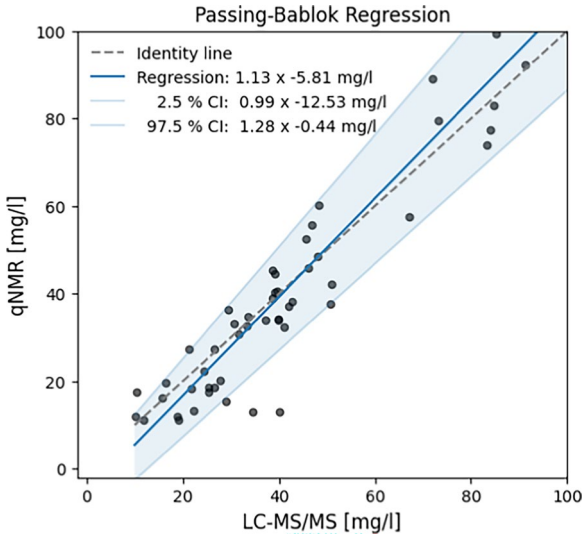


Figure 1. Concentration of piperacillin in human plasma determined by LC–MS/MS and NMR spectroscopy analyzed by Passing-Bablok Regression. CI denotes confidence interval.

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Topic: Infections and prevention.

001508

Microcirculation assessment in patient treated with angiotensin II or vasopressin as secondary vasopressors in refractory shock

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Introduction: Refractory shock is a severe systemic condition characterized by persistent hypotension, inadequate tissue perfusion, and organ dysfunction, despite appropriate fluid resuscitation (1–3) The surviving sepsis campaign currently recommends the use of vasopressin (AVP) as an adjunct to catecholamines; however, angiotensin II (Ang-II) has also emerged as a promising alternative vasopressor. The effects of such drugs on microcirculatory function warrant further investigation (5).

Objectives: To assess changes in microcirculatory function before and after the administration of AVP or Ang-II in patients with refractory shock.

Methods: Patients aged > 18 years, admitted to the ICU of the HUB (Brussels, Belgium) between May 2024 and April 2025 with a diagnosis of refractory shock, and enrolled in an ongoing registry study (SEVERE Registry), were included in the analysis. Microcirculatory data, including laser Doppler measurements, capillary refill time (CRT), and near-infrared spectroscopy (NIRS), were recorded prior to the initiation of the second vasopressor and at 24 h following its administration.

Results: We enrolled 18 patients, 9 received AVP, and 9 Ang-II. The groups were homogeneous in terms of baseline characteristics (Table 1). At baseline, NIRS values were similar between the AVP and Ang-II groups (56.5 [50–62] vs. 61.5 [56.5–69.25]), while it results significantly increased in the Ang-II group at 24 h (57 [49–68] vs. 67 [60–74]—p 0.02 Fig. 1). At baseline, 3 patients in the AVP group and 2 in the Ang-II group had CRT < 3 s, while at 24 h, no patient in the AVP group but 5 in the Ang-II group had CRT < 3 s; the improvement in the Ang-II group results significant with p: 0.016 (Figs. 2, 3 and 4). At baseline, SBF was lower in the Ang-II group compared to the AVP group, (20.7 [10.38–37.27] vs. 72.07 [27.15–94.96]); however, at 24 h, SBF was higher in the Ang-II group (152.65 [12.65–373.69]) compared to AVP (96.42 [22.37–234.17]—Figs. 5–9). Velocity blood flow was higher in the AVP group at T0 (273.86 [95.10–408.40] vs. 113.51 [63.4–154.46]) but increased more in the Ang-II group by T24h (363.25 [80.87–604.60] vs. 301.86 [105.19–454.14]) (Figs. 5–9).

Conclusions: This study demonstrates significant improvements in NIRS and CRT with Angiotensin II; whereas, SBF and VBF show trends of enhancement without reaching statistical significance. These findings suggest Ang-II potential benefits, further studies with larger cohorts are needed to confirm these findings and evaluate its role in refractory septic shock.

Table 1 Demographics and clinical characteristics of study populations

CHARACTERISTICS	All patients (n 18)	Vasopressin (n 9)	Angiotensin II (n 9)	*p*
Age, median (IQR)	64 (27-81)	65 (56-81)	64 (27-77)	0.42
Male, N. (%)	14 (77.8%)	9 (100%)	5 (55%)	0.02
BMI, median (IQR)	28.2 (18.8-41.9)	32.7 (25.6-41.9)	26.4 (18.8-32.9)	0.64
Score at admission				
APACHE, median (IQR)	25.5 (8-38)	22 (8-33)	28 (17-39)	0.55
SOFA, median (IQR)	13 (5-19)	13 (7-19)	13 (5-17)	0.55
Comorbidities, N. (%)				
Hypertension	13 (68.4%)	7 (77%)	6 (66%)	0.58
Chronic heart failure HFrEF	8 (44%) 6 (33%)	6 (33%) 5 (27%)	2 (11%) 1 (5%)	0.41 1.00
Atrial fibrillation	4 (21.1%)	3 (25%)	1 (14.3%)	0.98
Diabetes	7 (38.8%)	2 (11.1%)	5 (27.7%)	0.55
Peripheral artery disease	4 (22.2%)	0 (0%)	4 (22.2%)	1.00
Recent pulmonary embolism (< 1 year)	2 (10.5%)	1 (8.3%)	1 (14.3%)	1.00
Chronic kidney disease	6 (33.3%)	4 (22.2%)	2 (11.1%)	1.00
Type of shock, N. (%)				
Septic Cardiogenic Hypovolemic Mixed	14 (77.8%) 5 (27.8%) 2 (11.1 %) 5 (27.8%)	5 (27.8%) 1 (5.6%) 2 (11.1%) 3 (16.7%)	9 (50%) 4 (22.2%) 0 (0%) 2 (11.1%)	
Shock management				
NE dose before starting 2nd vasopressor (mcg/Kg/min), median (IQR)	0.81 (0.75-2.10)	0.97 (0.75-2.70)	0.75 (0.76-1.18)	0.55
Vis Score baseline, median (IQR)	85 (77-210)	107 (75-271)	79 (78-118)	0.62
Outcomes				
ICU death (%)	14 (77.7%)	8 (44.4%)	6 (33.3%)	0.47
WLST (%)	12 (66.7%)	6 (33.4%)	6 (33.4%)	0.31

BMI: body mass index; HFrEF: Heart failure with reduced ejection fraction; ICU: intensive care unit; WLST: withdrawal of life support

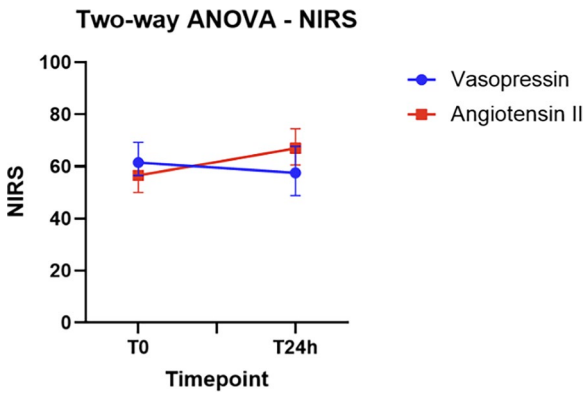
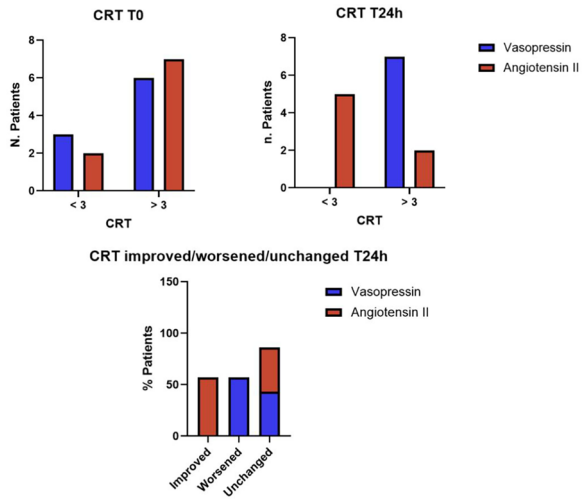
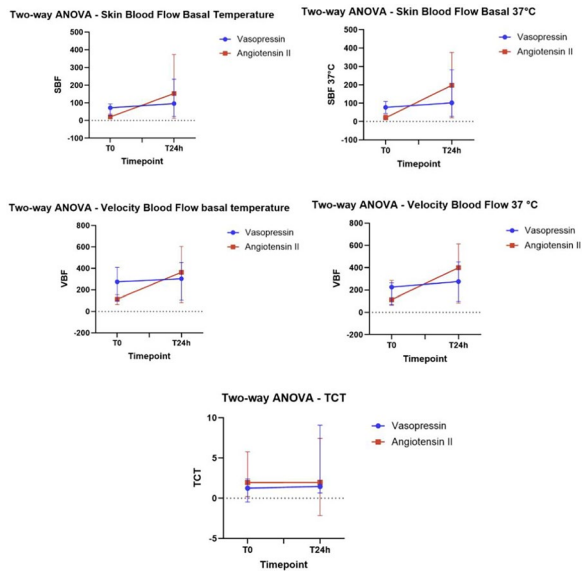


Figure 1 Time evolution NIRS between the two groups

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Figures 2–4 Time evolution CRT between the two groups



Figures 5–9 Time evolution SBF e VBF at basal temperature et 37°C between the two groups

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Topic: Cardiovascular issues in ICU.

001509

A new biomarker based score for sepsis induced disseminated intravascular coagulopathy

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Introduction: Disseminated intravascular coagulopathy (DIC) is associated with worse outcomes in septic patients (1). Different coagulation pathways are implicated in the pathophysiology of DIC, but they are not assessed by commonly used DIC scores.
Objectives: To test if specific coagulation biomarkers can improve prognostication in DIC septic patients.
Methods: In septic patients, we evaluated 11 biomarkers related with 3 relevant pathways in the development of DIC. Tissue factor (TF), von Willebrand factor (Ag vWF), ristocetin cofactor (Risto-Co), soluble P-selectin (sCD62p) regarding platelets and endothelium activation; thrombin–antithrombin complexes (TATc), fibrinogen, tissue factor pathway inhibitor (TFPI) and antithrombin III (AT-3) as pro- and anticoagulant molecules; plasminogen activator inhibitor 1 (PAI-1), tissue plasminogen activator (tPA) and D dimers as biomarkers of the fibrinolysis. We compared the biomarker values considering DIC and survival status. Then, we selected only one biomarker from each pathway able to discriminate both outcomes. For each selected biomarker, we dichotomized values as high or low based on median values for the whole population, and we scored 1 or 0 points when comparing non survivors with survivors, respectively. Finally, we created a new score by adding the points from each specific biomarker. Statistical analysis was performed using SPSS 23.0.
Results: We included 46 patients that were 67 (58–74) years, had a median APACHE II score of 19 (16–27), an SOFA score of 8 (6–10), and a 30-day mortality of 43%. Different biomarkers values are presented in Table 1. The 3 selected biomarkers were: tPA, AT3 and Risto-Co, and mortality tended to be higher with worse biomarkers values (Table 1 and Fig. 1). The mortality was not different when comparing sepsis induced coagulopathy (SIC) or DIC patients, but it was higher with higher values of this new biomarker based score (Fig. 1).

Variable	DIC (−) *n* = 39	DIC (+) *n* = 7	*P*	Survivors *n* = 26	No survivors *n* = 20	*P*
INR	1.4 (1.3–1.6)	2.2 (2.0–2.6)	< 0.001	1.4 (1.3–1.7)	1.5 (1.3–2.1)	0.282
Platelets (10^3/µL)	187 (105–312)	138 (49–257)	0.306	170 (84–252)	193 (108–261)	0.658
Tissue Factor (pg/mL)	57.4 (38.8–78.0)	89.9 (58.4–95.8)	0.108	55.6 (44.0–78.0)	66.4 (43.8–86.1)	0.375
Ag vWF (%)	546.0 (437.0–696.0)	818.0 (697.0–1039.0)	0.023	562.5 (413.0–756.0)	657.5 (477.0–913.5)	0.400
Risto-Co (%)	469.0 (375.0–546.0)	571.0 (531.0–585.0)	0.009	473.1 (375.0–531.0)	518.5 (435.5–568.5)	0.173
sCD62P (ng/mL)	56.4 (44.8–80.1)	77.3 (60.5–127.2)	0.049	59.0 (43.6–78.2)	58.4 (53.1–90.4)	0.330
TATc (pg/mL)	10.7 (6.2–17.6)	33.4 (21.6–62.8)	0.010	10.2 (6.6–27.8)	13.9 (7.4–19.6)	0.756
Fibrinogen (mg/dL)	499 (386–719)	408 (373–445)	0.056	507 (373–734)	464 (408–545)	0.816
TFPI (pg/mL)	38,400 (28,100–99500)	62,600 (33,800–112000)	0.306	35,100 (26,600–56400)	64,550 (33,100–115500)	0.051
AT-3 (%)	55.0 (44.0–69.0)	32.0 (20.0–43.0)	0.005	55.0 (49.0–67.0)	43.5 (29.5–69.0)	0.431
PAI-1 (ng/mL)	81.0 (60.0–124.5)	161.0 (120.0–205.0)	0.003	83.0 (54.0–144.0)	104.0 (78.0–139.5)	0.245
t-PA (pg/mL)	12,300 (9210–34628)	41,627 (35,901–52459)	0.003	11,300 (9326–21,133)	35,264 (12,500–48577)	0.018
D dimers (ng/mL)	4110 (2211–6989)	20,847 (12,712–33,638)	0.003	5021 (2578–12,712)	3963 (2212–13,438)	0.465

Conclusions: A new biomarker-based score incorporating different coagulation pathways prognosticates better the mortality than SIC and DIC scores in septic patients.

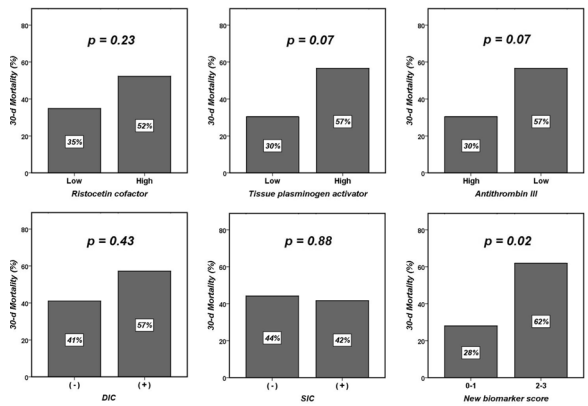


Figure 1 Mortality regarding each selected biomarker and the new proposed score

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Topic: Transfusion and haemostasis disorders.

001510

Plasmapheresis monotherapy vs. adjunctive continuous venovenous hemodiafiltration in acute hepatic failure: a retrospective cohort analysis of efficacy and clinical outcomes

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Intensive Care Medicine Experimental 2025,* 13(1)*:001510

Introduction: Acute hepatic failure (AHF) is a critical condition marked by rapid decompensation of hepatic function, necessitating prompt intervention to mitigate disease progression. Novel extracorporeal therapies, including therapeutic plasma exchange (TPE) and continuous venovenous hemodiafiltration (CVVHDF), have emerged as potential modalities to enhance toxin clearance and stabilize hepatic hemodynamics. However, the clinical efficacy of TPE as monotherapy vs. its synergistic application with CVVHDF remains a critical area of investigation. This study evaluates the therapeutic outcomes of TPE alone vs. combination therapy with CVVHDF in adult patients with acute or acute-on-chronic liver failure.

Methods: A single-center retrospective cohort study was conducted within a Liver Transplant Intensive Care Unit (ICU), analyzing data from adults aged 39–72 years admitted between January 2022 and March 2025. Eligible patients had confirmed AHF or acute-on-chronic liver failure and received either TPE alone (n = 23, 53.4%) or TPE combined with CVVHDF (n = 20, 46.5%). Primary endpoints included biochemical normalization (INR, ALT, AST) and transplant-free survival. Statistical significance was defined as $P < 0.05$.

Results: The TPE monotherapy cohort demonstrated significant biochemical improvements: median INR decreased from 2.0 (IQR: 1.8–2.8) to 1.3 (1.1–1.8), ALT from 451 U/L (66–1572) to 155 U/L (71–356), and AST from 264 U/L (132–1344) to 81 U/L (34–159) ($P < 0.05$). The TPE + CVVHDF cohort exhibited comparable reductions: INR declined from 3.1 (2.3–4.4) to 1.6 (1.4–2.5), ALT from 681 U/L (61–2486) to 159 U/L (70–1050), and AST from 921 U/L (138–1918) to 68 U/L (43–511) ($P < 0.05$). Overall, 39.5% (17/43) achieved transplant-free survival, while 18.6% (8/43) underwent liver transplantation.

Conclusions: Both TPE monotherapy and combination therapy with CVVHDF significantly ameliorate hepatic dysfunction in AHF, serving as viable bridging strategies to transplantation. The observed transplant-free survival rate underscores the therapeutic potential of these modalities. However, prospective multicenter trials are imperative to validate these findings, optimize treatment algorithms, and refine patient selection criteria for extracorporeal interventions.

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Topic: Metabolism, endocrinology, liver failure and nutrition.

001511

Re-evaluating β-lactam infusion strategies in adult sepsis: an updated meta-analysis of randomized trials

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Introduction: Recent randomized controlled trials (RCTs) comparing prolonged vs. intermittent β-lactam antibiotic infusions in sepsis patients have yielded conflicting outcomes, leaving clinical consensus unsettled. This study aimed to systematically evaluate the comparative effectiveness and safety of prolonged vs. intermittent infusion strategies in adult patients with sepsis through a meta-analysis of available RCTs.
Objectives: We performed a systematic search of PubMed, EMBASE, and the Cochrane Library for RCTs assessing β-lactam infusion strategies in septic patients. Primary outcomes included all-cause mortality, clinical response, microbiological response, and adverse events. Data were synthesized using a random-effects model, and results were reported as relative risks (RRs) with 95% confidence intervals (CIs). Subgroup analyses explored potential effect modifiers, such as infection etiology and dosing strategies. The review protocol was registered with PROSPERO (CRD42023463905).
Methods: A total of 16 studies encompassing 2210 participants were included. Compared to intermittent infusion, prolonged infusion was associated with a significant reduction in all-cause mortality (RR 0.79; 95% CI 0.67–0.94; $P = 0.01$) and improved clinical response rates (RR 1.20; 95% CI 1.05–1.37; $P = 0.01$). Microbiological eradication rates showed a favorable trend but were not statistically significant (RR 1.08; 95% CI 0.95–1.22; $P = 0.18$). No meaningful differences were found in adverse event rates between the two infusion methods (RR 0.93; 95% CI 0.66–1.31; $P = 0.68$). Subgroup analyses demonstrated greater mortality benefits in trials enrolling > 25 patients per arm (RR 0.81; 95% CI 0.68–0.96; $P = 0.02$), studies published after 2011 (RR 0.82; 95% CI 0.70–0.97; $P = 0.02$), infections primarily caused by gram-negative pathogens (RR 0.77; 95% CI 0.62–0.94; $P = 0.01$), use of a loading dose (RR 0.82; 95% CI 0.69–0.97; $P = 0.02$), and penicillin-based regimens (RR 0.63; 95% CI 0.40–0.99; $P = 0.045$).
Results: Prolonged infusion of β-lactam antibiotics appears superior to intermittent administration in reducing mortality and enhancing clinical success in septic patients, with no associated increase in adverse events. These findings support the adoption of prolonged infusion strategies, especially in settings involving Gram-negative infections and penicillin use.
Conclusions: These findings support the adoption of prolonged infusion strategies, especially in settings involving Gram-negative infections and penicillin use.

Topic: Sepsis.

001512

Antibiotic resistance and epidemiology of *Staphylococcus* spp. at ICU of tertiary hospital in Southern Vietnam: a retrospective study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001512

Introduction: Antibiotic resistance *Staphylococcus* spp. infections are increasingly prevalent in ICU, where critically ill patients with multiple comorbidities face a heightened risk of mortality. Despite itsclinical significance, research on the antibiotic resistance patterns and epidemiology of *Staphylococcus* spp. remains limited.
Objectives: This study aims to bridge this gap by providing clinicians with a comprehensiveoverview of *Staphylococcus* spp. and supporting evidence-based decision-making in antimicrobialtherapy.
Methods: This study collected data from 154 patients with *Staphylococcus* spp. infections between January 2020 and December 2024 in the ICU of Cho Ray Hospital, Vietnam.
Results: The highest infection rate was observed in *S. aureus*, accounting for 64.9% (100/154) of cases, followed by *S. haemolyticus* 14.9% (23/154), *S. epidermidis* 13.6% (21/154), *S. hominis* 4.5% (7/154), *S. capitis* 1.3% (2/154), and *S. lugdunensis* 0.6% (1/154). All cases of *S. haemolyticus*, *S. epidermidis, S. hominis*, and *S. lugdunensis* were resistant to oxacillin and benzylpenicillin. In addition, 72.9% of *S. haemolyticus* infections exhibited resistance to cotrimoxazole, while 100% of *S. lugdunensis* isolates were resistant to fusidic acid and tetracycline. Among the 100 cases of *S. aureus*, 98 (98%) were resistantto benzylpenicillin and 73 (73%) were classified as methicillin-resistant *S. aureus* (MRSA). All cases aresusceptible to vancomycin. Moreover, the mortality rate of patients with MRS is 46.3%.
Conclusions: This study provides insights into the changing patterns of antibiotic susceptibility in *Staphylococcus* spp. over a 5-year period. The findings have significant implications for antibioticselection in the treatment of *Staphylococcus* spp. infections among ICU patients.

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Topic:: Infections and prevention.

001515

Use of the anaconda ® anesthesia preserving device and its effect on dead space in patients with healthy lung under mechanical ventilation in a Level III hospital in Colombia

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Intensive Care Medicine Experimental 2025,* 13(1)*:001515

Introduction: The AnaConDa® AnaConDa® Anaesthesia Conservation Device (ACD) reflects exhaled anaesthetic agents and the literature reports ease of use outside operating theatres; however, evidence shows that exhaled CO_2 is also reflected, resulting in a dead space effect that exceeds the internal volume of the ACD (100 mL). CO_2 reflection from the ACD is attenuated by humidity, and these changes may not have a deleterious clinical impact on ventilated patients.
Objectives: To evaluate the effect of the ACD device on arterial blood gas values and ventilatory mechanics compared to a hygroscopic humidification filter (HMEF).
Methods: Prospective analytical analysis of patients under mechanical ventilation (MIV) attended in a level III hospital with ventilatory parameters and arterial blood gases taken on admission to the ICU with HMEF and after the change to ACD with inhaled sedation with isoflurane, excluding patients with lung parenchymal lesions of infectious, inflammatory or neoplastic origin, diagnosis of COPD, COPD and chest trauma.

Results: 57 patients were evaluated under IMV in ASV (adaptive support ventilation) mode, 57% men with mean age of 51.08 years. Statistically significant differences were found in peak inspiratory pressure ($p = 0.001$), airway resistance ($p = 0.001$), dead space volume ($p = 0.001$) and in the percentage of dead space volume ($p = 0.001$) and in the percentage of dead space volume ($p = 0.001$).
Conclusions: Although ACD causes an increasing effect on dead space, this is attenuated, but not eliminated, with the use of isoflurane. No short or long term changes were found on patients' pH, paO2 or pCO2 values which may indicate that its use is not harmful in terms of the use of ASV ventilatory strategy.

Table 1. Values of ventilatory mechanics and arterial blood gases measured with HMEF and ACD

Variable	humidifier n= 57	AnaConDa® Anesthesia Conservation Device n= 57	p< 0.05*
Minute volume (L/min) (DE)	8.19 (1.42)	8.67 (1.53)	0.196
PEEP (DE)	8.77 (0.98)	8.77 (0.98)	1,000
FIO2 (DE)	28.59 (3.09)	28.59 (3.09)	1,000
Maximum inspiratory pressure (cmH2O) (SD)	20.40 (2.86)	22.59 (3.09)	0.001
Mean airway pressure (cmH2O) (SD)	12.88 (1.82)	13.21 (1.78)	0.325
Tidal volume (cm ³) (SD)	449.93 (81.80)	478.51 (90.29)	0.079
Static compliance (ml/cmH2O) (SD)	58.63 (19.19)	60.28 (18.59)	0.642
Airway resistance (cmH2O/Lts/sec) (SD)	10.12 (2.60)	13.77 (3.64)	0.001
Dead space volume (cm ³) (DE)	132.10 (21.98)	156.67 (23.90)	0.001
Dead space volume/Tidal volume (%) (SD)	29.96 (4.70)	33.75 (5.51)	0.001
Expired CO2 slope (mmHg/ml) (SD)	5.31 (3.09)	4.54 (3.14)	0.189
Expired volume of CO2 (mL) (DE)	10.66 (2.50)	10.98 (2.91)	0.537
Inspired volume of CO2 (mL) (DE)	3.63 (1.31)	3.73 (1.42)	0.682
Alveolar volume (Lts/min) (DE)	5.98 (1.26)	5.84 (1.29)	0.573
PetCO2 (mmHg) (SD)	35.56 (5.61)	35.45 (5.65)	0.921
FetCO2 (%)(DE)	7.37 (1.14)	7.31 (1.09)	0.763
Alveolar volume (cm ³) (SD)	331.19 (72.26)	318.19 (67.05)	0.314
pH (DE)	7.40 (0.06)	7.39 (0.05)	0.470
pCO2 (mmHg) (SD)	32.93 (4.68)	33,12 (4,19)	0.815
paO2 (mmHg) (SD)	80.55 (10.75)	79.37 (11.23)	0.571

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Topic: Sedation, analgesia and delirium.

001516

Extracorporeal immune cell therapy (ICE) with purified granulocytes: extended-duration feasibility and immunomodulatory profile

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Intensive Care Medicine Experimental 2025,* 13(1)*:001516

Introduction: Extracorporeal immune cell therapy (ICE) represents a novel therapeutic strategy, where patient plasma is perfused through purified donor granulocytes to actively modulate the immune response while avoiding the risks of direct granulocyte transfusion. Preliminary clinical investigations have established safety and tolerability; however, specific dosing data and characterization of cytokine release patterns are still lacking [1].
Objectives: To investigate the feasibility, granulocyte integrity, and cytokine release dynamics during extended-duration ICE treatment up to 24 h.
Methods: Standard GC were purified to increase the potential storage time and subsequently used in the extracorporeal immune cell perfusion system (Fig. 1). An ex-vivo closed-loop extracorporeal circuit utilized three plasma filters (PF): PF-BC separated plasma from anticoagulated whole blood, PF-CC1 contained density-gradient purified granulocytes (2.5×10^9 cells, > 95% purity), and PF-CC2 served as a safety filter (Fig. 1). Two durations were studied—10 h (plasma flow 33 mL/min) and 24 h (13.5 mL/min). Granulocytes were stored for 72 h at 4 °C before use. Measurements at 0, 6, 10, and 24 h included viability (trypan-blue exclusion), phagocytosis of FITC-labelled Escherichia coli, oxidative burst (dihydrorhodamine-123), lactate dehydrogenase (LDH), glucose/lactate exchange, and cytokines (multiplex Luminex).
Results: Granulocyte viability remained consistently high (> 90%) in both regimens, with unchanged LDH indicating maintained cellular integrity. Functional assays demonstrated sustained phagocytic activity and oxidative burst (≥ 80% of baseline) throughout 24 h. Cytokine release followed a distinct time-dependent pattern: IL-8 levels peaked early at 6 h (median 8.2 ng/mL), stabilizing thereafter, whereas significant elevations of MCP-1, IL-6, IL-1β, and TNF-α occurred primarily between 10 and 24 h (all $p < 0.001$) (Fig. 3). Metabolic parameters remained stable without clot formation.
Conclusions: ICE demonstrates sustained granulocyte function and cell integrity over an extended treatment period, revealing a unique time-dependent cytokine release profile distinct from conventional extracorporeal techniques. These findings provide a scientifically robust framework for optimizing future ICE dosing strategies aimed at reversing sepsis-induced immunoparalysis.

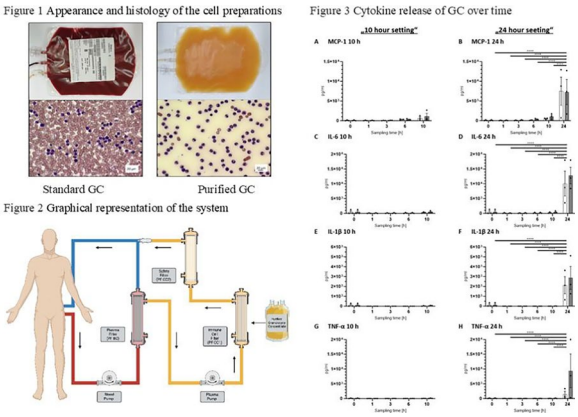


Figure 1. Appearance and histology of the cell preparations.
Figure 2. Graphical representation of the system.
Figure 3. Cytokine release of GC over time.

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Topic: Sepsis.

001518

Excessive oxygen exposure is associated with short-term poor prognosis in critical ill patients after abdominal surgery: a retrospective study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001518

Introduction: Patients after abdominal surgery in the ICU routinely receive adjuvant oxygen therapy to prevent hypoxemia. However, excessive oxygen exposure may pose potential hazards to critically ill patients through mechanisms, such as inducing oxidative stress, vasoconstriction, and atelectasis. At present, the impact of hyperoxia on the prognosis of patients after abdominal surgery in the ICU remains controversial. Therefore, this study aimed to explore the association between oxygen exposure indicators (PaO_2, FiO_2 and oxygen exposure time) and the 30-day mortality of patients after abdominal surgery in the ICU, and to clarify the appropriate range of oxygen therapy for postoperative patients.
Methods: This study was a retrospective cohort study, including patients who were admitted to the ICU for more than 24 h after abdominal surgery at the First Affiliated Hospital of Sun Yat-sen University from January 2018 to June 2022. Extracted all arterial blood gas results of the patients in the first 7 days during their stay in the ICU or before they were transferred out of the ICU (for patients staying in the ICU for less than 7 days), and calculated TWA-PAO_2 and TWA-FiO_2 [time-weighted average (TWA): The ratio of area under the variation-time curve to time] and the proportion of hyperoxia exposure time (the proportion of the duration of $PaO_2 \geq 112.93$ mmHg in the total ICU duration). The Kaplan–Meier curve and log-rank test were used to determine the optimal cutoff values of each indicator. Survival analysis was conducted after controlling the baseline differences using the propensity score matching (1:1) method. Finally, the independent risk factors for 30-day mortality of patients admitted to ICU after abdominal surgery were determined by the multivariate Cox regression model.
Results: A total of 1286 patients after abdominal surgery admitted to ICU who met the inclusion and exclusion criteria were included in this study. Among them, 1067 patients (83%) were in the survival group and 219 patients (17%) were in the non-survival group. The APACHE II score and SOFA score of the non-survival group were significantly higher than those of the survival group (23.00 [19.00, 29.00] vs. 17.00 [13.00, 21.00], $P < 0.001$; [5.00, 8.00] 6.00 vs. 5.00 [3.00, 7.00], $P < 0.001$, respectively), and BMI was significantly lower than that of the survival group (21.64 [19.71, 24.07] vs. 22.68 [20.20, 24.92], $P < 0.001$). Based on the log-rank test, the cutoff values of TWA-PaO_2, TWA-FiO_2, and the proportion of hyperoxia exposure time were determined to be 112.93 mmHg, 48.11% and 18%, respectively. The patients were divided into the hyperoxia and the hypoxia group, respectively, with the cutoff values of the three indicators as the boundaries. After propensity score matching, the baseline characteristics between the groups reached equilibrium. The survival analysis after matching also showed that the 30-day mortality of patients in the TWA-$PaO_2 \geq 112.93$ mmHg group ($P = 0.001$), the TWA-$FiO_2 \geq 48.11\%$ group ($P < 0.001$), and the group with the proportion of hyperoxia exposure time > 18% ($P < 0.001$) were all significantly higher than those in the corresponding hypoxia groups. Further multivariate Cox regression analysis revealed that TWA-FiO_2 (HR = 1.059, 95% CI 1.040–1.074, $P < 0.001$) and the proportion of hyperoxia exposure time (HR = 2.418, 95% CI 1.250–3.683) $P = 0.006$) is an independent risk factor for 30-day mortality in patients after abdominal surgery in the ICU.
Conclusions: High fractional inspired oxygen (TWA-$FiO_2 \geq 48.11\%$) and the proportion of hyperoxia exposure time (> 18%) are significantly associated with the 30-day mortality of patients admitted to ICU after abdominal surgery. The oxygen therapy strategies for patients after abdominal surgery should be carefully evaluated to avoid excessive oxygen therapy.

Topic: Acute respiratory failure and mechanical ventilation.

001519

Exploring nutritional recovery following hospital discharge in adult survivors of critical illness: a scoping review

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Intensive Care Medicine Experimental 2025,* 13(1)*:001519

Introduction: Survivors of critical illness frequently experience post-intensive care syndrome including muscle wasting and weight loss (1). Malnutrition and inadequate dietary intake are prevalent during hospitalisation, yet post-hospital discharge nutrition interventions remain under-investigated (2).
Objectives: This review aimed to synthesise current evidence available on nutritional recovery in adult survivors of critical illness following hospital discharge and to identify dietetic interventions supporting recovery.
Methods: Using Joanna Briggs Institute methodology, systematic search was conducted in MEDLINE, Embase, CINAHL, Web of Science, and Cochrane databases (2010–2024). Eligible studies reported nutrition intakes, body composition or dietetic interventions in survivors of critical illness after hospital discharge. Data were synthesis using the Social Ecological and Biopsychosocial Models to capture individual and systemic influences on recovery.
Results: Forty-four studies (mostly observational) met inclusion criteria. Nutritional recovery was shaped by complex biological, psychological, and systemic factors. Key barriers included appetite loss, dysphagia, and psychological distress significantly contributing to inadequate dietary intake. Across all times points, protein intake consistently fell below targets, with only 10% of survivors meeting the target of 1.2 g/kg/day after 12-month post-discharge (3). Energy intake remained suboptimal, throughout the first year (3, 4). Malnutrition and weight loss persisted for 12-month post-discharge. Body composition data revealed a dynamic trajectory: initial loss of lean mass followed by increases in fat mass. Two DEXA based studies demonstrated gains in total mass and fat mass between 6 and 12 months, while lean mass was maintained or further declined, indicating a shift toward adiposity rather than muscular recovery (5, 6). Six studies reported on handgrip strength which remained clinically low at 3 months (4) and was a significantly associated with 1-year mortality, particularly amongst malnourished individuals (7). Despite high nutritional risk, only 30% of studies reported explict dietitian involvement with referral rates varying from 9% to 43%. Dietetic interventions such as food fortification, texture modification and oral nutritional supplements were associated with improved nutritional adequacy and weight gain (4).
Conclusions: This review emphasises the complex challenges faced by ICU survivors after hospital discharge and highlights significant gaps in post-discharge nutrition care. Few survivors received adequate dietetic support, with considerable variability in dietary strategies and follow-up. Further research is required to develop effective, nutrition interventions, particularly within the vulnerable first 3-month post-discharge.

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8. Ella Terblanche acknowledges funding support from Health Sciences University for this PhD research

Topic: Metabolism, endocrinology, liver failure and nutrition.

001521

Corelation between nt-probnp and procalcitonin in sepsis and septic shock

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Intensive Care Medicine Experimental 2025,* 13(1)*:001521

Introduction: Sepsis and septic shock continue to pose major global health threats, marked by substantial mortality and long-term morbidity. Prognostic tools that combine markers of cardiac dysfunction and systemic inflammation may improve risk stratification. This study investigates the relationship between N-terminal pro-brain natriuretic peptide (NT-proBNP), a marker of myocardial strain, and procalcitonin (PCT), a biomarker of bacterial infection and systemic inflammation, in patients with sepsis and septic shock.
Objectives: To assess the correlation between NT-proBNP and PCT levels in patients with sepsis and septic shock, and evaluate their individual and combined prognostic value with respect to clinical outcomes, including ICU and hospital stay duration and in-hospital mortality.
Methods: A prospective, cross-sectional observational study was conducted over 12 months (April 2023–April 2024) at Fortis Hospital, Noida, India. One hundred adult patients (> 17 years) meeting Sepsis-3 diagnostic criteria for sepsis or septic shock were included. Patients with pre-existing cardiac, renal, or pulmonary disease were excluded. Blood samples were obtained on admission and at 72 h for NT-proBNP (electrochemiluminescence immunoassay) and PCT (fluorescent immunoassay). Clinical data and outcomes were collected. Statistical analyses included Pearson's correlation, independent *t* tests, and ROC curve analysis using SPSS v22.
Results: Demographics: 62% of patients were male, with a mean age of 53.07 ± 13.51 years. Pulmonary infections (45%) were the most frequent source.
Biomarker levels: Non-survivors had significantly higher NT-proBNP (12,483 vs. 6396 pg/mL at admission; 11,877 vs. 502 pg/mL at 72h) and PCT (21 vs. 8 ng/mL at admission; 25 vs. 2 ng/mL at 72h) than survivors ($p < 0.01$ for all comparisons).
Correlation: A moderate positive correlation was observed between NT-proBNP and PCT ($r = 0.48$, $p < 0.01$).
Prognostic performance: NT-proBNP predicted mortality with 80.5% sensitivity and 60.8% specificity; PCT showed 78.4% sensitivity and 63.5% specificity.
Outcomes: The overall mortality rate was 41%. ICU stay was longer in non-survivors (14.96 vs. 9.79 days), though not statistically significant ($p = 0.23$).
Conclusions: NT-proBNP and PCT are significantly elevated in non-survivors of sepsis and demonstrate moderate correlation. Both markers, individually and together, show promise as prognostic tools in sepsis. Further studies are warranted to validate their use in clinical algorithms guiding early risk stratification and therapeutic decisions.

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Topic: Sepsis.

001523

Pleural effusion in patients with heart failure and preserved ejection fraction

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Intensive Care Medicine Experimental 2025,* 13(1)*:001523

Introduction: The incidence of pleural effusions (PEs) radiologically in acute decompensated heart failure was estimated by 50%(1).The prevalence of PEs using chest ultrasound in patients with heart failure with preserved ejection fraction (HFpEF) was not studied before.
Objectives: To determine the prevalence and severity of PE using bedside chest ultrasound in patients with HFpEF.
Methods: We prospectively evaluated 85 patients admitted to the coronary care unit with acute pulmonary edema. 27 patients had LVEF below 50% and they were excluded. We used bedside ultrasonography to document the presence of pleural effusions (Fig. 1) and estimate the amount using Goecke 2 formula.
Results: 58 patients were recruited with estimated LVEF above 50% and median age of 73 years. The baseline characteristics of the patients are shown in Table 1. Pleural effusion was detected by chest ultrasound in 54 patients (94%) with 91% being bilateral and of moderate amount. The mean value of E/A and E/E' ratio was 1.92 and 19.9, respectively, where mean deceleration time (DT) was 171 ms; however, these parameters were not related to severity of pleural effusion ($P = 0.52$, 0.99 and 0.7, respectively) (Table 2). The N-terminal pro-brain-type natriuretic peptide (NT-proBNP) was significantly higher in patients with pleural effusion ($P = 0.046$).
Conclusions: PEs are present on chest ultrasound in 94% of patients with HFpEF and mainly bilateral. The severity of PE was moderate and not related to the LV filling pressure parameters.

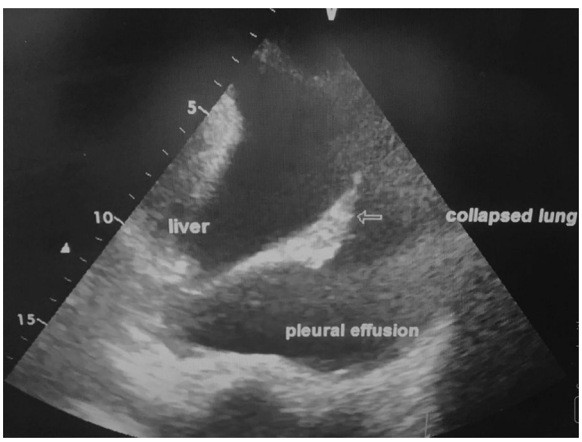


Figure 1 Pleural effusion

Table 1 and Table 2 .

	Pleural Effusion n=54	No Pleural effusion n=4	P value
Mean E/E'	19.9	20.25	0.99
Mean DT ms	171	151.25	0.70
Mean E/A	1.92	1.97	0.52
Pro-BNP	7028.4	2692.5	0.046

Table 2

Variables	No (%)
Age	73.3+- 1.1
Gender (female)	33 (56.9)
Diabetes mellitus	56 (96.6)
Hypertension	54(93.1)
CABG	10(17.2)
Percutaneous Coronary Intervention	17(29.3)
Spontaneous breathing	9(15.5)
Noninvasive ventilation	46 (79.3)
Invasive ventilation	3 (5.2)
Ultrasound chest -A profile	3(5.2)
Ultrasound chest - B profile	55(94.8)
Mean PE amount (ml)	566 (200-1250)
Creatinine (micmole/L)	260 (40 -300)

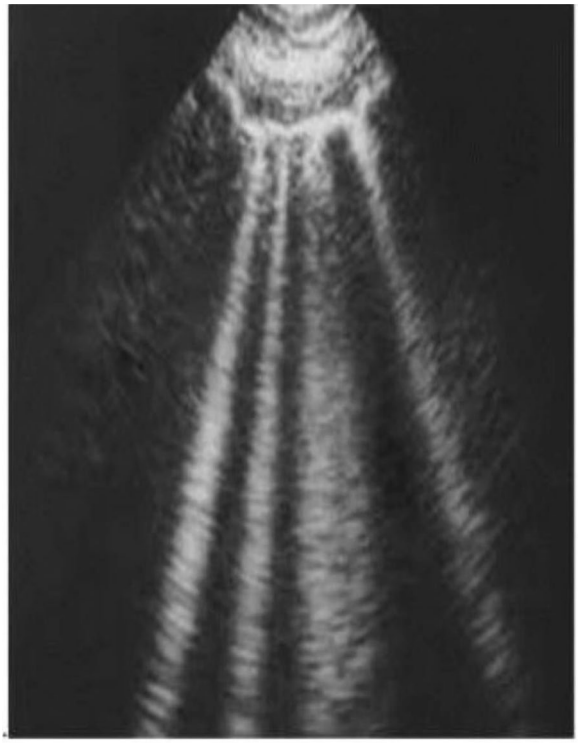
Topic: Imaging in intensive care.

001524

Elevated left ventricular end diastolic pressure can be detected by the presence of sonographic B lines on chest ultrasound

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Intensive Care Medicine Experimental 2025,* 13(1)*:001524

Introduction: Echocardiography and lung ultrasound are important tests for assessing left ventricular function in patients presented to the emergency department with acute pulmonary edema. Chest ultrasound is becoming an important tool in diagnosing acute pulmonary edema.
Objectives: To investigate the relationship between the B profile on ultrasound chest and spectral tissue Doppler echocardiography (E/e' ratio) in patients presented with the suspicion of acute pulmonary edema.
Methods: This paper reports a prospective observational study of 61 consecutive patients, which was presented with symptoms and signs of pulmonary edema and B—profile detected by echocardiography with a 5 MHz curvilinear probe. Critical care physicians trained in ultrasound examination performed echocardiography and chest ultrasounds.
Results: Sixty-one participants were included in the study. Forty-seven of the 61 patients had a B-profile and 14 patients had an A profile. The mean E/e' level in the patients with B-profile was 20.8, compared with the mean level in the patients with an A-profile of 8.2 (CI = 0.33–0.82). The distribution in the two groups differed significantly (p = 0.003). Based on the value of E/e', the sensitivity and specificity were determined; the sensitivity of B profile on ultrasound was 92% (95% confidence interval (CI) = 0.812–0.968), and the specificity was 91% (CI = 0.623–0.98). The positive predictive value of the B-profile was 97% (CI = 0.889–0.996), and the negative predictive value was 71% (CI = 0.454–0.883). The systolic function in the subjects with a B-profile was below 50% in 74.3% of the subjects and normal in 25.7% of the subjects. All the subjects with B profile and systolic function > 50% had elevated ProBNP and E/e' > 15. An A-profile subjects had systolic function > 55%.
Conclusions: Detecting the B-profile in lung ultrasound is highly sensitive and specific for elevated left ventricular diastolic pressures regardless of the systolic function of the left ventricle which may help in diagnosing pulmonary edema.



B lines.

Table 1 .

Thoracic ultrasound profile	High E/e'	Normal E/e'	Total
B- Profile	46	1	47
A -profile	4	10	14
Total	50	11	61
Variable	**Value**	**95% confidence interval**	
Sensitivity	0.92	0.812 to 0.968	
Specificity	0.91	0.623 to 0.98	
Positive predictive value	0.97	0.889 to 0.996	
Negative predictive value	0.714	0.454 to 0.883	
LR+	10.12	1.559 to 65.697	
LR-	0.088	0.034 to 0.229	

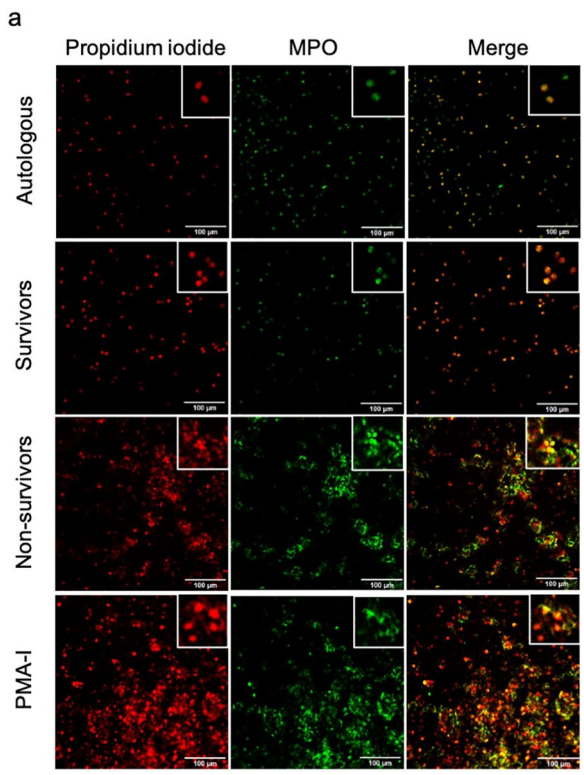
Topic: Cardiovascular issues in ICU.

001525

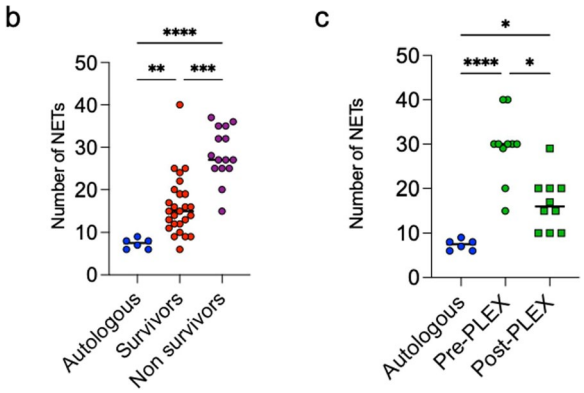
Plasma from septic patients induces neutrophil extracellular trap (NET) release ex vivo: impact of illness severity and modulation by plasma exchange

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Intensive Care Medicine Experimental 2025,* 13(1)*:001525

Introduction: Excessive neutrophil extracellular trap (NET) formation contributes to sepsis-related endothelial injury and thrombo-inflammation. Circulating mediators may drive this dysregulated response. Therapeutic plasma exchange (TPE) has been suggested to modulate this process, but its effect on NET formation remains underexplored.
Objectives: We aimed to assess whether plasma from septic ICU patients induces NET release ex vivo in neutrophils from healthy volunteers (HVs), and whether NET induction is associated with illness severity and mortality. We also investigated the effect of TPE on NET formation in plasma from critically ill COVID-19 patients.
Methods: Neutrophils were isolated from 6 HVs and incubated for 4 h with plasma from 40 ICU patients with sepsis (26 survivors, 14 non-survivors) or plasma from 5 ICU COVID-19 patients before and after TPE. NETs were quantified via fluorescence microscopy following propidium iodide and MPO staining. Neutrophil phenotype was assessed by flow cytometry. Controls included autologous plasma and PMA/ionomycin-stimulated neutrophils.
Results: Neutrophils incubated with plasma from septic patients showed significantly increased NET release compared to autologous plasma ($p < 0.01$), with a greater effect from non-survivors ($p < 0.001$). This was associated with reduced CD14, CD16, and CD64 expression. Plasma from COVID-19 patients before TPE induced marked NET formation ($p < 0.001$), which was significantly reduced post-TPE ($p < 0.05$), though not to baseline levels. Cytokine levels (IL-6, TNF-α) did not differ significantly between survivors and non-survivors and were not reduced by TPE (Figure a, b, c).
Conclusions: Plasma from septic and COVID-19 patients induces NETosis in healthy neutrophils, more so in patients with greater severity or non-survival. TPE partially attenuates this effect in COVID-19, supporting the role of circulating large molecules in driving NETosis. These findings suggest NET-related biomarkers could identify patients for NET-targeted therapies, including TPE.



(a) Representative images of NET release from neutrophils incubated with autologous plasma or plasma isolated from septic ICU survivors, non-survivors, and PMA-I (phorbol myristate acetate with ionomycin as a positive control). Propidium iodide (PI, red) indicates chromatin release, and MPO (myeloperoxidase, green) highlights neutrophil-specific structures. Merged images demonstrate colocalization of MPO and chromatin, indicative of NETs. Scale bars represent 100 µm. Insets magnify individual NET structures.



(b) Compared to incubation with autologous plasma, incubation with plasma from septic ICU survivors ($p < 0.01$) and non-survivors ($p < 0.0001$) is associated with increase in NETs release.
(c) Compared to incubation with autologous plasma, incubation with plasma from COVID-19 patients ($p < 0.0001$) is associated with an increase in NTEs, which is abrogated following TPE ($p < 0.05$).
Bars represent medians. Comparisons between groups are assessed using Mann–Whitney *U* tests and statistical significance is marked with an asterisk (*$p < 0.05$, ** $p < 0.01$, ***$p < 0.001$, ****$p < 0.0001$).

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Topic: Sepsis.

001526

Optimizing fluid resuscitation in burn ICU patients: implementation of a nurse-driven, titratable protocol

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Intensive Care Medicine Experimental 2025,* 13(1)*:001526

Introduction: Burn injuries are among the most critical forms of trauma, often resulting in systemic complications such as burn shock within the first 72 h. Fluid resuscitation is vital, particularly in patients with burns exceeding 20% of total body surface area (TBSA). While the Parkland formula remains widely used, both over- and under-resuscitation have been linked to poor outcomes, including abdominal compartment syndrome. Nurse-driven protocols may enhance precision, but standardized titratable methods are still underutilized.
Objectives: To evaluate the impact of a nurse-driven, titratable fluid resuscitation protocol on clinical outcomes and fluid-related complications in critically ill burn patients.
Methods: A quasi-experimental study was conducted in the Burn ICU of a tertiary hospital between June 2023 and September 2025 (IRB: H1RI-07-May24-01). Nurses completed a pre-intervention survey assessing knowledge of burn resuscitation, followed by targeted

education and post-assessment. A titration-based nurse-driven protocol was then implemented. Patient outcomes using the new protocol were compared to those managed with the standard approach. Primary Outcome mainly reduction in fluid-related complications and improvement in clinical workflow. Secondary Outcomes include ICU complications (e.g., infections, VAP, ARDS, CAUTI, GI ulcers, sepsis, VTE, and delirium), need for renal replacement therapy, incidence of abdominal compartment syndrome, mechanical ventilation duration, and ICU/hospital length of stay.
Results: To be presented upon data analysis.
Conclusions: A nurse-driven, titratable protocol may improve the safety and effectiveness of fluid resuscitation in burn ICU patients.

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7. We express our sincere appreciation to all researchers and contributors for their invaluable assistance in this project.

Topic: Trauma.

001529

Determination of critical DO_2 in patients undergoing cardiac surgery

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Intensive Care Medicine Experimental 2025,* 13(1)*:001529

Introduction: Patients undergoing cardiac surgery are exposed to significant physiological stress from tissue injury and cardiopulmonary bypass, often leading to hemodynamic mismatch during the first 24 h postoperatively. Hemodynamic coherence (alignment between macro- and microcirculatory parameters) is frequently disrupted in this context and is associated with poor outcomes. Despite its clinical relevance, the critical threshold of oxygen delivery (DO_2) specific to cardiac surgery patients remains unclear.
Objectives: To determine the critical DO_2 in patients undergoing cardiac surgery and evaluate its association with clinical outcomes and in-hospital mortality, based on lactate levels and the CO_2 gap/Ca-vO_2 ratio.
Methods: A retrospective observational study was conducted, including 508 adult patients admitted to the ICU after cardiac surgery between June 1, 2022, and June 1, 2024. Patients were categorized into three profiles:

- **Profile 1**: Lactate < 2 mmol/L
- **Profile 2**: Lactate ≥ 2 mmol/L and CO_2 gap/Ca-vO_2 ratio > 1
- **Profile 3**: Lactate ≥ 2 mmol/L and CO_2 gap/Ca-vO_2 ratio ≤ 1

Demographic and clinical data were collected. Logistic regression adjusted for age and sex was performed to assess outcomes and mortality.

Results: Of 508 patients, 165 (32.5%) were Profile 1, 295 (58.1%) Profile 2, and 48 (9.4%) Profile 3. The mean age was 57 years, of which 43.9% were women. Comorbidities included hypertension (42.3%), diabetes (22.4%), and hypothyroidism (10%). Common cardiovascular histories included heart failure (27%), atrial fibrillation (18.3%), and prior myocardial infarction (11.6%). Previous cardiac surgery was significantly more frequent in Profile 2 ($p < 0.05$).
Compared to Profile 1 and 3, Profile 2 was associated with higher risks of stroke (OR 4.3; 95% CI 1.23–14.78), hospital-acquired pneumonia (OR 2.0; 95% CI 1.07–3.88), acute kidney injury (OR 1.8; 95% CI 1.21–2.69) and in-hospital mortality (OR 2.2; 95% CI 0.99–5.13).

Table 1 Outcomes according to logistic regression in profile 2

Variable	OR	CI 95%	*p*
Stroke	4.27	1.23–14.78	0.02
Hospital-acquired pneumonia	2.04	1.07–3.88	0.002
Acute kidney injury	1.81	1.21–2.69	0.003
Renal replacement therapy	1.63	0.75–3.52	0.21
Hepatic failure	1.95	0.95–3.99	0.06
In-hospital mortality	2.25	0.99–5.13	0.05

Conclusions: Cardiac surgery patients exhibit a critical DO_2 threshold distinct from other hemodynamic states. A $DO_2 \leq 7.3$ ml/min/kg was associated with increased likelihood of developing Profile 2 and greater in-hospital mortality. Early identification of oxygen delivery imbalance may guide targeted interventions and improve postoperative outcomes.

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Topic: Cardiovascular issues in ICU.

001530

Utility of soluble interleukin-2 receptor (sIL-2r) and sIL-2R/ferritin ratio for diagnosis of malignancy associated hemophagocytic lymphohistiocytosis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001530

Introduction: Malignancy associated hemophagocytic lymphohistiocytosis (mal-HLH) poses unique challenges in diagnosis and management. We aimed to evaluate the utility of soluble Interleukin-2 receptor (sIL-2r) and sIL-2r/Ferritin for its diagnosis.
Objectives: To assess the performance of sIL-2R & sIL-2R/Ferritin ratio for the diagnosis of malignancy associated HLH in critically ill patients.
Methods: We retrospectively evaluated 72 patients admitted with suspected HLH, in whom s-IL 2r was measured. We collected relevant data from the our database including demographics, presentation, laboratory findings, outcomes etc.
Results: Using HLH 2004 criteria, 40 (of 72) patients had HLH with malignancy. The sensitivity, specificity, positive predictive and negative predictive value of sIL-2r as a part of HLH-2004 criteria for diagnosis of HLH for entire cohort were 77.5% (95% CI 61.55–89.16), 53.12%(95% CI 34.7–70.91), 67.3% (95% CI 57.96–75.60%) and 65.38% (95% CI 49.38–78.53%) with AUROC of 0.65 (95% CI 0.52–0.78). For sIL-2r/Ferritin ratio, the sensitivity, specificity, positive predictive and negative predictive value for entire cohort were 2.5% (95% CI 0.06–13.16%), 90.62% (95% CI 74.98–98.02%), 25% (95% CI 3.51–75.33%) and 42.65% (95% CI 39.69–45.65%) with AUROC of 0.521 (95% CI 0.38–0.66). Nineteen of 40 (47.5%) mal-HLH patients were discharged alive from ICU, as against 20 of 32 (62.5%) other patients. Mal-HLH patients had a longer Intensive care unit (ICU) and hospital length of stay (LOS) (11.10 ± 12.55 and 25.40 ± 21.39 vs. 7.70 ± 7.39 and 22 ± 11.93) days, respectively.
Conclusions: Performance of sIL-2r and sIL-2r/Ferritin ratio was moderate to poor for diagnosis of mal-HLH. The cutoff values of these variables need revision, with further research in a larger patient cohort.

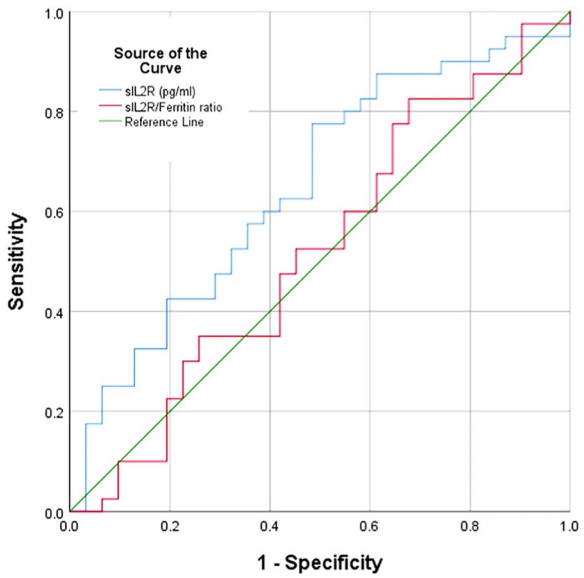


Figure 1 AUROC for sIL-2r and sIL-2r/Ferritin ratio for all patients
AUROC for sIL-2R and sIL-2R/ferritin ratio of all critically ill patients.

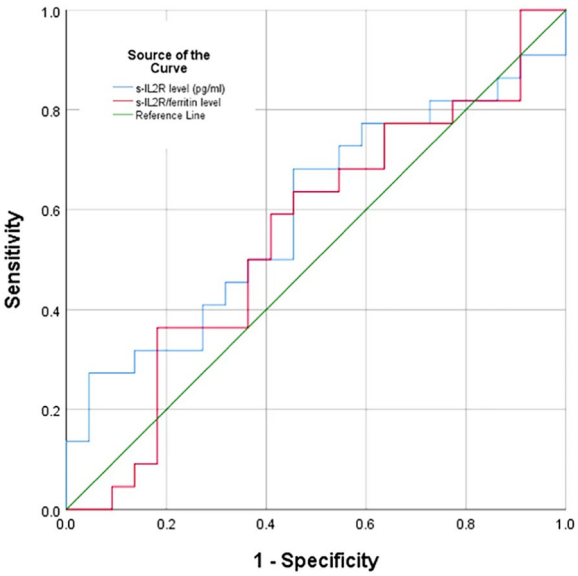


Figure 2 AUROC curve for sIL-2r and sIL-2r/Ferritin ratio in adults
AUROC curve for sIL-2R and sIL-2R/Ferritin ratio in adults.

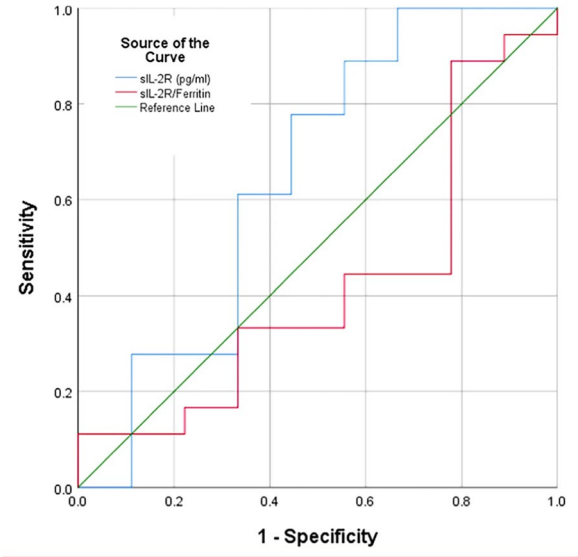


Figure 3 AUROC curve for sIL-2r and sIL-2r/Ferritin ratio in pediatric patients
AUROC for sIL-2R and sIL2R/Ferritin ration in pediatric patients.

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Topic: Haematologic-oncologic issues in the ICU.

001532

The effect of therapeutic plasma exchange on the outcome of patients with neurological autoimmune disease treated in the ICU of adam malik general hospital

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Intensive Care Medicine Experimental 2025,* 13(1)*:001532

Introduction: Therapeutic plasma exchange (TPE) eliminates circulating pathogenic substances such as autoantibodies from the bloodstream, thereby improving clinical outcomes. Diseases such as Myasthenia Gravis and Guillain–Barre syndrome often cause paralysis that requires intensive care, one of the expected uses is TPE. The purpose of this study was to determine the effect of TPEon the outcome of patients with neurological autoimmunity treated at Adam Malik Hospital.
Objectives: Guillain–Barre syndrome, ICU, Myasthenia Gravis, neurological autoimmune, therapeutic plasma exchange.
Methods: An analytical retrospective study was conducted on patients with neurological autoimmune disorders who underwent TPE and were ventilated at Adam Malik General Hospital. Demographic data, clinical outcomes, duration of ventilator use, and assessment of changes in neurological autoimmune scores using the Myasthenia Composite Scale (MCS) and Guillain Barre Disability Scale (GBDS) before and after TPE (1–2 cycles) were analyzed using descriptive and inferential statistical methods.
Results: We have 22 patients who underwent TPE, 16 people with myasthenia gravis underwent TPEand 9 people with Guillain Barre Syndrome underwent TPE, but no significant difference was foundbetween the two ($p > 0.05$). On the contrary, there was a decrease in MCS values after TPE, a significant difference was found between the two groups ($p < 0.05$).
Conclusions: TPE has been shown to have a positive impact on the outcome of patients with neurological autoimmune in the ICU of Adam Malik General Hospital. Further research is needed to explore the long- term effects and optimization of TPE protocols in this population.

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6. no conflict of interest

Topic: Sepsis.

001534

Feasibility and safety of cytosorb adsorbers in patients with acute liver failure receiving continuous renal replacement therapy

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Introduction: Acute liver failure (ALF) is a rapidly progressing disease in patients without pre-existing chronic liver diseases caused by severe liver damage. Hepatocyte death during ALF triggers the release of proinflammatory cytokines, fueling systemic inflammation and, consequently, multiorgan failure.(1) Despite recent advances in critical care, survival remains low without liver transplantation (LTx). Various liver-assist devices, all highly complex procedures limited to specialized centers, have been developed to support liver function but failed to show any clinical benefit.(1, 2) Cytosorb is a hemadsorption device that can be easily applied to continuous renal replacement therapy (CRRT), potentially supporting liver function by removing bilirubin and proinflammatory cytokines.(3) However, data on Cytosorb adsorber in ALF patients is scarce.(4).
Objectives: We aimed to assess the effects of Cytosorb on clinical and laboratory parameters in ALF patients. Furthermore, we investigated potential complications associated with Cytosorb use.
Methods: In our retrospective single-center analysis, all patients admitted with ALF to the Intensive Care Unit (ICU) at the Medical University of Vienna who received CRRT from 2012 to 2025 were included and separated into two groups (CRRT + Cytosorb and CRRT) with an observation period set from ICU admission to LTx, ICU discharge, or death.
Results: 28 ALF patients ($n = 14$ CRRT + Cytosorb and $n = 14$ CRRT) were included with a median age of 47.1 years (IQR: 32.5–56.4) and 82.1% female patients. Median SAPS II and SOFA scores were 43

(33.3–50.3) and 11 (5–14), with high rates of invasive mechanical ventilation (n = 24, 85.7%) and vasopressor therapy (n = 23, 82.1%). Of 19 patients (67.9%) listed for LTx, 13 (46.4%) received LTx. ICU and 3-month survival was 60.7% and 50%, respectively. Cytosorb significantly decreased bilirubin (median pre-treatment 20.85 mg/dL to post-treatment 9.46 mg/dL; − 54.6%; $p < 0.001$). A significant platelet drop was detected in both groups. Survival was higher in the Cytosorb group compared to the control group (ICU survival: 71.4% vs. 42.9%, $p = 0.127$; 3-month survival: 71.4% vs. 28.6%, $p = 0.023$). However, patients in the control group were sicker (SAPS II: 45.5 vs. 38.5, p = 0.039), less often listed for LTx (42.9% vs. 92.9%, p = 0.005) and less often transplanted (28.6% vs. 64.3%, p = 0.058). No complications attributed to Cytosorb were observed.

Conclusions: Cytosorb was associated with a significant reduction in bilirubin levels. Survival differences are probably attributed to differences in baseline characteristics and transplant eligibility between groups. No major bleeding complications or other adverse effects directly related to Cytosorb use were detected. Our data support the feasibility, safety, and potential benefits of Cytosorb as an adjunctive therapy in ALF management. Larger prospective studies are warranted to evaluate the impact of Cytosorb treatment in ALF patients.

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Topic: Metabolism, endocrinology, liver failure and nutrition.

001537

Sharing is caring: a systematic review of publicly available intensive care data sets

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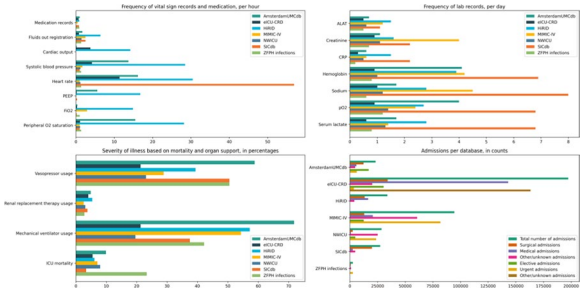
Intensive Care Medicine Experimental 2025,* 13(1):*001537

Introduction: Multiple Intensive Care Unit (ICU) databases have been publicly released to advance data driven intensive care medicine. However, these public ICU data sets are prone to changes, updates and new releases. Therefore, the goal of this review is to provide clinicians and data scientists with a state-of-the-art overview and guide for choosing the relevant ICU data sets for their respective research questions.

Methods: A systematic search was carried out in PubMed, PhysioNet, Arxiv, MedRxiv, and BioRxiv to identify all publicly available intensive care data sets of adult patients. After data extraction of database characteristics, a qualitative synthesis of results was carried out.

Results: 876 publications were identified. After screening, 7 publicly available ICU databases were included for analysis: AmsterdamUMCdb, eICU Collaborative Research Database (eICU-CRD), HiRID, Medical Information Mart for Intensive Care (MIMIC)-IV, Northwestern ICU (NWICU), Salzburg Intensive Care database (SICdb), and Zigong Fourth People's Hospital (ZFPH) database of patients with infections. A qualitative synthesis showed notable differences in number of patients, usage of organ support, admission types, and frequency of measurements.

Conclusions: Each public ICU datas et differs due to differences in medical practice, information technologies and approach to legal restrictions. This systematic review provides clinicians and data scientists with an overview of available public ICU data sets and their characteristics.



Visual comparison of ICU data set characteristics. ALAT = alanine aminotransferase, CRP = C-reactive protein, FiO2 = fraction of inspired oxygen, PEEP = positive end-expiratory pressure, pO2 = partial pressure of oxygen.

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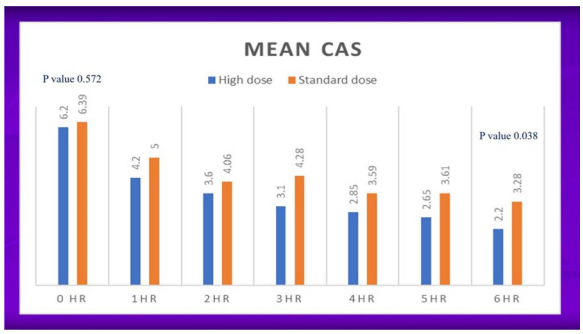
Topic: Health Services Research and Outcome.

001538

A comparison of efficacy of high-dose magnesium sulphate infusion vs. standard dose magnesium sulfate infusion in moderate-to-severe asthma exacerbation in children

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Intensive Care Medicine Experimental 2025,* 13(1)*:001538

Introduction: Standard dose magnesium sulfate was recommended in GINA guideline for treatment of severe asthma exacerbation. There have been a few prospective randomized studies assessing the efficacy of high dose compared with standard dose magnesium sulfate for treatment of severe asthma exacerbation in children which demonstrated the better efficacy of high dose magnesium sulfate but there was no a single study evaluate in moderate asthma exacerbation in children. We hypothesized that early administration of high dose magnesium would be benefit in moderate to severe asthma exacerbation in children.
Objectives: To compare the efficacy of a high dose magnesium sulfate infusion vs. standard dose in pediatric patients with moderate to severe asthma exacerbation.
Methods: This was a randomized double blinded controlled trial of 38 children 2–15 years of age who presented with moderate to severe asthma exacerbation. All patients were not completely responded to the standard bronchodilators and systemic steroid in the first hour. They were randomized into 2 groups, 20 for high dose magnesium sulfate (50 mg/kg in 30 min then 50 mg/kg/hour for 4 h) and 18 for standard dose magnesium sulfate (50 mg/kg in 30 min then placebo). Patients were monitored every 1 h. for clinical asthma score (CAS) and cardiopulmonary complications such as hypotension, bradypnea and apnea.
Results: There were no significant difference in ages, gender, past medical history of asthma, personal atopy and initial clinical asthma score between two groups. The mean of clinical asthma score at 6 h was significantly lower in the patients treated with high dose magnesium sulfate compared with the standard dose (2.20 ± 1.66 vs. 3.28 ± 1.54, *P* value = 0.038). Furthermore, there was a trend of higher responder percentage, defined by reduction of CAS 3 or more within 6 h, in high dose group 86.7% vs. 64.3% but the *P* value did not reach the significant level (*P*-value = 0.215). There were no adverse events in both groups.
Conclusions: The early administration of high dose magnesium sulfate infusion in children with moderate-to-severe asthma exacerbation is better than standard dose without any adverse events.



Mean Clinical Asthma Score (CAS) of high-dose vs. standard dose of MgSO4 in moderate-to-severe asthma exacerbation in children.

Topic: Acute respiratory failure and mechanical ventilation.

001539

Short- vs. long-course antibiotic therapy in patients with acute cholangitis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001539

Introduction: The mortality rates of acute cholangitis (AC) have significantly decreased by comparing patients' data before 1980 and after 2000, from 10–30% to 2.7–10%[1]. Multiple factors, such as the development of modern diagnostic techniques, therapeutic methods for bile duct decompression, and new antibiotics adapted to microbiological studies, have significantly contributed to this improvement in the prognosis of AC.
Objectives: To investigate if shorter-course antibiotic treatments could be similarly effective to long-course treatments in adults with AC.
Methods: Inclusion criteria were as follows: (i) 18 years of age or older, (ii) patients with moderate or severe acute cholangitis according to Tokyo guidelines 2018 (19), and (iii) patients who underwent successful biliary drainage through ERC, EUS-guided drainage, or PTBD.
All patients with moderate or severe cholangitis were planned for emergent biliary drainage (within 48 h of admission). Once successful biliary drainage was achieved, patients were randomized into two groups: conventional duration group (CD group): 10 days of intravenous antibiotic therapy; short duration group (SD group): 5 days of intravenous antibiotic therapy. The choice of antibiotic was as per guideline and institutes bacteriological profile.
Results: A total of 202 consecutive patients with acute moderate or severe cholangitis were screened during the study period. Of them, 130 met the inclusion criteria and were randomized to the CD or SD group.
The mean age of included patients was 63.85 ± 10.74 years and 55% were male. In the study cohort, 101 (77.7%) patients had moderate cholangitis and 29 (22.3%) patients had severe cholangitis. Most of the patients (51.7%) had malignant etiology of cholangitis, while the remaining patients (48.3%) had benign etiology of cholangitis. For biliary drainage, ERC (*n* = 101; 84.2%) was the most commonly used procedure followed by PTBD (*n* = 18;15%). One hundred eleven (92.5%) patients underwent drainage within 48 h of admission (81 patients within 24 h and 30 patients between 24 and 48 h of admission); however, 9 (7.5%) patients underwent drainage after 48 h because of logistic reasons. All 9 patients had moderate cholangitis.
Predrainage intravenous antibiotics were given to all included patients. 115 patients received intravenous piperacillin-tazobactam, and 15 patients received carbapenems. Of 130 patients, bile culture was sent in 85 (65.3%) patients.
Total duration of antibiotics required postintervention till day 30 was 10.32 ± 1.92 and 5.35 ± 3.33 days in the CD and SD groups, respectively (*P*, 0.001). The mean total duration of hospitalization in the CD and SD groups was 2.81 ± 1.48 days and 3.0 ± 1.76 days, respectively (*P* = 0.53).
Conclusions: To conclude, short duration of antibiotics is noninferior to conventional duration of antibiotics in patients with moderate to severe cholangitis in terms of clinical cure, recurrence of cholangitis, and overall mortality.

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8. No acknoledgment

Topic: Infections and prevention.

001540

Clinical and microbiological factors for bacteria in blood and bile among patients with acute cholangitis

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Introduction: Acute cholangitis, the most common hepatobilliary system disease, is an infectious condition caused by partial or complete obstruction of the biliary system and can have life-threatining consequences if not given timely treatment [1, 2]. Fever, abdominal pain, and jaundice are typical clinical manifestations of patients with acute cholangitis and obstruction of the bile duct is the main cause biliary obstruction.
Clinical manifestations and laboratory tests upon admission were reviewed to predict the presence of bacteria in bile when bile drainage was conducted [3, 4].
Methods: This was a retrospective study. Patients with acute cholangitis admitted to a St.Paraskeva medical center, Communal Clinical hospital 8, department of surgery Pustomyty Hospital between January 2018 and December 2023. The diagnostic criteria for acute cholangitis were based on Tokyo Guidelines 18. Data were collected retrospectively by local investigators using electronic case report forms (eCRF) then centralized and anonymized. The following data were collected: age, gender, cardiovascular diseases (coronary artery diseases or chronic heart failure), hypertension, other comorbidities (e.g., diabetes mellitus, cancer, immune deficiency, cirrhosis, and chronic renal failure), clinical symptoms (abdominal pain, jaundice, diarrhea, and chills) at ICU admission. Laboratory examinations of blood cell components and other analyses were collected within 24 h during hospitalization.
Results: According to the bile culture results, 322 patients with acute cholangitis were divided into the following group: bacteria in bile—group I (212) and control (110) groups—group II.
Positive blood culture was frequently reported in patients with AC (n = 240/322). Bile culture was only performed in 145/322 and was positive in 75% of the cases (250). microbiological data are summarized in Table 1. in blood or bile culture, the most frequently identified bacteria were gram-negative bacilli (82%) and gram positive (17%). The most frequently identified bacteria were Escherichia coli (47%), Kl.pneumonia (11%), Enterococcus faecalis (7%), Enterobacter cloacae (6.5%) and Pseudomonas aerugenosa (4.5%). finally, an infection caused by Extended spectrum beta lactamase (ESBL)—producing bacteria was observed in 35 AC patients.
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Table 1 Microbiological data in blood and bile culture

Germs	Blood	Bile
Positive culture	240 (75%)	145 (45%)
Total pathogens	318 (98%)	250 (78%)
Gram negative bacilli	264 (82%)	196 (61%)
Escherichia coli	152 (47%)	82 (25%)
Kl.pneumonia	35 (11%)	20 (6%)
Enterobacter cloacae	21 (6.5%)	16 (5%)
Kl. oxytoca	15 (4.5%)	8 (2.5%)
Ps.aeruginosa	15 (4.5%)	18 (5.6%)
ESBL	35 (11%)	30 (9.3%)
Gram positive bacilli	54 (17%)	54 (17%)
Enterococcus faecium	23 (7%)	25 (7.8%)
Streptococcus spp.	19 (6%)	6 (1.9%)
Enterococcus faecalis	16 (5%)	38 (12%)
Staphylococcus aureus	4 (1.3%)	6 (1.9%)
Other GP	13 (4%)	11 (3.5%)

Conclusions: The commonly isolated bacteria from bile samples in patients with acute cholangitis were *E. coli*, *Kl. pneumoniae*, and *E. faecalis*. Age, C-reactive protein, duration of antibiotic usage, alanine aminotransferase level were independent risk factors, and the predictive model could efficiently identify the patients with a high risk of bacteria in bile when invasive operations are conducted.

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5. No acknowledgment

Topic: Infections and prevention.

001541

Clinical impact of adjusted valproic acid level in patients with hypoalbuminemia: a single-center cohort study

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Introduction: Valproic acid (VPA) is highly binding to albumin, which is affecting both the free fraction and overall clearance of the drug in patients with hypoalbuminemia. There is a lack of data regarding patients with hypoalbuminemia receiving VPA. Thus, this study aims to evaluate the impact of adjusted VPA levels (aVPAc) in predicting effectiveness and potential adverse effects compared to total VPA levels (tVPA) in patients with hypoalbuminemia.
Methods: Retrospective cohort study among adult patients who were known to have seizures or epilepsy between January 1, 2016, and December 31, 2022. tVPA was compared with aVPAc based on albumin levels using receiver operating characteristics (ROC) curves and differences in the area under the curves (AUCs) by the DeLong method. Hepatotoxicity, hyperammonemia, hyponatremia, and thrombocytopenia were considered the safety endpoints, while effectiveness endpoints included predicting seizure occurrence, status epilepticus, and requiring additional antiepileptic medications during hospitalization.
Results: Out of 1622 screened patients, 71 with hypoalbuminemia received VPA therapy. The ROC analysis results revealed that an aVPAc threshold of 154.19 mg/dL demonstrated a higher sensitivity (86%) but lower specificity (47%) for predicting hepatotoxicity compared to a tVPA threshold of 67.53 mg/dL (sensitivity: 71%, specificity: 72%). While the ROC-AUC for aVPAc was 0.64 (95% CI 0.41–0.86), the difference in predictive ability between aVPAc and tVPA was not statistically significant ($p = 0.51$). Furthermore, five patients, representing 23%, developed significant hyperammonemia during their admission. An aVPAc threshold of 188.00 mg/dL exhibited superior sensitivity (100%) and lower specificity (82%) for predicting hyperammonemia compared to a tVPA threshold of 74.32 mg/dL (sensitivity: 40%, specificity: 88%). The ROC-AUC for aVPAc in predicting hyperammonemia was 0.95, suggesting a strong predictive ability.
Conclusions: Adjusted valproic acid concentrations (aVPAc) show increased sensitivity and specificity in predicting hepatotoxicity and hyperammonemia, highlighting their potential for improving safety monitoring in hypoalbuminemia patients. Future randomized control trials with larger sample sizes are required to confirm these findings.

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Topic: Neurointensive care.

001543

Glasgow Coma Scale (GCS), GCS-Pupil Score (GCS-P) and Full Outline Of Unresponsiveness (FOUR) Score in traumatic brain injury (TBI) patients: a comparative study of inter-observer variability

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Introduction: Traumatic brain injury (TBI) is a common cause of mortality, morbidity and socio-economic losses in India. Patients with TBI generally present to the emergency department with altered sensorium. Various scores, scales, and tools have been devised for the assessment of patients with altered sensorium.
The Glasgow Coma Scale (GCS) was the first scale devised to assess altered sensorium in head injury patients. (1) GCS-Pupil (GCS-P) score is an extension of GCS and is calculated by subtracting the pupillary reactive score from the total GCS.(2) The Full Outline of Unresponsiveness (FOUR) Score was developed in 2005 as a proposed substitute for GCS. (3)Having various options for assessing patients with TBI poses a dilemma as to which score could be relied upon when different levels of professionals, such as doctors and nursing officers (NO), assess and diagnose the patients.
Objectives: The objective of this study is to assess the interobserver variability among junior resident (JR) doctors and NO during assessment of GCS, GCS-P, and FOUR score in TBI patients.
Methods: After approval from the Institutional Ethics Committee and CTRI registration, informed consent was obtained from the patient's next of kin. Patient's demographic data, diagnosis, vital signs, and blood sugar on admission were recorded. The assessment of GCS, GCS-P and FOUR score was performed within 6 h of admission by a JR and NO separately. GCS, FOUR score, and GCS-P were assessed after adequate resuscitation and after the effect of sedatives and/or neuromuscular blockers, if any, had worn off.
Results: We recruited 136 patients with TBI. The mean age of patients in this study was 40.04 ± 16.33 years. This study consisted of 79.4% males and 20.6% females. The mean pulse rate, mean systolic blood pressure and diastolic blood pressure were 89.50 ± 21.31 bpm, 129.57 ± 24.89 mmHg, and 80.24 ± 15.85 mmHg, respectively. The kappa value for the GCS best eye response, best verbal response and best motor response was 0.834, 0.881, and 0.823, respectively, indicating perfect agreement between raters. The GCS total score had a lower kappa value of 0.670, indicating substantial agreement. For the GCS-P left eye response, the kappa value was 0.908; for the right eye response, the kappa value was 0.812, showing good agreement. The GCS-P total score had a kappa value 0.718, indicating substantial agreement. The kappa value for the FOUR score eye response, motor response, brainstem reflexes, and respiration score was 0.865, 0.848, 0.724, and 0.821, respectively. The FOUR total score showed moderate agreement with a kappa value of 0.593.
Conclusions: GCS-P had the highest inter-observer agreement compared to total GCS and FOUR score. However, among the individual components, best verbal response had the highest inter-observer agreement for GCS score assessed by JR and NO. In contrast, eye response had the highest inter-observer agreement for the FOUR score.

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Topic: Neurointensive care.

001545

Exploring infection risk factors and multidrug-resistant organisms (MDROs) in burn intensive care units: a multicenter case–control study

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Introduction: Despite the widespread incidence of multidrug-resistant organisms (MDROs) within burn centers, there is a lack of research investigating infection risks in critically ill burn patients. This study aimed to identify the risk factors associated with the acquisition of MDROs among critically ill burn patients admitted to the Burn Intensive Care Unit (BICU) and to determine the prevalence of MDROs in this population.
Methods: This was a multicenter observational case–control study that included adult patients (age ≥ 18) patients admitted to BICU between January 2015 and December 2022. Patients were excluded if the burn injury affected < 10% of body surface area (BSA), died within 24 h of ICU admission, unknown timing of burn injury, history of MDROs within 1 year prior to the admission, or antibiotics use within 3 months prior to the admission. We identified the risk factors and prevalence of MDROs, ICU length of stay (LOS), hospital LOS, 30-day mortality, and in-hospital mortality rates as the study outcomes. An exact matching approach with 1:1 ratio was used to match the groups based on age, gender, and admission year. Stepwise Forward selection logistic and linear regression tests were used as appropriate.
Results: A total of 173 patients were included, 84 patients in the case group (MDRO) were matched with 84 patients in the control group (non-MDRO). Patients who had MDR organisms has lower GCS baseline (unadjusted OR: 0.88, P = < 0.01), higher baseline SOFA score (unadjusted OR: 1.19, P = < 0.01), APACHE II score (Unadjusted OR: 1.11, P = < 0.01), invasive MV status at admission (unadjusted OR: 3.76; 95%, 1.96, 7.20 P = < 0.01), and higher affected total body surface area (TBSA) (unadjusted OR: 1.04, P = < 0.01) compared to the non-MDRO group. However, regression analysis showed that those with lower baseline GCS [(95%CI): 0.094 (0.828–0.987), P = 0.024], higher TBSA affected [(95% CI): 1.023 (1.002–1.045), P = 0.031], and UTIs [(95% CI): 7.198 (1.973–26.259) were significantly more prone to MDRO infections. The most common isolated pathogens in the MDRO group was *Acinetobacter Baumannii* (57%), while the most common infection was pneumonia (52.4%). The MDRO group had significantly longer MV duration and ICU LOS (median: 12 vs. 0 day, P = 0.0002) and (median: 28 vs. 17 days, P = 0.0002), respectively. There was no significant difference between the groups in other outcomes.
Conclusions: This study showed a significantly increased risk of infections with MDROs in burn patients who had larger TBSA burns, lower GCS, and higher SOFA and APACHE II scores. Future studies with larger sample size are needed to confirm our results.

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Topic: Infections and prevention.

001546

Scoping review of AI-supported pain assessment and management in intensive care units

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Introduction: Pain assessment and management are among the most complex and vital responsibilities in intensive care units (ICUs), especially for patients with impaired consciousness or verbal limitations. Traditional pain assessment tools often fall short in such populations. With the rise of artificial intelligence (AI), particularly machine learning algorithms, innovative methods have emerged to enhance objectivity and consistency in pain evaluation.
Objectives: This scoping review aimed to evaluate pain assessment and management studies using AI in ICUs.
Methods: A comprehensive literature search was conducted in PubMed, Scopus, and ScienceDirect databases, targeting studies published between 2015 and 2025. The search strategy included keywords such as ("Artificial Intelligence" OR "Machine Learning") AND ("Pain" OR "Pain Management") AND ("Intensive Care Units" OR "unconscious patient"). Of the 225 publications identified, 15 studies met the inclusion criteria and were analyzed in detail. Duplicates were removed and eligibility was assessed through title/abstract screening followed by full-text review.
Results: AI systems in neonatal ICUs can detect pain by analyzing multimodal data such as facial expressions, body movements, crying sounds, and vital signs. Studies report high concordance between AI systems and expert evaluations. In adult ICU patients, communication barriers—due to language differences, cognitive impairments, psychiatric conditions, or tracheostomy—complicate self-reporting of pain. Thus, behavioral assessments based on facial expressions are the standard in non-verbal patients. However, medical equipment (e.g., oxygen masks and tubes), lighting, and camera angles hinder facial analysis. Deep sedation can mask pain behaviors, making behavioral scales less consistent. Deep learning-based systems attempt to classify pain severity by analyzing facial features, leveraging prior knowledge, extracting image patches, and generating synthetic expressions. Despite their accuracy, video privacy and data security concerns limit clinical use. Physiological markers such as vital signs, pupil diameter, and sweating have been explored but are insufficient on their own. Wearable devices with accelerometers show potential for continuous tracking of mobility, comfort, sedation, and sleep, offering a user-friendly and cost-effective solution compatible with ICU routines.
Conclusions: AI-assisted pain assessment applications in ICUs are on the rise, with significant advances in face recognition, vital sign-based prediction, and analgesic dosage recommendations. However, the integration of these systems into clinical decision-making processes is limited. Shortcomings in standard algorithms and ethical frameworks remain significant. In order for AI-based systems to be used in wider clinical practice, comprehensive, multicenter studies are needed to address factors such as privacy, user-friendly design, and algorithm transparency.

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5. Grant support for this research has been applied for and is currently under evaluation.

Topic: Nursing care and physiotherapy.

001547

Prevention of in-hospital cardiac arrests: the role of early warning systems

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Introduction: In-hospital cardiac arrests (IHCAs) are major adverse events with an incidence of 0.92 per 1000 bed days [1]. There has been a downward trend in mortality rates over the years [2]. Early recognition of a deteriorating patient is a pivotal aspect of the afferent limb of rapid response team (RRT) initiation [3]. Physiological vital observations criteria-based scoring systems such as NEWS2 have been incorporated into UK hospitals for many years, including ours.
Objectives: The aim of this study was to identify whether IHCAs were preceded by clinical deterioration through analysis of patients' National Early Warning Score 2 (NEWS2) data 24 h prior to the CA, and whether an RRT review would have been indicated at the time.
Methods: Data were collected by retrospectively analysing electronic medical records (EMRs) of patients who had been admitted to a 32 bed UK University tertiary centre adult ICU following ROSC from an IHCA over a period of 2 years from January 2023. Data were collated onto an MS Excel spreadsheet and analyzed using SPSS.
Results: A total of 854,319 bed-days occurred during the time period examined (736,878 of which resulted from emergency admissions). A total of 194 inpatients had an IHCA in the selected time period, 0.23 arrests per 1000 bed-days. 18 (9.3%) patients gained ROSC and were transferred to ICU – who were analysed in this study. The median age was 71.5 (IQR 61.8–77.5). Median ICU LOS was 2 days (IQR 1–7). Average downtime was 18.6 $\pm$ 19.3 min. 14/18 patients (78%) had an initial non-shockable rhythm. Most common cause of CA was thrombosis and hypoxia, collectively comprising 33.3% of the cohort. Overall ICU mortality rate was 77.8%. Notes review showed that almost all of the IHCAs (94%) were sudden. They also had a preceding median NEWS score of 2 (IQR 1–3) 24 h prior to the CA and would not have triggered a RRT review. 7 out of 18 patients had RRT reviews—5 in person and 2 remotely prior to their CAs. Median NEWS score at time of RRT referral was 5 (IQR 4–6.5). This subgroup had an average respiratory rate of 23 $\pm$ 5 and average heart rate of 95 $\pm$ 2 bpm at time of review. 29% were on supplemental oxygen. Mortality rate for the RRT referred subgroup was higher (85.7%) compared to the non RRT subgroup (72.7%) indicating sicker patients were being identified appropriately; however, this was not statistically significant ($p = 0.485$).
Conclusions: For those gaining ROSC post IHCAs, a significant number of all IHCAs were sudden in nature and we see little improvements that can be made to NEWS2 or RRT system from an afferent limb perspective. Efforts should be focused on optimal post-ROSC care to improve patient outcomes. While the overall rate of cardiac arrest is low, further insight into preventability maybe gained by analyzing IHCA not gaining ROSC.

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Topic: Cardiac arrest.

001548

Risk factors for mortality in severe pneumocystis jirovecii pneumonia: retrospective insights from admissions to a tertiary intensive care unit over the last 15 years

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Introduction: Pneumocystis jirovecii pneumonia (PJP) is a life-threatening opportunistic infection that affects immunocompromised individuals. It was the first described AIDS-defining disease. The increasing use of immunosuppressive drugs and new biotherapies for solid organ transplantation, immune-mediated inflammatory diseases and hematological malignancies has contributed to its rising incidence. As a result, PJP-related ICU admissions are increasing, mainly due to non-HIV cases.
Objectives: To assess clinical outcomes and identify factors associated with in-hospital mortality in PJP patients requiring ICU admission.
Methods: We conducted a retrospective cohort study including all patients diagnosed with PJP admitted to the polyvalent Intensive Care Unit of Santa Maria University Hospital (Lisbon, Portugal) between January 2010 and December 2024. Epidemiological, demographic, and clinical data were extracted from electronic medical records and inserted into an anonymized database. Statistical analysis was performed using GraphPad Prism 10.1.1, focusing on mortality associated factors.
Results: During the study period, 55 ICU patients were diagnosed with PJP, but 4 were excluded due to negative microbiologic tests available only after ICU discharge. Among the 51 included, the diagnosis was definitive in 43 (84.3%) and presumptive in 8 (15.7%), based on typical clinical and radiologic findings in immunocompromised patients when appropriate microbiologic tests could not be obtained.
Patients mean age was 56.1 years (SD 14.4), 68.6% were male, and median ICU stay was 10 days (IQR 5–16). Mean SAPS II and SOFA scores at admission were 50.5 (SD 18.8) and 8.0 (SD 4.1), respectively. Respiratory support included high-flow oxygen therapy ($n = 17$, 33.3%), non-invasive ventilation ($n = 20$, 39.2%), invasive mechanical ventilation ($n = 41$, 80.3%; median duration: 13 days), and VV-ECMO ($n = 7$, 13.7%; median ECMO run: 24 days). In-hospital mortality rate was 62.7%. However, it was lower in patients aged 30–45 years (33.3%).
PJP-related ICU admissions markedly increased over the study period, from 13 in the first 7 years to 35 in the last. This trend can be partially explained by a growing number of admissions of patients with a history of solid organ or stem cell transplantation (from 0 to 7 cases—0–20% of the total admissions).
Mortality was associated with the need for invasive mechanical ventilation ($p = 0.006$), neuromuscular blockade ($p = 0.004$), and prone positioning ($p = 0.007$); as well as bacterial co-infection ($p = 0.020$), shock ($p = 0.003$), septal thickening on chest CT scan ($p = 0.044$), and advanced radiologic stage according to Mu et al. classification ($p = 0.030$).
Conclusions: This study provides valuable insights into the evolving clinical profile of PJP patients requiring ICU admission and allows the identification of key clinical and radiologic factors associated with increased in-hospital mortality. It also adds important information for prognostication and tailoring of management strategies.

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Topic: Infections and prevention.

001549

Ultrasound-based assessment of muscle mass loss in ICU patients with traumatic brain injury

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Introduction: Critically ill patients often experience significant skeletal muscle wasting, which is associated with mortality. Patients with traumatic brain injury (TBI) are at increased risk due to neuroinflammation, immobility, and catabolic stress. Ultrasound can be used to assess muscle mass in the ICU, but data on *vastus intermedius* muscle loss in ICU patients are limited (1).
Objectives: To compare muscle mass loss between survivors and non-survivors with TBI during ICU stay, via ultrasound evaluation of the *vastus intermedius*.
Methods: This prospective cohort study included adult patients with moderate to severe TBI admitted to the ICU at San Juan del Río Hospital, Querétaro, Mexico, from January 2023 to February 2024. Ultrasound measurements of *vastus intermedius* were performed every 3 days from ICU admission to discharge. Muscle mass at admission, day 7, and discharge, along with muscle loss percentage at discharge, were compared between survivors and non-survivors using Student's *t* test. A Poisson regression model with robust standard errors was used to estimate the effect of muscle mass on mortality risk.
Results: We included 54 patients (median age: 47 years; 70.4% male). The median length of hospital stay was 12 days (IQR: 7–18). Eight patients (14.8%) died during ICU stay. Differences in *vastus intermedius* muscle thickness were observed between survivors and non-survivors at various timepoints during their ICU stay. At admission, survivors had a significantly greater muscle thickness (mean 0.75 cm, SE = 0.03) compared to non-survivors (0.55 cm, SE = 0.04; $p < 0.001$). This difference remained significant on day 7 (0.65 cm, SE = 0.0332 vs. 0.49 cm, SE = 0.0536; $p = 0.02$) and at discharge (0.67 cm, SE = 0.04 vs. 0.50 cm, SE = 0.06; $p = 0.02$). In contrast, the percentage of muscle loss at discharge did not differ significantly between groups: 6.64% (SE = 8.91) in survivors vs. 11.74% (SE = 10.73) in non-survivors ($p = 0.4738$). Lower muscle mass was associated with a higher risk of ICU mortality at different timepoints in regression models (Table 1). Specifically, greater *vastus intermedius* thickness at admission and on day 7 were significantly associated with reduced mortality risk. A similar trend was observed at discharge, although this did not reach statistical significance. Conversely, the percentage of muscle loss during ICU stay was not significantly associated with mortality.

Table 1 Mortality risk according to *vastus intermedius* muscle mass (cm) at different timepoints

Variable	B	RR	95%CI	*p* value
At admission	− 0.044	0.957	0.918–0.997	0.04
At day 7	− 0.080	0.923	0.855–0.997	0.04

Variable	B	RR	95%CI	*p* value
At discharge	− 0.048	0.953	0.904–1.004	0.07
Percentage of muscle mass loss	0.007	1.007	0.977–1.038	0.64

Conclusions: Lower *vastus intermedius* muscle thickness was significantly associated with ICU mortality in patients with TBI. Bedside ultrasound may serve as a valuable tool for early risk stratification and monitoring of muscle mass in this population.

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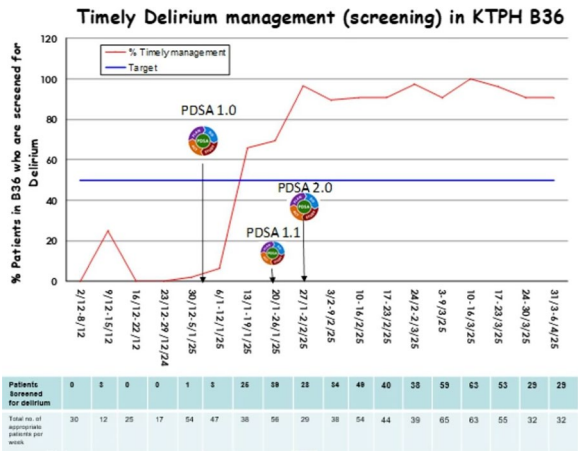
Topic: Neurointensive care.

001550

Improving timely delirium management in surgical ICU

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Introduction: Timely management of delirium has been shown to reduce duration of delirium and length of stay, with significant cost savings and better cognitive and functional outcomes. Management of delirium is multidisciplinary and focuses on early detection and managing underlying causes, e.g., sepsis, reviewing high risk medications, regular orientation and early rehabilitation. In our Surgical ICU, the prevalence of delirium was 26% of patients admitted in january 2024, but initiation of delirium care bundle remains at the discretion of the clinicians.
Objectives: We worked to improve timely delirium management in all appropriate patients in the surgical intensive care unit.
Methods: Following the principles of quality improvement from December 2024, our multidisciplinary team studied and analysed root causes that contributed to inadequate delirium management. Our team focussed on education interventions to the clinical staff, specifically nursing and medical team, and created CAM-ICU pocket cards to promote routine screening for delirium, as well as promoted a delirium care bundle to enable timely delirium specific interventions by our occupational therapists, to improve timely management of delirium in the patients admitted to our surgical intensive care unit.
Results: Auditing the electronic records, we saw a dramatic increase of CAM–ICU documentation by our nurses and implementation of the delirium specific care bundle that let to timely intervention by our occupational therapist for patients who screened positive for delirium. The timely delirium specific management was sustained above the our target 50% of cases in the next 3 months following the initiation of the interventions.
Conclusions: Simple interventions can lead to sustained improvements on timely delirium management of ICU patients.



Timely Delirium Management in our ICU after initiation of interventions.

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Topic: Sedation, analgesia and delirium.

001551

Critical illness in obstetric patients: a 3-year retrospective analysis in a resource-limited mexican hospital

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Intensive Care Medicine Experimental 2025,* 13(1)*:001551

Introduction: Pregnancy and the puerperium are well-established risk periods for increased morbidity and mortality in women of reproductive age. This vulnerability is primarily due to significant physiological and anatomical changes that complicate clinical management (1). A systematic review reported ICU admission rates of up to 16% among obstetric patients in resource-limited settings, with a median of 2.7 admissions per 1000 deliveries—substantially higher than in high-income countries (2). In Mexico, the estimated maternal mortality ratio is 16.5 per 100,000 live births, with the highest burden observed in women aged 30–34, according to the 2024 Epidemiological Surveillance Report (3). This study aimed to assess diagnostic patterns among critically ill obstetric patients in a low-resource Mexican hospital over a 3-year period.
Objectives: To describe diagnostic trends and clinical characteristics of critically ill obstetric patients admitted to a resource-limited hospital from 2022 to 2024, with the goal of identifying the most frequent

causes of critical illness and guiding improvements in early detection and management.

Methods: We performed a retrospective chart review of all obstetric patients admitted to the intensive care area of a second-level hospital in Mexico between January 1, 2022, and December 31, 2024. Demographic and clinical data, including age and primary diagnosis, were extracted from medical records.

Results: Severe preeclampsia was the most common diagnosis, peaking in 2023 with 25 cases before declining to 11 in 2024. Obstetric haemorrhage showed a bimodal pattern, with 8 cases in both 2022 and 2024, and an increase to 15 in 2023. Ruptured ectopic pregnancies remained infrequent throughout the study period. Notably, two rare but clinically significant cases were recorded under the "other" category in 2023: one diabetic ketoacidosis and one prolonged septic shock. The latter resulted in the only maternal death during the study period, occurring within 2 h of hospital admission, emphasising the consequences of delayed referral and advanced disease at presentation (Fig. 1).

Conclusions: This review underscores that severe preeclampsia and obstetric haemorrhage are the leading causes of critical illness in obstetric patients within low-resource settings. While most cases were managed successfully, the single maternal death highlights the urgent need for timely diagnosis, efficient referral systems, and robust clinical protocols to improve outcomes in this vulnerable population.

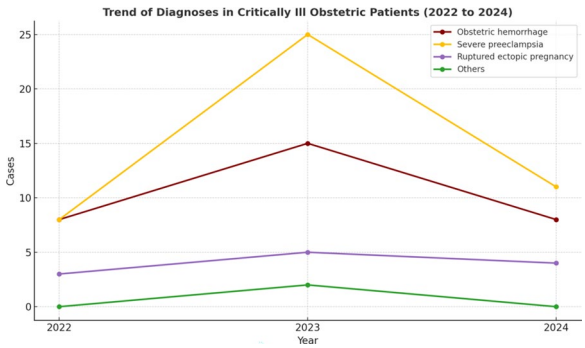


Figure 1 Trends in diagnoses among critically ill obstetric patients (2022–2024)

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Topic: Health Services Research and Outcome.

001554

Chronic critical illness in the ICU: definitional perspectives from a prospective study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001554

Introduction: Although advances in intensive care have enabled more patients to survive from acute critical illness, this has also led to the emergence of a large and increasing population of patients who remain dependent on mechanical ventilation (MV) and other intensive care therapies for prolonged periods. These patients experience chronic conditions requiring multi-organ support (1). This condition is referred to as chronic critical illness (CCI) and has become a significant burden on healthcare systems (2). However, a universally accepted definition of CCI is lacking in the medical literature.

Objectives: This study aimed to compare the prevalence and characteristics of four commonly used CCI definitions in the literature by evaluating patients admitted to the our Medical Intensive Care Unit. In addition, as a subgroup of CCI, the characteristics of patients with PIICS (Persistent Inflammation, Immunosuppression and Catabolism Syndrome), was studied.

Methods: A total of 1074 patients admitted to Medical Intensive Care Unit between 01/10/2023 and 31/03/2025. Among them, 22 patients transferred from other centers and 229 with repeated admissions during the study period were excluded. The remaining 823 patients were assessed according to four previously described CCI definitions, and CCI prevalence rates were determined.

The four CCI definitions were as follows: CCI 1: Prolonged need for MV (at least 6 h per day, MV duration $\geq$ 21 days) (3); CCI 2: MV or tracheostomy required for 14–21 days or longer (4); CCI 3: ICU stay of 8 days or more with at least one of the following: MV (at least 96 h in a single period), tracheostomy, stroke, head trauma, sepsis, or major trauma (5); CCI 4: Prolonged ICU stay ($\geq$ 14 days) with a cardiovascular SOFA score $\geq$ 1 or other parameter scores $\geq$ 2 on day 14 of the ICU stay (6). The PIICS diagnostic criteria were as follows: ICU stay of 14 days or longer; CRP > 50 µg/dL; total lymphocyte count < 0.80×10^9/L; albumin < 3.0 g/dL; pre-albumin < 10 mg/dL; creatinine elevation index < 80% (7).

Results: Of the 823 patients included in the study, 460 (55.89%) were male. The median age of the patients was 67 years (IQR: 54–77). The prevalence of CCI was found to be as follows: CCI 1: 5.22% (n = 43); CCI 2: 8.99% (n = 74); CCI 3: 23.94% (n = 197); CCI 4: 19.90% (n = 163). The prevalence of PIICS was 8.02% (n = 66) (Table 1). Among patients meeting the CCI 4 criteria, the prevalence of PIICS was 40.49%.

Table 1 Prevalence of chronic critical illness (CCI) and PIICS

Conditions	*n*	Prevalence (%)
CCI 1	43	5.22
CCI 2	74	8.99
CCI 3	197	23.94
CCI 4	163	19.90
PIICS	66	8.02

Conclusions: This is the first study in the literature to prospectively compare different definitions of "Chronic Critical Illness" and to evaluate the prevalence of PIICS. The findings that different definitions yield different prevalence rates demonstrates the need for an ideal and easily applicable definition for CCI and further researches focusing on PIICS.

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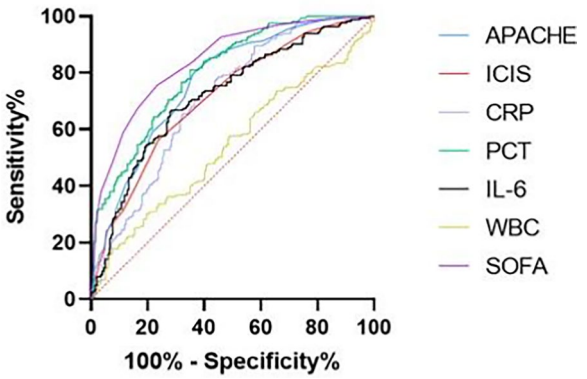
Topic: Health Services Research and Outcome.

001558

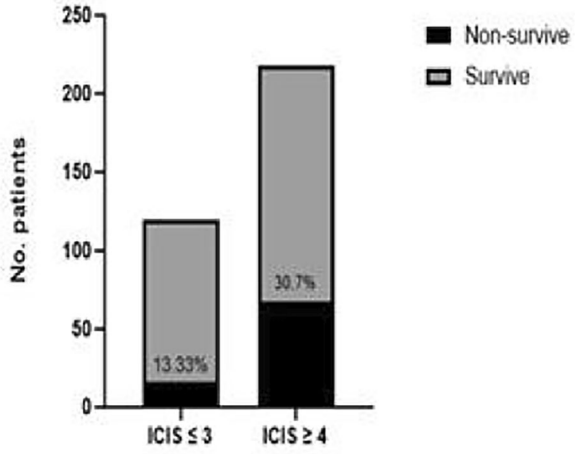
Role of ICIS score in sepsis prediction and its association with disease severity in intensive care patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001558

Introduction: Sepsis, a life-threatening condition, has a high mortality rate in ICUs, necessitating early detection, severity assessment, and mortality prediction. The Intensive Care Infection Score (ICIS) uses five hematological parameters to gauge the body's immune response to infection.
Objectives: The aim of this study is to assess the ICIS score's effectiveness in predicting sepsis development, disease progression, and mortality in ICU patients with Systemic Inflammatory Response Syndrome (SIRS).
Methods: An observational cohort study was conducted on 357 patients with SIRS scoring ≥ 2 within 48 h of ICU admission at Bach Mai Hospital from February 2023 to March 2024. Sepsis was diagnosed at baseline (D0) using Sepsis-3 criteria, confirmed by two doctors. Patients were monitored over 28 days at multiple timepoints, with blood samples taken to measure ICIS and other routine parameters.
Results: The patient cohort predominantly consisted of middle-aged males, accounting for 68% of participants (mean age: 60 ± 15.1). A significant difference in ICIS was observed at D0, with median scores of 6 for the sepsis group and 4 for the non-sepsis group. The area under the curve (AUC) for ICIS in predicting sepsis was comparable to that of C-reactive protein and interleukin-6 (0.71, 0.70, 0.72, respectively). At a cutoff value of 5, ICIS demonstrated a predictive capability for sepsis with a specificity of 76.22% and negative predictive value (NPV) of 80.3%. Over 28 days, mortality was 2.3 times higher for patients with ICIS ≥ 4 vs. ICIS < 4 (30.7% vs. 13.33%, $P < 0.05$).
Conclusions: The ICIS is a practical, cost-effective tool easily integrated into routine blood cell analysis, providing rapid results for timely treatment decisions. Its high NPV is crucial for assessing antimicrobial resistance, and it effectively predicts mortality in critically ill ICU patients, underscoring its importance in intensive care management.



Sepsis diagnostic performance of ICIS and other markers at baseline.



ICIS score in association with 28-day mortality.

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Topic: Sepsis.

001559

Antibacterial activity of serum in vitro is mediated via immunoglobulins and the soluble membrane attack complex

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001559

Introduction: Healthy human serum has inherent antimicrobial and immunomodulatory properties conferred by various circulating mediators, including immunoglobulins (Igs) and complement proteins. Igs and complement proteins work in combination to exert potent direct antimicrobial effects via formation of the membrane attack complex (MAC) (1). The MAC is a complex of complement proteins C5b-C9 which forms a pore on bacterial membranes. Spontaneous MAC formation is

inhibited by endogenously formed CD59. Low levels of complement proteins are associated with increased mortality risk in sepsis (2), while immunoglobulin replacement may improve outcomes (3).
Objectives: To investigate the relative effects of IgG, IgM, and soluble CD59 on bacterial growth in serum in vitro.
Methods: *Escherichia coli* (strain K12) (106 cells/mL-1) was added to healthy volunteer serum ($n = 7$) ± soluble CD59 (10 mcg/mL) (Biotechne) or antibodies against the Fc portion of IgG or IgM (100 mcg/mL) (ThermoFisher). Samples were incubated overnight at 37o C and colony forming units (CFUs) counted on nutrient Agar plates. Control samples included bacteria in broth alone.
Results: Following overnight incubation, 5 × 108/mL CFU were identified in broth alone. Serum significantly suppressed bacterial growth, with no growth seen in 4 of 7 serum samples. Inhibition of the Fc portion of IgG, or IgM partially reversed the antibacterial effect of serum; albeit not statistically significant. Addition of soluble CD59 partially reversed the antibacterial effect of serum ($p = 0.023$) (Fig. 1).
Conclusions: Healthy volunteer serum has inherent antimicrobial activity against E coli; this effect seems to be mediated by IgG, IgM and the MAC. The potential benefits of immunoglobulin or complement protein supplementation in sepsis warrant investigation.

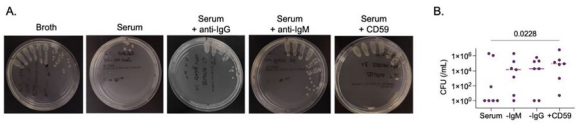


Figure 1 **A** Agar plates demonstrating CFU of E coli following incubation in broth or serum, with/without soluble CD59 or antibodies against the Fc portion of IgG or IgM. **B** Inhibition of IgG or IgM Fc portions, or soluble CD59 partially reversed antibacterial effects of serum.

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Topic: Sepsis.

001560
Economic burden of inappropriate intensive care unit utilization: a narrative review
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Intensive Care Medicine Experimental 2025,* 13(1)*:001560

Introduction: The escalating costs of ICU care necessitate a thorough examination of utilization practices. Alarmingly, there are increasing concerns that financial incentives may drive the inappropriate prolongation of ICU stays, raising ethical questions regarding patient welfare and resource allocation. This review analyzes the existing literature on the economic implications of inappropriate ICU utilization, with a critical perspective on the definitions, impacts, and proposed strategies.
Objectives: This study aims to identify the various definitions and criteria used to determine inappropriate ICU utilization, to evaluate its economic impact (including costs and resource allocation), and to explore proposed strategies for cost reduction and the optimization of ICU resource allocation from an economic perspective.
Methods: A comprehensive literature review was conducted using PubMed. The search strategy included terms related to ICU utilization, economics, and ethics. The identified articles (including the initial set of 31 relevant publications) will be analyzed to extract data on: (1) specific numerical data related to ICU costs and length of stay, (2) factors associated with prolonged or potentially unnecessary ICU admissions, (3) ethical arguments regarding resource allocation in the ICU, and (4) concrete proposals for improving the economic efficiency of ICU utilization. The extracted information will be compared and categorized based on these themes to provide a synthesized overview of the current knowledge.
Results: The reviewed literature highlights several key contexts associated with potentially inappropriate ICU utilization, including prolonged lengths of stay, particularly in patients with limited potential for further clinical improvement; admissions for conditions manageable in lower-acuity settings based on retrospective analyses; and significant variability in discharge practices across different institutions and patient populations. Economic factors identified as contributing to this issue include fee-for-service reimbursement models that may incentivize prolonged stays, a lack of alignment between physician incentives and resource stewardship, and the absence of universally accepted, evidence-based guidelines for ICU admission and discharge. Proposed strategies to mitigate inappropriate utilization and reduce costs frequently involve the implementation of standardized admission and discharge criteria, the application of risk stratification tools to guide admission decisions, and the development of step-down units or intermediate care pathways. Ethical considerations regarding these strategies, such as the potential for restricted access to necessary care and the impact on patient autonomy, are also prominent in the literature.
Conclusions: The findings of this critical review underscore the urgent need for stricter oversight and ethical guidelines to prevent the inappropriate prolongation of ICU stays driven by financial incentives. Failure to address this issue risks compromising patient well-being, distorting resource allocation, and eroding public trust in the healthcare system. Future research should focus on developing robust mechanisms to detect and deter such practices, ensuring that ICU utilization decisions are based solely on patient needs and evidence-based medicine, rather than financial gain.

Topic: Health Services Research and Outcome.

001561
Bacterial opsonisation by complement C3b in vitro is impaired in patients with sepsis compared to healthy volunteers
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Intensive Care Medicine Experimental 2025,* 13(1)*:001561

Introduction: Healthy human serum has inherent antimicrobial and immunomodulatory properties conferred by various circulating mediators, primarily antimicrobial peptides, complement proteins, and immunoglobulins. Patients who die from sepsis have lower levels of complement C3 compared to survivors, suggestive of depletion (1). C3b, derived from C3, is an opsonin which promotes bacterial phagocytosis (2).
Objectives: To investigate differences in serum from healthy volunteers (HV) compared to patients with sepsis (and age-matched preoperative patients) on C3b deposition on bacteria in vitro.
Methods: Serum was collected from seven septic ICU patients, three patients undergoing major elective surgery, and three healthy volunteers. 50µL of bacterial suspension (1 × 1010 colony forming units of E coli bacteria (strain K12)/ml in phosphate-buffered saline (PBS)) was added to an equal volume of serum, or PBS alone, and incubated for 30 min at 37 °C. Samples were then incubated with PE-labelled anti-C3b antibodies (Biolegend) for 20 min at a 1:250 dilution, washed, and resuspended in PBS. Co-localization of C3b on bacteria (and absence with PBS alone) was first confirmed by confocal laser microscopy. Flow

cytometry (Fortessa X20 flow cytometer running BD FACSDiva v9) was then performed to ascertain C3b deposition on bacteria. Data were analyzed using FlowJo (version 10.7.1, BD) and presented as median fluorescence intensity (MFI) (Arbitrary Units). Data were compared using Kruskal–Wallis test (GraphPad Prism v10).

Results: Confocal microscopy confirmed C3b deposition (red) on bacteria (blue) in healthy volunteer serum, but not in PBS alone (Fig. 1A). Flow cytometry analysis demonstrated that levels of C3b deposited on bacteria was significantly lower in ICU patients compared to healthy volunteers (Fig. 1B, C). Levels of C3b deposition in elective surgical patients were lower than HV, albeit not statistically significant (N.B. more patients are being enrolled).

Conclusions: The functional consequences of decreased C3 in patients with sepsis has not previously been explored. We demonstrate that compared to HV, patients with sepsis have lower C3b deposition on bacteria. This may contribute to impaired bacterial clearance or recurrent infections in sepsis.

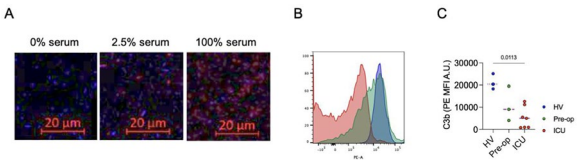


Figure 1 **A** Confocal microscopy demonstrating C3b (red) deposition on bacteria (blue) in serum but not PBS. (**B**) Flow cytometry histograms demonstrating PE-labelled C3b deposition on bacteria in serum; (**C**) with differences between volunteers and ICU patients

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González-Alsina A et al. Front Cell Infect Microbiol. 2024;14:1328185.
Tang H et al. Front Immunol. 2023;14:1126874.

Topic: Sepsis.

001562

Evaluation of the ICIS score for infection diagnosis in critical patients at Bach Mai hospital's intensive care center, Vietnam

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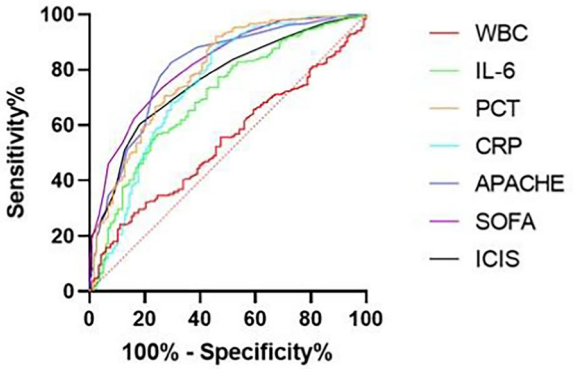
Introduction: Infection, caused by pathogenic microorganisms, can lead to severe outcomes like septic shock and death. While various biomarkers are used for diagnosis, the Intensive Care Infection Score (ICIS) reflects the immune response to infection but lacks research in Vietnam.

Objectives: This study aims to evaluate the cutoff point of the ICIS score in diagnosing infections in patients with systemic inflammatory response syndrome (SIRS) admitted to the Intensive Care Unit, and compare its diagnostic performance with that of other well-established biomarkers.

Methods: A cohort observational study was conducted on 357 critically ill patients admitted to the Intensive Care Unit (ICU) at Bach Mai Hospital from February 2023 to March 2024. Patients were assessed for infection on the first day at ICU (D0), and those without infection were monitored to detect ICU-acquired infections (Dx) during their stays. The diagnosis of infection was confirmed using microbiological tests and imaging diagnostics. Measurements of ICIS, procalcitonin (PCT), C-reactive protein (CRP), and interleukin-6 (IL-6) were taken at D0 and Dx, along with clinical changes indicative of infection.

Results: Middle-aged men (mean age: 60 ± 15.03) represented 73.2% of the study population, with infections primarily affecting the respiratory, digestive, and urinary systems. A significant difference in ICIS scores on day D0 was observed between infected and non-infected patients. The area under the receiver operating characteristic curve (AUC) for ICIS in predicting infection was 0.76, higher than CRP's 0.70 At a cutoff score of 4, ICIS demonstrated a sensitivity of 60.43% and a specificity of 81.82% for detecting infections, with a superior positive predictive value (PPV) compared to PCT (88.6% vs. 82.4%). Over a 28-day longitudinal observation period, the ICIS score was the only biomarker that significantly distinguished between the groups with and without acquired infections, surpassing PCT, CRP, and IL-6 (*P* value: 0.005, 0.44, 0.32, and 0.45, respectively.

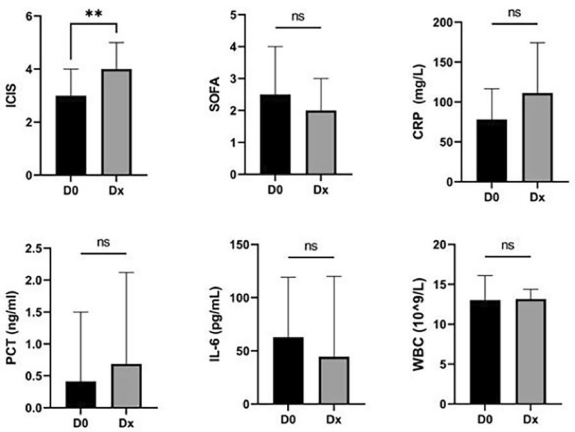
Conclusions: The ICIS proves to be a significant hematological tool for the diagnosis and management of infections in critically ill patients. It offers enhanced capabilities in identifying infections associated with Systemic Inflammatory Response Syndrome (SIRS) and supports the prompt initiation of antibiotic treatment in the ICU environment.



Infection diagnostic performance in patients with SIRS of ICIS and other markers at ICU.

Variable	Cut-off	AUC	Sensitivity (%)	Specificity (%)	PPV	NPV
APACHE	≥8	0.803	82.70	70.34	86.67	63.54
SOFA	≥3	0.813	73.64	73.73	86.74	54.52
CRP (mg/L)	≥32.4	0.743	86.61	55.93	82.10	64.16
ICIS	**≥4**	**0.763**	**60.43**	**81.82**	**88.58**	**46.98**
IL_6 (pg/mL)	≥84.93	0.703	56.07	76.27	84.65	42.66
PCT (ng/mL)	≥0.161	0.795	92.05	54.24	82.44	74.52
WBC (g/L)	≥19.14	0.547	24.27	88.98	83.71	33.49

Comparison of various markers in infection diagnostic.



Changes in the values of ICIS (A), SOFA (B), CRP (C), PCT (D), IL-6 (E), WBC (F) between the day without infection (D0) and the day of infection progression (Dx). Only the ICIS value showed a statistically significant difference (according to the Mann–Whitney test).

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Topic: Infections and prevention.

001563

Connect my care app: a feasibility study of a person-centred online mobile phone application (m-health tool) for family communication and care planning in critical care

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001563

Introduction: This study explored the feasibility of "Connect My Care," a web-based mobile phone application (an m-health tool), as a family communication adjunct in critical care. It is known that families act as support lynchpins for patients but struggle with receiving communication in critical care (O'Gara et al. 2022). Central to family-centred care is information sharing. Developing family-centred interventions is crucial for improving care satisfaction, clinical outcomes and mental wellbeing (Duong et al., 2022).
Objectives: To explore family members' and nurses' perceptions of the feasibility, acceptability, and usability and experiences of a m-health tool (App).
Methods: We conducted a feasibility study in a single centre (District General Hospital ICU in the UK). We recruited family members of patients with an anticipated length of stay > 48 h. Ethical approval was obtained via the Health Research Authority (Ref: 271,378) and informed consent was provided. We gathered quantitative data from participants who tested the App using the Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM), and Feasibility of Intervention Measure (FIM) alongside analysis on App content and in-depth qualitative interviews with families/professionals.
Quantitative data were analyzed and reported using descriptive statistics. Qualitative data were audio-recorded, transcribed, and analysed using Thematic Analysis.
Results: 16 family members and 1 nurse were recruited. Analysis of communication content showed a focus on patient condition and general enquiries. Family questions to staff centred on treatment (including medication), and planned treatment schedules. 100% of those completing questionnaires reported liking Connect my Care; 88% found it fitting/appealing (AIM); 75% reported that CMC is implementable, doable and easy to use; 100% found the intervention appropriate (IAM).
Interview themes were analyzed and four key themes identifed: *communication facilitation; response characteristics; technical issues;* and *value of content*. Participants suggested more instantaneous responses from bedside staff would make it more proactive and maximise family benefits.
Conclusions: Families found the CMC app to be acceptable, appropriate, and feasible; however, staff engagement was identified as problematic. Future challenges centre on creating more appealing, interactive content, maximising staff engagement the Connect My Care m-health App, and incorporating it into routine care.

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3. This study was supported by a Research Grant from the European Society of Intensive Care Medicine

Topic: Health Services Research and Outcome.

001564

Continuous monitoring of transpulmonary pressure, lung compliance, and patient-generated pressure during assisted mechanical ventilation

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001564

Introduction: Excessive inspiratory efforts complicate the transition to assisted mechanical ventilation and can result in lung injury. Monitoring lung mechanics and patient effort in spontaneously breathing patients is particularly difficult. We evaluated a novel method based on the estimation of patient's effort contribution during a low inspiratory assist maneuver (LAM) to monitor transpulmonary pressure (PL), lung compliance and patient effort without the need of esophageal pressure (Pes) measurement during assisted mechanical ventilation.
Methods: In ICU patients on assisted ventilation, Pes and the electrical activity of the diaphragm (EAdi) were simultaneously recorded. All were ventilated with neural-pressure support (*n*-PSV), a modified PSV mode in which the pneumatic signal is replaced by the EAdi signal for breath triggering and cycling-off. A LAM (2 cmH2O-assisted cycle) was programmed every 3 min. LAM-derived PL (PLLAM) was estimated by

comparing assisted and LAM breaths with similar respiratory output confirmed by EAdi matching.
PLLAM was obtained by dividing ventilator pressure (PVENT), i.e., the difference between the assisted-breath (Passist) and unassisted breath (PLAM) pressure divided by 1 minus the squared patient-ventilator breath contribution (tidal volume ratio between the LAM and the assisted breath) [1]. By knowing PLLAM, lung compliance (CL) and patient-generated pressure (PPAT) are obtained using the following formulas: CL = VT/PLLAM and PPAT = (PASSIST – PLAM) – PLLAM.
PLLAM, CL and PPAT were compared with the reference Pes derived values (PLPes, CLPes and Pes). Patients were submitted to three sequential 30min n-PSV ventilation periods at different levels of assist: clinically adjusted, over-assistance (50% increase) and under-assistance (50% decrease).
Results: We included 25 patients in which a total of 867 LAM breaths were compared to 18,395 assisted breaths. PLLAM, CL and PPAT were in good agreement and correlated well with the respective reference methods: PLPes Bias 0.1 cmH2O (LoA ± 3.7 cmH2O, R2 0.74), CLPes Bias 0 ml/cmH2O, (LoA ± 17 ml/cmH2O, R2 0.72) and Pes Bias 0.1 cmH2O (LoA ± 3.7 cmH2O, R2 0.65). The continuous monitoring allowed to detect patient trajectories during n-PSV, informing about patient contribution to assisted breathing and helping to identify unfavorable conditions of high PLLAM and PPAT (increased lung stress risk) or low PLLAM and PPAT (risk of diaphragmatic deconditioning).
Conclusions: The LAM-EAdi-based method provides good estimates of transpulmonary pressure, lung compliance and patient generated pressure measured in a continuous way without the need of esophageal pressure measurements. This opens possibilities to monitor patients during assisted ventilation, facilitating real time recognition of unsafe lung and diaphragmatic ventilation and helping to improve ventilator setting adjustments.

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Topic: Acute respiratory failure and mechanical ventilation.

001565

Effect of ventilatory settings on the right ventricular diastolic pressure gradient in a porcine model of ARDS

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001565

Introduction: Right ventricular (RV) dysfunction affects outcome in ARDS. Ventilatory settings can modify the characteristics of the pulmonary vascular system, affecting right ventricle afterload. The RV diastolic pressure gradient (RVDPG) has been described as an early marker of right ventricular dysfunction.
Objectives: To evaluate how RVDPG is affected by different lung conditions and PEEP settings in a porcine model of ARDS.
Methods: A model of ARDS in 5 pigs was established combining lung saline lavage and injurious mechanical ventilation for 2 h. Following a lung recruitment maneuver, the PEEP level associated with the highest dynamic compliance during a decremental PEEP trial was determined. Subsequently, three PEEP levels were randomly applied: overdistention (OD), 6 cmH2O above, optimal (OPT) 2 cmH2O above and collapse (COL), with 6 cmH2O below the highest dynamic compliance PEEP level, respectively. Respiratory mechanics, gas exchange, pulmonary vascular mechanics and RV pressure were measured at baseline (BL), after ARDS induction (VILI), and following each PEEP level application. Effective arterial elastance (EAeff), calculated as the difference between mean pulmonary artery (PA) and wedge pressures divided by stroke volume, was used as a global index of RV arterial load. The RVDPG was calculated as the difference between the RV end-diastolic and early diastolic pressures (Fig. 1). Comparisons across different PEEP levels were performed using repeated measures ANOVA with Bonferroni correction for post-hoc analysis.
Results: Compared to BL, VILI worsened Pa/FiO2 (524 ± 41 vs. 153 ± 113 mmHg, $p = 0.003$), PaCO2 (45 ± 7 vs. 60 ± 6 mmHg, $p < 0.001$), dynamic pulmonary compliance (27 ± 6 vs. 13 ± 4 ml/mmHg, $p < 0.001$) and pulmonary vascular resistance (279 ± 80 vs. 511 ± 56dyn/s/cm5, $p = 0.002$), EAeff (0.34 ± 0.15 vs. 0.66 ± 0.23 mmHg/ml, $p = 0.007$) and increased the RVDGP (3.5 ± 1.0 vs. 5.9 ± 2.3 mmHg, $p = 0.038$).
Among the three PEEP level strategies, OPT showed the best dynamic compliance (29 ± 5ml/mmHg) compared to OD (20 ± 3ml/mmHg, $p = 0.004$) and COL (15 ± 4ml/mmHg, $p < 0.001$). COL showed the lowest PaO2/FiO2 (161 ± 50mmHg) compared to OD (543 ± 66mmHg, $p < 0.001$) and OPT (548 ± 57mmHg, $p < 0.001$) and the highest PaCO2 (67 ± 8mmHg) compared to OD (59 ± 5mmHg, $p = 0.032$) and OPT (53 ± 4, $p = 0.001$).
RVDGP was lower in OPT (3.9 ± 0.9mmHg) than in COL (7.5 ± 2.8mmHg), $p = 0.023$ and no differences were found between OPT and OD (4.5 ± 1.3mmHg), $p = 1$ nor between OD and COL, $p = 0.05$. Similar behavior was found in both EAeff and pulmonary vascular resistance.
Conclusions: The application of optimal PEEP improved pulmonary mechanics and gas exchange, which translated into favorable pulmonary hemodynamics. These improvements were associated with a reduction in the RVDPG, suggesting a better condition for RV performance. Furthermore, RVDPG may serve as a feasible bedside parameter to monitor the hemodynamic effects on RV of lung conditions and ventilatory settings in ARDS.

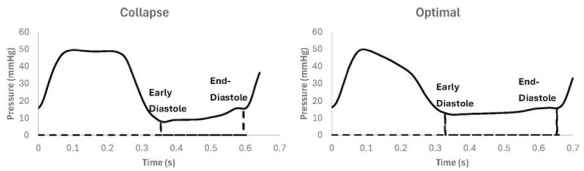


Figure 1 Representative example of the right ventricle diastolic pressure gradient in the same animal under collapse (COL, left) and optimal PEEP level (OPT, right) conditions. Note the steeper increase of the diastolic pressure during COL, resulting in an increased right ventricle diastolic pressure gradient compared to OPT

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Topic: Cardiovascular issues in ICU.

001566

Effects of intraoperative and early postoperative bicarbonated vs. acetated Ringer's solutions on acid–base status and kidney injury following orthotopic liver transplantation: a randomized clinical trial

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001566

Introduction: Intraoperative and postoperative intravenous fluid is necessary for patients undergoing liver transplantation (LT) because of blood loss and major surgical intervention. However, chloride-liberal fluids like normal saline in LT recipients were associated with an increased risk of metabolic acidosis and postoperative acute kidney injury (AKI), which is a common complication post-LT (1). Therefore, balanced solutions with more physiological chloride concentration are preferred in this population. Currently, most commercially available balanced solutions are buffered with organic anions (acetate, lactate, or malate), which rely on liver metabolism to maintain acid–base balance (2). Alternatively, bicarbonated Ringer's solution (BRS) contains no organic anions and can function independently of liver metabolism. In patients undergoing LT, when liver function was severely compromised, the use of BRS, compared with balanced solutions with organic anions, may confer clinical benefits.
Objectives: The aim of the present trial is to compare the use of BRS with acetated balanced solution (ARS) on acid–base status and kidney injury in patients undergoing orthopedic LT.
Methods: This is a single-center, investigator-initiated, single-blind, randomized, parallel-group trial. Patients aged 18 years or older who were recipients undergoing LT surgery at the study site were eligible for inclusion. Patients who underwent combined transplantation, or received renal replacement therapy (RRT) or had increased serum creatinine levels within 1 week before the operation were then excluded. Patients assigned to the BRS group received BRS whenever isotonic intravenous crystalloid is ordered during the orthotopic LT operation and the following 48 h after the operation, whereas patients in the ARS group received ARS during the same period. The primary outcome is the change of standard base excess (SBE) during the operation, calculated by the difference of SBE measured before and after the operation (ΔSBE = SBEpost—SBEpre). Secondary outcomes include ΔSBE at multiple timepoints and renal function related measures.
Results: During the study period, 86 patients undergoing LT were assessed for eligibility, and 72 were randomized (35 in the BRS group and 37 in the ARS group). The LT operation was aborted in six patients (2 in the BRS group, and 4 in the ARS group). Eventually, 33 patients in the BRS group and 37 in the ARS group completed the LT operation and received the allocated intervention. At 0 h post the LT operation, the ΔSBE in the BRS group was 2.2 ± 4.2 mmol/L compared with 1.7 ± 4.1 mmol/L in the ARS group (mean difference 0.4 mmol/L [95%CI − 1.6–2.5 mmol/L], $p = 0.69$). For other timepoints, SBE was significantly less affected in the BRS group at inferior vena cava (IVC) block (ΔSBE − 1.4 ± 1.7 mmol/L vs. − 3.8 ± 1.7 mmol/L, mean difference 2.4 mmol/L [95%CI 1.6–3.2 mmol/L], $p < 0.001$) and shortly after IVC reperfusion (ΔSBE − 4.3 ± 2.9 mmol/L vs. − 6.1 ± 2.8 mmol/L, mean difference 1.8 mmol/L [95%CI 0.5–3.2 mmol/L], $p < 0.01$). Changes in serum acetate concentration, arterial standard base excess, and estimated glomerular filtration rate are shown in Fig. 1. For renal function-related measures, there was a numerous reduction of AKI incidence in the BRS group during the first 48 h post operation (13/33 (39.4%) vs. 20/34 (58.8%), $p = 0.11$).
Conclusions: This randomized controlled trial showed that compared with ARS, the use of BRS in patients undergoing LT operation resulted in less affected acid–base status during the LT operation. Moreover, a numerous reduction in AKI incidence was observed during the first 48 h postoperation, suggesting that the physiological superiority may be translated into clinical benefits.

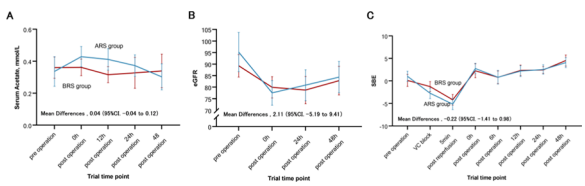


Figure 1 Changes in serum acetate concentration, arterial standard base excess (SBE), and estimated glomerular filtration rate (eGFR). Generalized estimating equations (GEE) model was used to estimate the effect of bicarbonated Ringer's solution (BRS) vs. acetated balanced solution (ARS) on serum acetate, SBE and eGFR with adding interaction term of treatment and timepoint.

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Topic: Perioperative care.

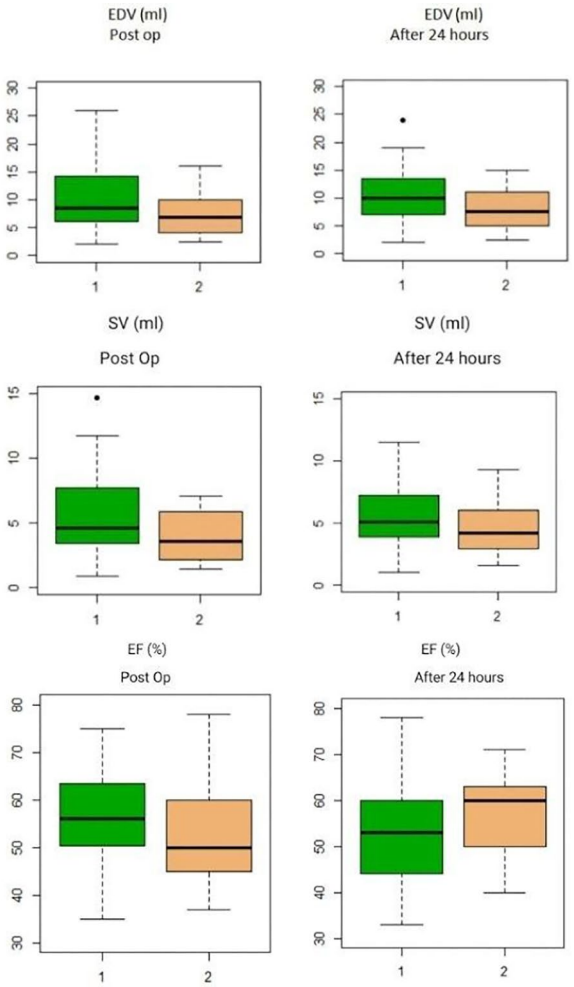
001567

Evaluation of hemodynamic parameters during infusion therapy after cardiac surgery in children

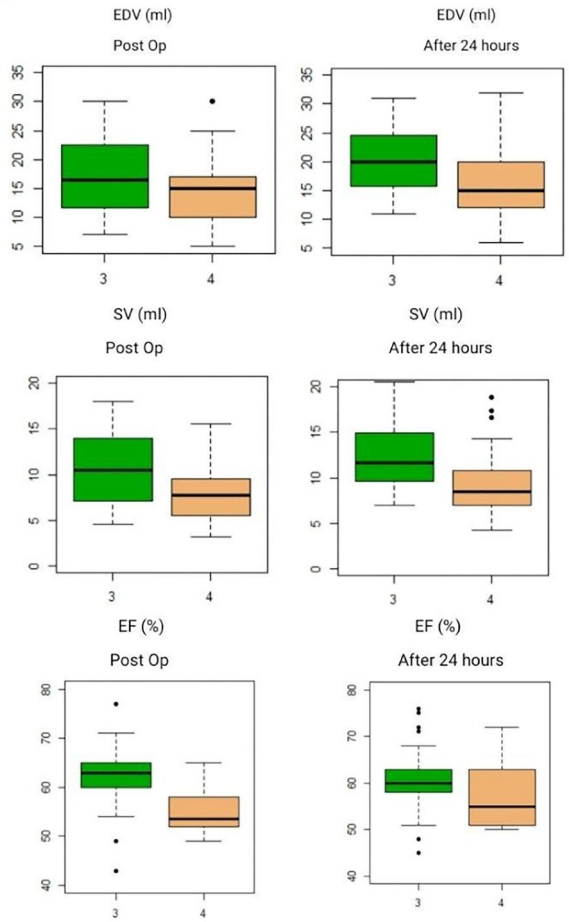
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***Intensive Care Medicine Experimental 2025,* 13(1)**:001567

Introduction: Hemodynamic instability in the early postoperative period remains one of the major challenges in pediatric cardiac surgery. Infusion therapy, as a key method for correcting volume status in children after heart surgery, significantly affects central hemodynamic parameters. However, there is still no consensus on the most effective strategies for fluid management and their impact on echocardiographic parameters over time. Given the high sensitivity of the pediatric population to fluctuations in circulating blood volume and cardiac function, studying the changes in hemodynamic parameters during infusion therapy is of particular clinical importance. The results of such studies may help optimize infusion strategies, reduce complication rates, and improve outcomes in this patient group.
Objectives: To improve the approach to intensive care in the early postoperative period after cardiac surgery in children by evaluating central and peripheral hemodynamic parameters. For this purpose, we analyzed hemodynamic parameters during infusion therapy in 120 children (aged 1 month to 5 years) after radical correction of conditions such as TGA, TAPVR (groups 1 and 2), and Tetralogy of Fallot (groups 3 and 4). All children received balanced crystalloid solutions as part of infusion therapy. Groups 1 and 3 received a fluid volume 25% greater than that given to groups 2 and 4. The study was conducted in the pediatric cardiac intensive care unit at the National Children's Medical Center.
Methods: In the early postoperative period, clinical data and central and peripheral hemodynamic parameters were assessed in all patients. These included echocardiographic measurements (LVEDV, LVESV, EF, and SV), SpO_2, heart rate, arterial blood pressure, and central venous pressure. In addition, blood gas analysis was performed. Inotropic support included adrenaline and milrinone; in 63 patients, dopamine was also used at doses of 5–10 μg/kg/min.
Results: Significant differences were observed between subgroups in mean systolic and mean arterial pressure at 6 h and in LVEDV at 24 h after surgery. These differences were associated with the additional use of dopamine in inotropic support. Group 1, compared to group 2, showed a small but statistically significant increase in LVEDV at 24 h. Group 3 demonstrated better improvement in myocardial contractility than group 4 ($p < 0.0001$). The most variable and informative parameters—LVEDV, EF, and SV—allowed for the evaluation of both intergroup and intragroup differences in the postoperative period (in most cases, $p < 0.01$).
Conclusions: Changes in central and peripheral hemodynamic parameters during low-volume infusion therapy (groups 2 and 4) were associated with better outcomes in the early postoperative period, including shorter stays in intensive care. Deterioration of

hemodynamic parameters in children does not always require additional fluid administration and is often linked to insufficient inotropic support in the early postoperative phase.



ECHO parametres in first and second groups



ECHO parametres in third and fourth groups

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3. Head of Emergency Department A.Sharipov

Topic: Cardiovascular issues in ICU.

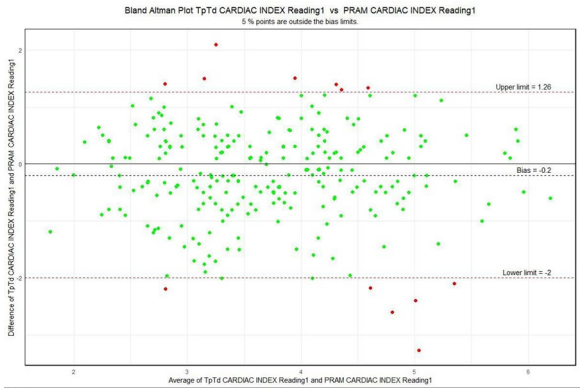
001568

Comparison between transpulmonary thermodilution (PiCCO) and pressure recording analytical method (PRAM) for cardiac output estimation in hemodynamically unstable patients: a prospective study

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001568

Introduction: Many minimally invasive methods are available for measuring cardiac output in critically ill patients, one being Pressure Recording Analytical Method (PRAM).
Objectives: We aimed to assess the agreement between PRAM and intermittent transpulmonary thermodilution (PiCCO) in hemodynamically unstable patients.
Methods: In this prospective observational study, we included 25 hemodynamically unstable ICU patients ICU patients and carried out 250 paired cardiac output measurements using PiCCO and PRAM methods. Bland–Altman analysis was performed to find out the mean bias and limits of agreement between two methods.
Results: Bland–Altman plot demonstrated a mean bias of – 0.2 L/min/m2 with upper and lower limits of agreement of 1.26 L/min/m2 and of – 2 L/min/m2, respectively, in CI measurements. The percentage error (PE) was 44.48% between CI-PRAM and CI-TPTD.
Conclusions: Determination of CO measurement with PRAM in hemodynamically unstable patients did not show acceptable agreement with transpulmonary thermodilution. Further studies are required to explore its use in patients with hemodynamic instability.



Bland–Altman analysis of cardiac index by PRAM and PiCCO.

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Topic: Cardiovascular issues in ICU.

001569

Effectiveness of cefazolin vs. anti-staphylococcal β-lactam for treating methicillin-susceptible *Staphylococcus aureus* pneumonia in critically ill patients admitted to intensive care units: a multicenter cohort study

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Introduction: Critically ill patients are more likely to have infections and infections-related complications, which can result in death. The optimal choice of β-lactam antibiotic for patients diagnosed with proven methicillin-susceptible Staphylococcus aureus (MSSA) pneumonia remains unclear. Moreover, to our knowledge, no study has addressed the efficacy of cefazolin compared to antistaphylococcal β-lactam antibiotics for treating MSSA pneumonia in critically ill patients. The study aimed to evaluate the effectiveness of cefazolin compared to antistaphylococcal β-lactam in treating MSSA pneumonia in critically ill patients admitted to intensive care units.
Methods: This multicenter retrospective cohort study was conducted in three tertiary hospitals around Saudi Arabia from January 2016 to July 2021. Inclusion criteria were any adult patients (≥ 18 years) admitted to the intensive care unit with confirmed MSSA respiratory culture who received any de-escalated antibiotics with anti-MSSA activity

as definitive antibiotics. Eligible patients were categorized into two groups based on the de-escalated antibiotic received (cefazolin vs. non-cefazolin). The primary outcome was the treatment failure rate, while other outcomes were considered secondary. Logistic, linear, and negative binomial regression analyses were utilized for study endpoints as appropriate.
Results: A total of 54 patients were included in the study (27 patients in cefazolin vs. 27 patients in non-cefazolin). The treatment failure rate was significantly higher in the cefazolin group compared to non-cefazolin (OR 5.73; 95% CI (1.303–25.191), $P = 0.0209$). Moreover, the rate of re-escalation to other antibiotics was higher in the cefazolin group, too (OR 17.98; 95% CI (2.731–118.425), $P = 0.0027$). No significant difference was found in MSSA recurrence infection rate within 3 months, time of microbiological sterilization, or time to defervescence. In addition, the 30-day and in-hospital mortality rates, ICU re-admission, ICU and hospital length of stays, and ventilator-free days were similar between the two groups.
Conclusions: In critically ill patients with MSSA pneumonia, Anti-MSSA β-lactam antibiotics, other than cefazolin, showed a lower treatment failure rate and rate of re-escalation to different antibiotics. Further studies with larger sample size are needed to validate the study findings.

Topic: Infections and prevention.

001570

The dynamic trend of blood lactate levels and its predictive value on mortality during VA-ECMO support and after ECMO weaning: a single-center retrospective observational study

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Introduction: Venoarterial extracorporeal membrane oxygenation (VA-ECMO) is utilized as a last-resort intervention for refractory cardiogenic shock (CS). However, the prognostic value of lactate dynamics during ECMO support and after weaning remains unclear. This study aimed to evaluate lactate trends and their association with 28-day mortality.
Methods: We retrospectively analyzed all consecutive patients receiving VA-ECMO for longer than 48 h from January 2018 to May 2024. Blood lactate was measured before ECMO implantation, at 4, 6, 12 and 24 h during ECMO support, 1 h before weaning as well as 2 and 24 h post-weaning. Hyperlactatemia was defined as lactate $\geq$ 5 mmol/L. Subgroup analysis was performed based on initial lactate levels and 24-h lactate clearance (LC).
Results: Among the 248 patients with available baseline lactate measurements, lactate levels were consistently higher in non-survivors at each timepoint ($p < 0.001$). The area under the receiver operating characteristic (ROC) curve (AUC) for baseline lactate in predicting 28-day mortality was significantly higher than that of 24-h LC (0.73 [0.64–0.82] vs. 0.55 [0.45–0.65], $p = 0.023$). In addition, lactate levels exceeding 5 mmol/L at any time during the first 24 h of ECMO were associated with an increased risk of 28-day mortality. Kaplan–Meier curves showed significant differences in 28-day mortality across baseline lactate categories, with hazard ratios of 2.59 (95% CI, 1.14–5.91, $P = 0.024$) for lactate 5–10 mmol/L and 3.42 (95% CI, 1.71–6.83, $P = 0.001$) for lactate $\geq$ 10 mmol/L. Among patients with baseline hyperlactatemia, survivors exhibited a significantly higher LC over the first 24 h (24 h LC: 79.4% [71.6–84.6] vs. 62.4% [30.3–80.5], $P = 0.003$). In 37 patients with lactate measured peri-weaning, elevated post-weaning lactate levels were more predictive of outcome than pre-weaning levels (AUC at 2 h post-weaning: 0.88 [0.77–0.99] vs. 0.60 [0.34–0.86], $p = 0.042$; at 24 h: 0.90 [0.78–0.99] vs. 0.60 [0.34–0.86], $p = 0.011$).
Conclusions: Baseline lactate is a valuable predictor of prognosis in VA-ECMO patients, allowing better risk stratification. LC provides additional predictive value in patients with hyperlactatemia, while post-weaning lactate trajectory offers crucial insight into outcomes. These findings underscore the importance of dynamic lactate monitoring throughout the course of ECMO support.

Topic: Cardiovascular issues in ICU.

001571

Medication Regimen Complexity score in comparison with multi-organ dysfunction score as a predictor of the clinical outcome of critically ill patients in a tertiary care center

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Introduction: Evidence is limited on the optimal utilization of the Medication Regimen Complexity–Intensive Care Unit (MRC–ICU) scores for predicting clinical outcomes in critically ill patients. Therefore, this study aims to examine how a high score on the MRC-ICU within 24 h of ICU admission predicts clinical outcomes for critically ill patients in ICUs.
Methods: A single-center retrospective cohort study included adult ICU patients admitted for > 72 h between January 2021 and December 2021. Patients were categorized into two groups based on MRC-ICU scores ($\geq$ 9 vs. < 9) assessed within 24 h of ICU admission. The primary endpoint was the multiorgan dysfunction (MOD) score at 72 h of ICU admission. Other clinical outcomes were secondary such as ICU length of stay (LOS), hospital LOS, vasopressors-free days (30 days), organ support-free days, ICU readmission within 3 months, 30-day mortality, and in-hospital mortality. Multivariable logistic and linear regression analyses were used as appropriate.
Results: Among 1422 patients, those with MRC–ICU scores $\geq$ 9 had significantly higher MOD scores at 72 h (median 5 vs. 3, $p < 0.001$), longer hospital LOS, and higher 30-day and in-hospital mortality rates in crude analyses. Moreover, the linear regression analysis showed a significant association between MRC–ICU score and MOD score at day 3 of ICU admission (coefficient: 0.49, 95% CI 0.07–0.92, $p = 0.02$). However, no significant differences were observed with ICU LOS, vasopressor-free days, or mortality after adjusting for possible confounders.
Conclusions: Higher 987MRC-ICU scores might be linked to worse outcomes, including greater organ dysfunction, longer hospital stay, and higher mortality. However, after adjusting for potential confounders, no significant difference in mortality was observed. Further

research is needed to optimize medication regimens and improve critical care outcomes.

Topic: Pharmacology and toxicology/poisoning.

001572

Evaluation of the clinical impact of de-escalated vs. non-de-escalated antibiotics for the treatment of methicillin-susceptible *Staphylococcus aureus* pneumonia in critically ill patients admitted to intensive care units: a multicenter cohort study

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Introduction: Critically ill patients are at a higher risk of developing infections and related complications, which can lead to death. Each additional day of antipseudomonal β-lactam use increases resistance risk; therefore, de-escalation is highly recommended to improve antibiotic use. To our knowledge, no study has evaluated the clinical impact of de-escalation in critically ill ICU patients with proven MSSA pneumonia. Therefore, this study aimed to address the clinical impact of the de-escalation strategy compared to non de-escalated strategy in critically ill patients with proven MSSA pneumonia.
Methods: This multicenter retrospective cohort study was conducted in three tertiary hospitals from January 2016 to July 2021. Adult critically ill patients admitted to the intensive care unit with proven MSSA respiratory culture who received antibiotics with anti-MSSA activity were screened for eligibility. The primary outcome was the treatment failure rate, while the secondary outcomes included time to defervescence, time of microbiological sterilization, rate of recurrence of MSSA infection and ICU readmission within 3 months of completing treatment, 30-day mortality, ICU and hospital LOS, and ventilator-free days. Propensity score (PS) matching was applied at a 1:1 ratio, and multivariate regression analyses were utilized as appropriate.
Results: After PS (1:1), 58 patients were included in the study (29 patients in non-deescalated vs. 29 patients in de-escalated). The treatment failure rate was significantly higher in the de-escalated group compared to non-de-escalated (OR 16.98; 95% CI (3.304–87.225), $P = 0.0007$). In addition, the time of microbiological sterilization was longer in the de-escalated group (Beta. 0.71; 95% CI (– 0.10–1.52), $P = 0.08$); however, it failed to reach statistical significance. Moreover, no significant difference was found in the 30-day mortality rate, hospital and ICU length of stays, ventilator-free days, ICU re-admission rate, recurrence MSSA infection rate, and time to defervescence.
Conclusions: Our results show that non-de-escalated patients had lower treatment failure and non-significantly longer time of microbiological sterilization. Further studies with larger sample sizes are needed to validate these findings and draw more definitive conclusions to guide clinical management.

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Topic: Infections and prevention.

001573

Functional, pulmonary, psychological, and cognitive status up to 12-month post-ICU discharge in COVID-19 patients: a preliminary analysis of the international AFTERCOR study

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Introduction: Long-term sequalae and disabilities associated with Coronavirus disease 2019 (COVID-19) are currently poorly defined, specifically in patients who have been discharged from intensive care units. We hypothesized that functional and pulmonary capacity, as well as mental health and cognitive function, would remain outside the normal range for up to 12 months after ICU discharge.
Methods: We hypothesized that functional and pulmonary capacity, as well as mental health and cognitive function, would remain outside the normal range for up to 12 months after ICU discharge.
Results: 340 patients from 9 sites in 6 countries (Ireland, Spain, Italy, USA, Singapore, and Colombia) admitted to the ICU from January 2021 to December 2023 for COVID-19 were included in the study. Median (IQR) age was 59 years (SD 13y), 32.1% were females and median length on ICU was 21 days. 200 (58.8%) and 233 patients (68.5%) received invasive and non-invasive ventilation respctively, and 188 patients (55.3%) were diagnosed with ARDS. During the 12-month follow-up, 14 patients (4.1%) died.
The 6-min walking test was outside a normal range in 67/68, 121/125 and 95/100 of the patients at 3, 6, and 12 months, with a mean walking distance of 367, 409, and 461 m, respectively (Fig. 1A). The BIS score was not normalized in 17.9%, 10.5%, and 8.3% (Fig. 1B), while the WHODAS score in 39.4%, 33.0%, and 23.4% (Fig. 1C) at 3, 6, and 12 months, respectively. FVC and FEV1 were outside normal limits in 40.7% and 33.3% of the patients at 3 months, 19.8% and 11.9% at 6 months, 10.3% and 6.3% at 12 months (Fig. 1D, E). DLCO was abnormal in 62.0%, 47.3% and 31.3% (Fig. 1F) of patients at 3, 6, and 12 months. As shown by the HADS, anxiety was present in 30.1%, 15.0%, and 10.8% (Fig. 1G) of the patients, while 18.1%, 10.0%, and 8.1% (Fig. 1H) had significant depression at 3, 6, and 12 months. The PHQ-9 was outside normal limits in 64.6%, 57.9%, and 45.4% (Fig. 1I) of the patients, while the MoCA test revealed cognitive impairment in 41.0%, 21.6%, and 11.8% of the patients at 3, 6, and 12 months.
Conclusions: The assessment of severely ill COVID-19 patients indicates that even though functional status, pulmonary assessment, mental health, and cognitive function improve over time but still affect a significant number of patients 12 months after ICU discharge.

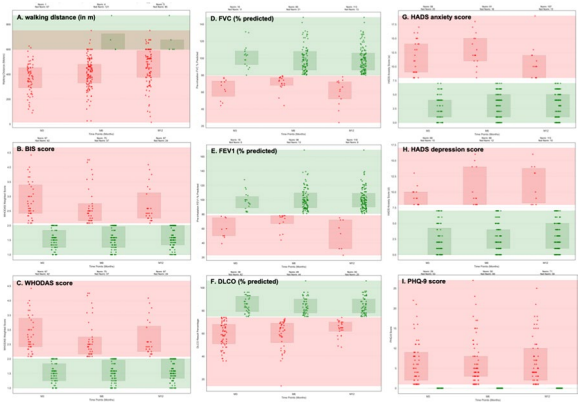


Figure 1 Results at 3-, 6-, and 12-month post-ICU discharge, grouped by normalized and non-normalized values. For each graph, *Y* values within normal range are highlighted in green. **A** walking distance. **B** BIS score. **C** WHODAS score. **D** FVC. **E** FEV1. **F** DLCO. **G** HADS anxiety score. **H** HADS depression score. **I** PHQ9 score

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2. The AFTERCOR study is supported by research grants from the Wesley Medical Research Foundation (Brisbane, Australia), Gilead (USA) for two US American sites and Universidad de La Sabana for the Colombian site.

Topic: Acute respiratory failure and mechanical ventilation.

001575

Inflammatory stimuli-induced neutrophil-derived exosome (TNF-Exo) induce macrophage pyroptosis via the A20/NEK7/NLRP3 axis in sepsis-associated acute kidney injury

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Introduction: Sepsis is a systemic inflammatory response syndrome triggered by infection or trauma, rapidly progressing to multi-organ dysfunction, with sepsis-associated acute kidney injury (SA-AKI) as one of the most frequent and severe complications. Recent studies have shown that neutrophils contribute to inflammation in sepsis not only through phagocytosis and the release of inflammatory mediators but also by secreting extracellular vesicles (exosomes), thus amplifying inflammatory signaling and tissue injury. However, the specific mechanisms of neutrophil-derived exosomes under inflammatory stimulation (TNF-Exo) in SA-AKI remain unclear. Elucidating the role of TNF-Exo in SA-AKI may identify new therapeutic targets and diagnostic biomarkers.
Objectives: This study aimed to explore whether TNF-Exo contributes to SA-AKI progression, clarify the molecular mechanism by which miR-519c-5p within TNF-Exo promotes macrophage pyroptosis via targeting A20 and activating the NEK7/NLRP3 signaling pathway, and evaluate the clinical potential of plasma exosomal miR-519c-5p in predicting SA-AKI severity and patient outcomes.
Methods: TNF-Exo were first isolated from neutrophils stimulated by inflammatory conditions (TNF-α) in mice and characterized using transmission electron microscopy (TEM), nanoparticle tracking analysis, and western blot. A mouse model of SA-AKI was established to evaluate renal function markers (serum creatinine and urea–nitrogen) and renal histopathological changes after injection of TNF-Exo. Confocal microscopy was used to investigate macrophage uptake of TNF-Exo. Flow cytometry, RT-qPCR, Western blot, and proteomics were performed to assess macrophage polarization and pyroptosis. Next-generation miRNA sequencing was conducted to identify key exosomal miRNAs, followed by transcriptomics, dual-luciferase reporter assays, and immunoprecipitation to confirm the target gene and signaling interactions. Critical molecular pathways were further validated using animal models and gene knockdown experiments. Finally, a prospective observational study was performed, enrolling septic patients to investigate plasma exosomal miR-519c-5p as a predictive biomarker for SA-AKI severity and mortality risk.
Results: We successfully isolated exosomes from inflammatory-stimulated neutrophils (TNF-Exo) and found that administration of TNF-Exo to mice led to their accumulation in renal tissues, significantly elevated serum creatinine and urea nitrogen levels, increased kidney wet/dry weight ratios, and induced prominent histopathological injury and inflammatory cell infiltration, indicating exacerbated SA-AKI. Both in vivo and in vitro experiments demonstrated substantial uptake of TNF-Exo by renal macrophages and RAW264.7 cells, accompanied by significant macrophage M1 polarization, increased pyroptosis, and elevated inflammatory cytokine levels (TNF-α and IL-1β). MiRNA sequencing revealed notably increased expression of miR-519c-5p in TNF-Exo and plasma exosomes from SA-AKI patients. Mechanistically, miR-519c-5p directly targeted and suppressed A20 expression, enhancing

NEK7 K63-linked ubiquitination and subsequent activation of the NLRP3 inflammasome, thereby promoting macrophage pyroptosis. Inhibition of miR-519c-5p or overexpression of A20 markedly reduced TNF-Exo-induced macrophage pyroptosis and alleviated renal injury and mortality in the sepsis mouse model. Clinically, plasma exosomal miR-519c-5p levels were significantly higher in SA-AKI patients compared to non-AKI or AKI stage 1–2 patients ($P < 0.01$). The predictive value of plasma exosomal miR-519c-5p within 24 h post-sepsis diagnosis for SA-AKI stage 3 (AUC = 0.813) and 30-day mortality (AUC = 0.745) was substantial. Multivariate analysis further confirmed that elevated miR-519c-5p was an independent predictor of SA-AKI stage 3 and 30-day mortality.
Conclusions: This study demonstrates that TNF-Exo significantly exacerbates the progression of SA-AKI. TNF-Exo-delivered miR-519c-5p targets and suppresses A20, enhancing NEK7-mediated activation of the NLRP3 inflammasome, ultimately inducing macrophage pyroptosis. Moreover, plasma exosomal miR-519c-5p is a promising early biomarker for predicting SA-AKI severity and mortality risk in sepsis patients. These findings provide new insights and potential therapeutic targets for the diagnosis and treatment of SA-AKI.

Topic: Acute kidney injury and haemofiltration.

001576

Variability in pharmacokinetic parameters and PK/PD target attainment in critically ill patients with apparently preserved renal function treated with ceftazidime/avibactam

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Introduction: Sepsis due to difficult-to-treat (DTR) resistant Gram-negative bacilli is a major cause of hospital morbidity and mortality. Ceftazidime/avibactam (CAZAVI) is a therapeutic option whose pharmacokinetics is increasingly being characterized using real-world data from critically ill patients. Glomerular filtration rate is a key determinant of CAZAVI pharmacokinetics; however, despite preserved renal function as inferred from serum creatinine (SCr), a spectrum of renal dysfunction may be present, potentially impacting the pharmacokinetic profile of CAZAVI in critically ill patients.
Objectives: To describe the pharmacokinetics and PK/PD Target Attainment of CAZAVI in critically ill patients with normal renal function.
Methods: Critically ill patients receiving CAZAVI were prospectively enrolled. Plasma levels of CAZAVI at steady state were measured every hour over an 8-h dosing interval. CAZAVI was administered at a dose of 2.5 g TID, adjusted based on estimated renal function using SCr. In parallel, creatinine clearance (CrCl-24 h) was measured from a 24-h urine collection. Pharmacokinetic parameters were calculated using a non-compartmental model. Pharmacodynamic target attainment (PK/PD) was assessed using three criteria: (1) fCFZ4h > MIC × 1 (8 mg/L) with fAVI > 1 mg/L; (2) fCFZ8h > MIC × 1 (8 mg/L) with fAVI > 1 mg/L; and (3) fCFZ8h > 4 × MIC (32 mg/L) with fAVI > 4 mg/L. This study was approved by the institutional ethics committee, and informed consent was obtained from all patients or their relatives.
Results: Ten patients were enrolled (Table 1). Median SCr was 0.6 [0.50–0.89] mg/dL, and all had an estimated glomerular filtration rate > 50 mL/min, thus receiving standard dosing of CAZAVI. However, CrCl-24 h measurements revealed that four patients had acute kidney injury (AKI) with reduced CrCl (43.5 [30.5–54.5] mL/min), and 2 patients exhibited augmented renal clearance (ARC), with CrCl values of 192.5 and 149 mL/min, respectively. Significant differences were observed among the three groups in average 8-h AVI concentrations ($p = 0.026$), AVI area under the curve (AUC, $p = 0.032$), and AVI clearance ($p = 0.037$). Comparing AKI vs. non-AKI patients revealed differences in AVI-avg 8 h ($p = 0.01$) (Fig. 1), AVI–AUC ($p = 0.01$), and AVI-Cl ($p = 0.019$). Comparing ARC vs. non-ARC patients showed differences in CFZ-avg 8 h ($p = 0.044$), CFZ–AUC ($p = 0.044$), CFZ-Cmax ($p = 0.044$), CFZ-T1/2 ($p = 0.044$), CFZ-Cl ($p = 0.044$), CFZ-Ke ($p = 0.044$), AVI-T1/2 ($p = 0.044$), and AVI-Ke ($p = 0.044$). All patients achieved PK/PD target according to criterion 1. According to criterion 2, only ARC patients failed to achieve the PK/PD target. Based on criterion 3, only 4 patients achieved target PK/PD—2 with AKI and 2 with normal renal function.

Table 1 Description of patients treated with ceftazidime/avibactam

	All patients *N* = 10
Male, *N* (%)	8(80)
Age, years	65 [65–67]
APACHE II, points	15 [13–18]
SOFA, points	8 [5–10]
IMV, *N* (%)	9 (90)
Norepinephrine, *N* (%)	9 (90)
Critical care LOS, days	47 [39–69]
Hospital LOS, days	59 [40–123]
Bloodstream, *N* (%)	3 (30)
Hospital mortality, *N* (%)	2(20)

APACHE II: Acute Physiology and Chronic Health disease Classification System II. SOFA: Sepsis-related Organ Failure Assessment. IMV: Invasive Mechanical Ventilator. LOS: Length of stay.

Conclusions: Patients with low serum creatinine and CrCl > 50 mL/min may represent a heterogeneous group in terms of renal function when assessed via CrCl-24 h, which significantly influences pharmacokinetic parameters and the attainment of more stringent PK/PD targets. ARC patients were identified as being at the highest risk of not achieving optimal PK/PD targets.

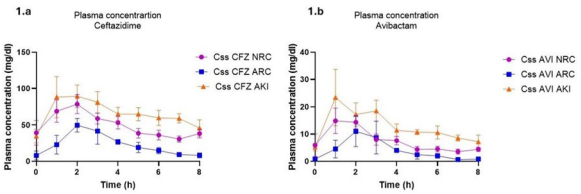


Figure 1 Plasma concentration–time profiles of ceftazidime (1.a) and avibactam (1.b) over 8 h in critically ill patients categorized by renal function. Css CFZ and Css AVI represent steady-state plasma concentrations of ceftazidime and avibactam, respectively. NRC: normal renal clearance; ARC: augmented renal clearance; AKI: acute kidney injury. Data are presented as average ± SEM

Topic: Pharmacology and Toxicology/Poisoning.

001577

Enhancing sedaconda ACD-S reflection efficiency through thermocycling: a bench study with isoflurane

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***Intensive Care Medicine Experimental 2025,* 13(1)**:001577

Introduction: The Sedaconda ACD-S is widely used for inhaled sedation in intensive care. As volatile anesthetics like isoflurane are potent greenhouse gases, reducing their consumption supports greener anesthesia [1]. Thermocycling, the cyclical warming and cooling of the reflector, has been shown to enhance reflection efficiency [2].

Objectives: To determine the optimal temperature difference between clinical conditions and thermocycling to maximize reflection efficiency for isoflurane using 5 °C increments.
Methods: Isoflurane was administered via syringe pump at infusion rates of 0.5, 1, 2, and 5 ml/h. A test lung was ventilated in IPPV mode (tidal volume = 500 ml; respiratory rate = 12/min) and maintained under BTPS and normocapnic conditions, which were continuously monitored within the test lung. Inspired gas was actively heated to 37 °C.
The expiratory limb directed gas through a copper tube placed in a freezer. Temperature was varied in six steps between 26 °C and 1 °C in 5 °C increments by modifying freezer settings, copper exposure, and insulation (Fig. 1). Temperature before the ACD-S was measured. Isoflurane concentration was recorded under steady-state conditions (5 min average, repeated three times). Reflection efficiency was calculated. A clinical baseline was measured using a shorter tube system and without heating and cooling the breathing system.
Results: By intensifying thermocycling, higher isoflurane concentrations were achieved at identical infusion rates in the test lung. To maintain a concentration of 0.5 Vol%, it would be possible to reduce the infusion rate from 2.46 ml/h under clinical conditions to 0.74 ml/h at a thermocycling temperature of 1 °C, resulting in a 70% reduction in isoflurane consumption (Fig. 2). At all tested concentrations, thermocycling increased reflection efficiency in a non-linear manner (Fig. 3).
Conclusions: Reflection efficiency increases with cooling intensity, following a first-order pattern with the highest increase during moderate cooling and leveling off around 16 °C. Even a moderate thermocycling approach had a significant effect on reflection efficiency, suggesting that complex cooling systems may not be required and offering a promising step toward greener anesthesia.

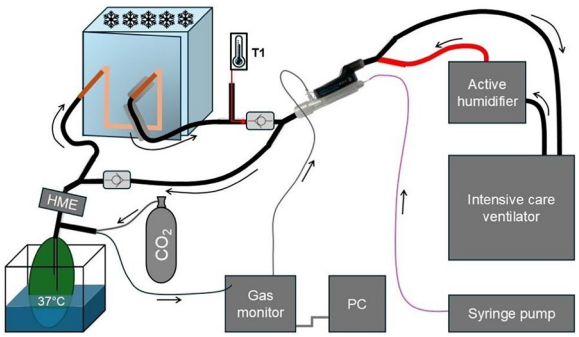


Figure 1 Experimental setup for thermocycling trials with isoflurane and the ACD-S
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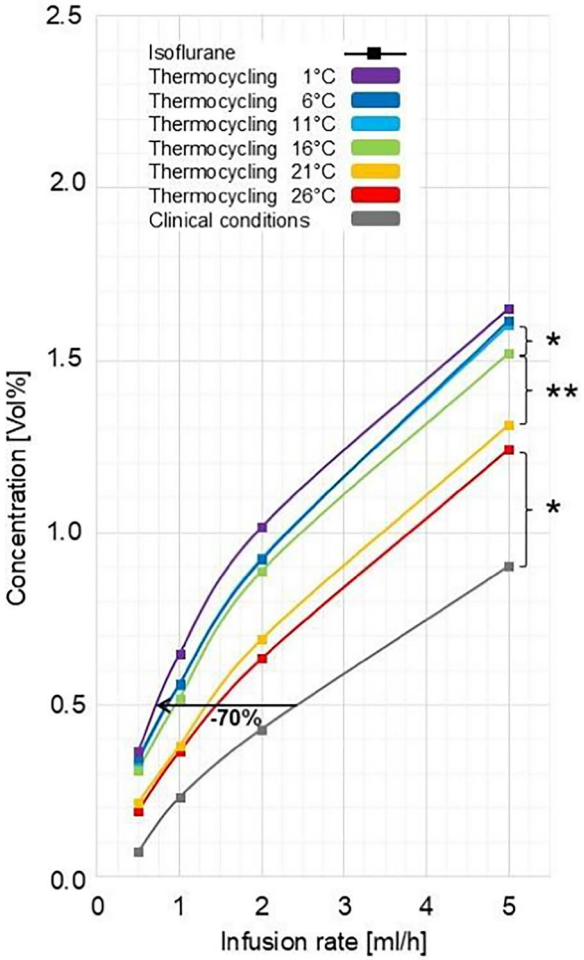


Figure 2 Concentration of isoflurane depending on the infusion rate across all temperature levels* $p < 0.05$, ** $p < 0.01$
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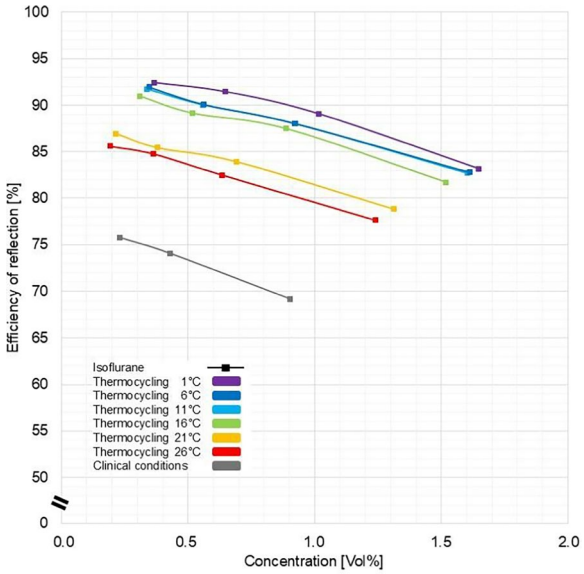


Figure 3 Efficiency of reflection depending on the concentration of isoflurane across all temperature levels

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[3] Own financing

Topic: Sedation, analgesia and delirium.

001578

Severe acute respiratory infections (SARI): insights from a tunisian sentinel surveillance study 2022–2025

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Intensive Care Medicine Experimental 2025,* 13(1)*:001578

Introduction: Severe acute respiratory infections (SARI) remain a significant public health concern globally, particularly in resource-limited settings. In Tunisia, sentinel surveillance systems play a crucial role in monitoring SARI trends, etiological agents, and risk factors.

Objectives: This study aims to describe the clinical and therapeutic features of SARI cases admitted to a sentinel surveillance center in Tunisia and to determine the factors associated with mortality.

Methods: We conducted a retrospective analysis of SARI cases admitted between October 2022 and April 2025 (during three influenza seasons) in the intensive care unit (ICU) of Zaghouan's regional hospital, a Tunisian sentinel site. Data on demographics, clinical presentation, comorbidities, outcomes, and laboratory results were collected. Descriptive statistics and multivariate analyses were performed to identify factors associated with severe outcomes.

Results: Among 131 patients meeting the WHO SARI case definition who underwent a nasopharyngeal sampling, 65 (49%) were positive. The mean age was 52 years ± 16SD, with 90% having underlying conditions (chronic respiratory disease in 58%, heart disease in 29%, diabetes in 35%). Seventeen percent of patients admitted already required home mechanical ventilation or home oxygen therapy. Severity scores were calculated upon admission using the Simplified Acute Physiology Score II (SAPS II) and Chronic Health Evaluation II (APACHE II), with values of 27 ± 14SD and 10 ± 6SD, respectively. Influenza viruses were detected in 52% of cases (respectively, A/H1N1 in 40%, A/H3N2 in 8%, B in 5%), while other pathogens accounted for 48% (Rhinovirus 21%, RSV 5%, SARS-CoV-2 9%, bacterial co-infections 4%). All patients had signs of respiratory distress upon admission, circulatory failure was noted in 13 cases (20%), neurological distress in 8 (12%) and acute kidney injury in 12 (18%). Invasive mechanical ventilation (IMV) was needed in 23 patients (35%) with a mean duration of 6 days ± 2. Antibiotics were initially prescribed for 51 patients (78%) and antivirals for 31 (48%). Health-associated infections occurred in 19 patients (29%). Ventilator-associated pneumonia (VAP) was the most frequent infection (15%) followed by urinary tract infection (UTI) (6%). Intra-hospital mortality was 18%, with a higher rate among elderly patients and those with comorbidities.

In multivariate analysis, *rhinovirus* infection emerged as a protective factor against mortality ($p = 0.042$), with antiviral treatment showing similar significance ($p = 0.042$). Significant risk factors associated with mortality included COVID-19 infection ($p = 0.002$), organ failure ($p = 0.001$), invasive mechanical ventilation ($p < 0.001$) and septic shock ($p < 0.001$).

Conclusions: *Rhinovirus* infection was protective against mortality, while COVID-19, organ failure, and invasive ventilation were associated with poor outcomes. These results emphasize the importance of pathogen-specific management and critical care optimization in resource-limited settings.

Topic: Acute respiratory failure and mechanical ventilation.

001579

Immunotherapies for sepsis induced-immunosuppression: recombinant IL-7 but not Nivolumab partially restores CD4 + lymphocyte function in septic patients ex vivo

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Introduction: Sepsis survivors are at increased risk of subsequent infection due to persistent immunosuppression. This is associated with characteristic features in lymphocytes including lymphopenia, increased apoptosis mediated by increased PD-1 expression, cell anergy (reduced cytokine release), and an increase in immunosuppressive regulatory subtypes (Treg). [1].

Immunotherapies targeting lymphocyte proliferation pathways (e.g., recombinant IL-7 (rIL-7) or the PD-1–PD-L1 pathway (e.g., nivolumab) have not yet shown clinical benefit.[2].

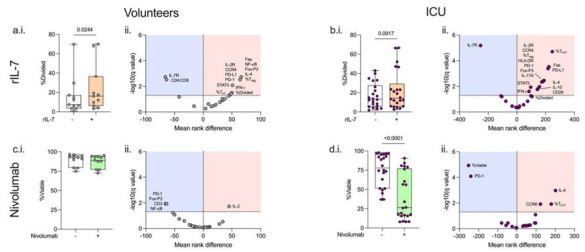
This may be because immunotherapies which target and improve one specific lymphocyte pathway may not improve overall cell immunophenotype or function.

Objectives: Do immunotherapies targeting CD4 + lymphocytes improve overall cell function in response to a secondary infection?

Methods: Peripheral blood mononuclear cells (PBMCs) were isolated from healthy volunteers and from septic ICU patients. To model the lymphocyte response to a secondary infection, PBMCs were stimulated ex vivo for 72 h with or without CD3/28 beads, and co-incubated with or without rIL-7 (100 ng/ml) or nivolumab (10 mg/ml).

Spectral flow cytometry was used to assess multiple CD4 + lymphocyte immunophenotype and functions including: **activation** (CD3, CD4, CD8, CD19, CD28, HLA-DR, NF-κB), **suppression** (CTLA-4, PD-L1), **proliferation** (CellTrace, IL-7R), **differentiation** (IL-2R, IL-2, CCR4,

CCR6, IL-4, IL-17A, FoxP3, STAT5, T-bet), **cell death** (Live-dead, Fas, PD-1), and **cytokine Release** (IL-10, IFN- γ).
Proliferation was assessed by calculating the percentage (%) of divided cells and viability by calculating the % of live cells and compared using Wilcoxon or Mann–Whitney test (paired and unpaired data, respectively). Lymphocyte function was analysed using multiple Mann–Whitney tests, Volcano plots were generated using a false discovery rate of 5%.
Results: 24 ICU patients (10 [42%] non-survivors) and 11 volunteers were recruited.[3] CD4 + lymphocytes from ICU patients displayed a blunted response to bead stimulation with features of anergy (data not shown) compared to volunteers.
After stimulation with rIL-7, volunteer CD4 + lymphocytes showed increased proliferation (*Fig a.i.*), while ICU patients only demonstrated a non-significant increase (*Fig b.ii.*). However, in both cohorts, there were increases in markers of activation, differentiation and cytokine release (*Fig a.ii.* and *b.ii.*) suggestive a reversal of the anergic immunophenotype.
After stimulation with nivolumab, there was no effect on volunteer CD4 + lymphocytes cell viability (*Fig c.i.*) but a reduction in viability in ICU patients (*Fig d.i.*). This effect was not seen in lymphocytes in the absence of CD3/28 beads (data not shown). Few additional effects were seen in volunteers (*Fig c.ii.*) but in ICU patients there was an increase in markers of differentiation (*Fig d.ii.*).
Conclusions: CD4 + lymphocytes from septic patients display an immunosuppressive phenotype and are unable to respond to a secondary infection. rIL-7 partially restores CD4 + lymphocyte function with increases in cell proliferation and multiple other cell functions suggesting a clinical benefit. Nivolumab; however, paradoxically enhanced cell death although further work is required to explore this finding.



PBMCs from volunteers (n = 11, grey dots) and ICU patients (n = 24, purple dots) were stimulated for 72h with CD3/28 beads and in the presence or absence of rIL-7 (top row, a. and b.) or nivolumab (bottom row, c. and d.). The effect of rIL-7 on cell proliferation was assessed using CellTrace (expressed as percentage of cells which had divided, a.i. and b.i.), while the effect of nivolumab was assessed using cell viability (c.i. and c.ii.). Data compared using Wilcoxon test and dispalyed as individual volunteer/patient (dot), median (horizontal line), interquartile range (box) and range (whisker).
The effect of the immunotherapy on overall cell function is displayed using volcano plots (ii.), where the shaded red area shows markers which have significantly increased with the therapy, while the blue area shows markers which have significantly decreased and all are listed. Each dot represents the median of all the volunteers or patients.

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4. UCL Precision AMR
5. RCOA/BJA
6. Intensive Care Society
7. European Society of Intenisve Care Medicine
8. Medical Research Council UK

Topic: Sepsis.

001580

Prognostic value of electroencephalogram in brain-injured patients admitted to the ICU

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Intensive Care Medicine Experimental 2025,* 13(1)*:001580

Introduction: Electroencephalogram (EEG) is commonly used in ICU to evaluate brain function in patients with severe traumatic brain injury (TBI). While its diagnostic value is well established, its prognostic role remains unclear.
Objectives: This study aims to assess the performance of EEG to predict prognosis in critically TBI.
Methods: We conducted a retrospective descriptive study over 6 years (2019–2025) in the ICU of Zaghouan Regional Hospital. We included patients with severe TBI. EEG was performed in cases of delayed awakening, suspected encephalitis, or epilepsy to assess brain function and prognostic value.
Results: A total of 35 patients with severe TBI were included. The mean age was 43 ± 17 years, with a gender ratio of 7. Median SAPS II and APACHE II scores were 36 [27–41] and 13 ± 6, respectively. Relevant past medical history included psychiatric disorders (5%), epilepsy (10%), and chronic alcohol use (40%).
At admission, 12% of patients had experienced cardiac arrest (mean downtime 9 ± 1 min). Seizures were present in 60%. Median initial Glasgow coma scale was 6 [3–10], with preserved brainstem reflexes in all cases. Initial brain CT scan was abnormal in 80%, revealing edema (50%), ischemic stroke (15%), hemorrhage (80%), and hematoma (65%).
Osmotherapy was indicated in 60% of patients, and neurosurgical intervention in 16% of cases. Antiepileptic drugs were prescribed in 84% of patients. Orotracheal intubation was indicated in all patients with a median length of mechanical ventilation of 21 days and 63% of patients underwent tracheostomy. Vasoactive agents were used in 71% of cases. Median ICU stay was 32 days, and the mortality rate was 20%.
EEG was primarily indicated for delayed awakening (60%), epilepsy monitoring (28%), and suspicion of seizures (12%). The median time to

first EEG was 8 days [6–17] within X days after discontinuing sedation. EEG findings were normal in 32%of cases, showed cerebral suffering in 52% of cases (93% moderate, 7% severe), status epilepticus in 11%of cases, and post-anoxic encephalopathy in 5% of cases. A second EEG was performed in 15% of patients (median day 12 [11–14]), showing improvement in 5% of patients, worsening in 5% of patients, and stable findings in 5% of patients.
At discharge, 40% of patients had neurological sequelae: motor deficits (10%), frontal syndrome (10%), memory impairment (5%), fluctuating consciousness (5%), and vegetative state (5%).
Univariate analysis revealed that cardiac arrest was significantly associated with cerebral suffering on EEG ($p = 0.037$), the development of neurological sequelae ($p = 0.009$), and a trend toward higher mortality ($p = 0.07$). Multivariate analysis confirmed that cardiac arrest remained an independent risk factor for neurological sequelae ($p = 0.035$, OR = 22.9; IC95%[1.237–423.816]).
Conclusions: Cerebral suffering was a significant risk factor for the persistence of neurological sequelae.
EEG can predict neurological prognosis of patients with severe TBI, particularly in detecting cerebral suffering and guiding clinical management.

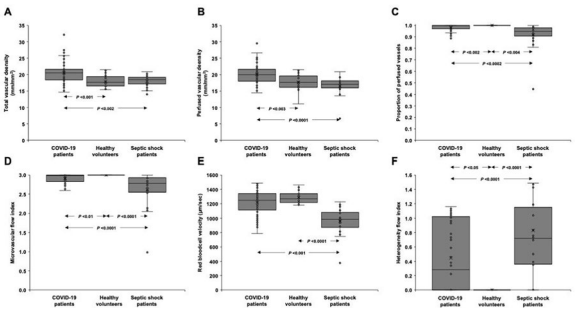
Topic: Neurointensive care.

001581

Different microcirculatory patterns in patients with COVID-19 ARDS and with septic shock: a multicenter cross-sectional study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001581

Introduction: COVID-19 is an inflammatory disease with a complex pathophysiology that involves a dysregulated systemic immune response. The development of multiple organ failure has been related to endothelial activation and widespread microthrombosis (1). Therefore, there is a compelling need for studying microcirculation in COVID-19 critical patients. Nevertheless, reports about the characteristics of sublingual microcirculation in this population are controversial. In fact, total vascular density has been described as decreased, normal, or increased (2, 3).
Objectives: Our goal was to assess comprehensively the sublingual microcirculation in patients with COVID-19, comparing it with that of patients with septic shock and with healthy volunteers.
Methods: This was a multicenter cross-sectional study. IRB approval was obtained from all the ICUs. We included mechanically ventilated patients with ARDS secondary to COVID-19 ($n = 62$) and with septic shock ($n = 20$), from four intensive care units. We also studied healthy volunteers ($n = 20$). Sublingual microcirculation was assessed by videomicroscopy.
Results: Patients with COVID-19 exhibited a distinctive pattern of sublingual microcirculation, mainly characterized by increased vascular density. This finding could be secondary to enhanced angiogenesis. TVD was independently associated with PPV, SOFA score, base excess, and hematocrit. On the other hand, the convective variables of microvascular perfusion only showed minor alterations. Therefore, this study adds evidence showing that patients with COVID-19 have a distinctive pattern of microcirculatory flow.
Conclusions: Patients with COVID-19 exhibited a distinctive pattern of sublingual microcirculation, mainly characterized by increased vascular density. This finding could be secondary to enhanced angiogenesis. TVD was independently associated with PPV, SOFA score, base excess, and hematocrit. On the other hand and contrary to septic patients, the convective variables of microvascular perfusion only showed minor alterations.



Patients with COVID-19 exhibited a distinctive pattern of sublingual microcirculation, mainly characterized by increased vascular density. This finding could be secondary to enhanced angiogenesis. TVD was independently associated with PPV, SOFA score, base excess, and hematocrit. On the other hand, the convective variables of microvascular perfusion only showed minor alterations. Therefore, this study adds evidence showing that patients with COVID-19 have a distinctive pattern of microcirculatory flow.

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4. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors

Topic: Acute respiratory failure and mechanical ventilation.

001583

Thromboembolic complications in severely burned children

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Intensive Care Medicine Experimental 2025,* 13(1)*:001583

Introduction: Severe burns induced hypercoagulable state, either in the acute or recovery phase, and exposed patients to thromboembolic complications, often underdiagnosed. Few studies were interested to these complications in burned children, highlighting the importance of our research.
Objectives: The aim of this study was to determine the incidence of thromboembolic complications (TBEC) in burned children and study their clinical and evolutionary characteristics.
Methods: A retrospective descriptive study conducted in the burn intensive care unit over an 8-year period (January 1, 2018–January 1, 2025). All patients under 18 years admitted for severe burns and developed thromboembolic complications (deep veinthrombosis and pulmonary embolism) were included. Epidemiological, clinical, and prognostic data of these patients were collected and analyzed.

Results: During the study period, 511 children with burns were admitted. Among them, 11 developed thromboembolic complications (incidence of 2.2%). The median age of these patients was 16 [9–16] years, with a sex ratio of 4.5. Burns were secondary to domestic accidents in eight cases and suicide attempts in three cases. Thermal burns occurred in eight cases and electrical burns in three cases. All patients were transferred from other hospitals. The median burned body surface area was 40% [20–55]. All patients had burns involving the lower limbs and were fitted with central venous catheters. Nine patients required invasive mechanical ventilation. TBEC occurred after a mean delay of 20 ± 10 days. Deep veinthrombosis was observed in five cases, and pulmonary embolismin 6 cases. All patients had received prophylactic anticoagulation upon admission. Thrombolysis was necessary for two patients. The median length of ICU stay was 29 days [10–67], with a mortality of 82% (9/11 patients).
Conclusions: This study reveals that the incidence of thromboembolic complications in burned childrenis was 2.2%. These complications occur late, primarily in patients with extensive burns, lower limb burns, and venous catheterization.

Topic: Cardiovascular issues in ICU.

001585

Managing severe asthma exacerbations with non-invasive ventilation: a strategy to prevent intubation

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Intensive Care Medicine Experimental 2025,* 13(1)*:001585

Introduction: Severe asthma exacerbations may result in acute respiratory failure requiring ventilatory support: noninvasive ventilation (NIV) has emerged as a potential alternative to invasive mechanical ventilation (IMV) in selected cases.

Objectives: This study aimed to evaluate the effectiveness and outcomes of NIV in patients admitted to the ICU for severe asthma exacerbations.
Methods: We conducted a retrospective descriptive study over 6 years (2019–2025) in the ICU of Zaghouan Regional Hospital, Tunisia. We included all patients admitted for severe asthma exacerbation who received at least one NIV session. NIV was initiated at admission, with each session lasting 2–4 h, up to three sessions per day. The need for IMV defined NIV failure. NIV-related complications were recorded as secondary outcomes.

Results: Twenty-four patients were included (mean age: 41 ± 15 years). Mean SAPS II was 22.5 ± 10, and median APACHE II was 8 [2–28]. Median asthma duration was 10 years [4–20]. Asthma was intermittent in 33.3%, mild persistent in 37.5%, moderate persistent in 20.8%, and severe persistent in 8.2%. Maintenance therapy was lacking in 12.5%. Adherence was good in 47.6% and poor in 52.4%. One-third had prior ICU stays; 8.3% had required IMV before.
Triggers included allergens (12.5%), poor adherence (12.5%), and COVID-19 (5%). Pneumonia was present in 45% of cases (viral: 54% mostly rhinovirus; bacterial: 42% mainly pneumococcus; mixed: 4%). Tracheobronchitis was observed in 25%.
At admission, the respiratory rate was 32 ± 6 breaths/min. Speech limitation was noted in 58.3%, and 87.5% showed signs of increased work of breathing. ABGs showed: pH 7.33 ± 0.12, $PaCO_2$ 44.6 ± 14.4 mmHg, PaO_2 95.8 ± 45.3 mmHg, HCO_3 25 ± 8 mmol/L, and SaO_2 93 ± 5%.
NIV was indicated for altered respiratory mechanics (75%) and hypoxemia (25%). Initial settings included IPAP 8 ± 2 cmH_2O, PEEP 5 ± 2 cmH_2O, FiO_2 49 ± 24.6%, inspiratory trigger − 1 to − 2 cmH_2O, expiratory trigger 25%, and rise time 300–500 ms. Median session duration was 3 ± 1 h.
Post-NIV ABGs showed improved gas exchange: pH 7.40 ± 0.05, $PaCO_2$ 36.7 ± 8 mmHg, and P/F ratio 285 ± 100. NIV succeeded in 79% of patients; 20.8% required IMV. No barotrauma was reported. One nasal pressure ulcer occurred.
Median ICU stay was 5 [3–8] days. In-ICU mortality was 8.3%. NIV success was associated with higher survival ($p = 0.004$). Favorable factors included male sex ($p = 0.034$), younger age (37 vs. 53 years, $p = 0.041$), lower SAPS II (18 vs. 36, $p = 0.00$), shorter symptom duration (4 vs. 6 days, $p = 0.008$), lower PEEP (5 vs. 10 cmH_2O, $p = 0.008$), and lower FiO_2 (42% vs. 100%, $p = 0.001$). NIV success significantly reduced IMV need ($p < 10–3$).
Conclusions: NIV improved respiratory parameters and reduced IMV requirement in severe asthma exacerbations. Its success was linked to better survival and specific clinical and ventilatory factors.

Topic: Acute respiratory failure and mechanical ventilation.

001588

Nosocomial urinary tract infections: a 10-year tale of prevention, surveillance and microbiological challenges

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Introduction: Patients in intensive care units (ICUs) are at high risk for healthcare-acquired infections (HAI) due to the high prevalence of invasive procedures and devices, induced immunosuppression, comorbidity, frailty and increased age.
Urinary tract infections (UTIs) are among the most common HAIs. The presence of a urinary catheter and the duration of exposure—allowing continuous access of organisms into the urinary bladder—are the main risk factors, but other host factors and healthcare related variables can also affect the risk of its development.
Quality improvement actions focused primarily on antimicrobial management and prevention of healthcare-associated infection are feasible and have the potential to decrease antibiotic use and healthcare-associated infection rates. Periodic audit procedures allow for protocol updates, with the goal of future improvements in outcomes.
Methods: A single-centre retrospective analysis was made, including all patients admitted in the intensive care unit (ICU) for more than 48 h over a period of 10 years (2015–2024). The main focus was on the assessment of incidence in the context of the broadening of admission criteria witnessed in this period, length of ICU stay and previous hospitalisation time, length of use of urinary catheter and emergence of multirresistant microorganisms. Furthermore, this included an audit of antibiotic prescription and preventative care practices. The diagnosis of nosocomial infections was done using the criteria from the HELICS-ICU program.
Results: A total of 2742 admissions were included in this analysis, accounting for 26,458 days of urinary catheterisation. A total of 112 nosocomial UTIs were diagnosed in this period.
The number of catheterisation days kept stable over the period of study, which means an actual reduction in catheterisation period per patient, as the number of ICU admissions per year.
nearly doubled in the same period. The length of ICU stay has noticeably decreased from an average of 12.2 days in 2015 to under 9 in 2024.
The number of infections per year also decreased over time, as have the percentages of multirresistant to drugs (MDR) bacterial isolates. In 2024 the lowest number of diagnosis was achieved for the period and none of the infections was caused by MDR bacteria.

Conclusions: Consistent preventative efforts and assertive antimicrobial stewardship programmes, along with increased support from the microbiology laboratory correlates with improving ICU results.

Topic: Infections and prevention.

001589

Azithromycin effect on vascular smooth muscle

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Introduction: Azithromycin (AZM) has been used in sepsis treatment due to its bacteriostatic and immunomodulatory effects and seems to decrease mortality and ICU stay in critically ill patients [1, 2]. Even though AZM has been shown to induce autophagy in smooth muscle cells, mainly in proliferating ones that are critical for remodeling [3] and arrhythmogenic effects have been reported [4], the effects on vessels have not been elucidated yet. However, the implication of vascular effects in sepsis is of great importance, due mainly to the use of vasoreactive drugs during sepsis treatment.
Objectives: The aim of the present study was to investigate the effect of AZM on vessels, using both rabbit aortic SMC primary cultures (cellular level) and rabbit aortic rings (tissue level).
Methods: Cells and tissues were incubated with AZM (1-10 μM) in actively proliferating (in the presence of 10%FBS) and non-proliferating cells for 24–72 h. In cell cultures, the effect of AZM on autophagy was observed microscopically, in the presence or absence of the autophagy inhibitor 3methyladenine (3MA, 5 mM). Cell viability was evaluated with Trypan blue staining. In aortic rings, the AZM (10 μm) effect was studied after tissue sectioning and with the use of Cresyl Violet, Toluidine Blue and H&E stains as well as immunofluorescent localization of the autophagy markers Beclin1 and LC3. The inhibition of inflammation by AZM was examined with ELISA for IL-1b and TNF-a concentrations evaluation.
Results: In vascular smooth muscle cell (VSMCs) cultures, cell incubation for 24–72 h with AZM (1-10μM), in both cell phenotypes (Fig. 1A, B), reduces cell number and induces the appearance of autophagic vacuoles (Fig. 1C). In proliferating VSMCs the effect of AZM on their number became apparent as early as after 24 h in culture (Fig. 1B). This effect was reversed by either AZM exclusion from the culture or in the presence of 3MA (5 mM), verifying the induction of autophagy. Furthermore, incubation of aortic rings for 24 h with AZM (0.1 or 10μM) increased Beclin1 and LC3 immunoreactivity and promoted alterations in smooth muscle appearance (Fig. 2). In addition, AZM reduced IL-1b and TNF-a concentrations, showing the anti-inflammatory effect of AZM.
Conclusions: AZM induces autophagy in vascular smooth muscles both in the cellular and the tissue level. The observed effect could demonstrate a positive way of azithromycin action beyond its antimicrobial and anti-inflammatory properties that could be of significance during sepsis.

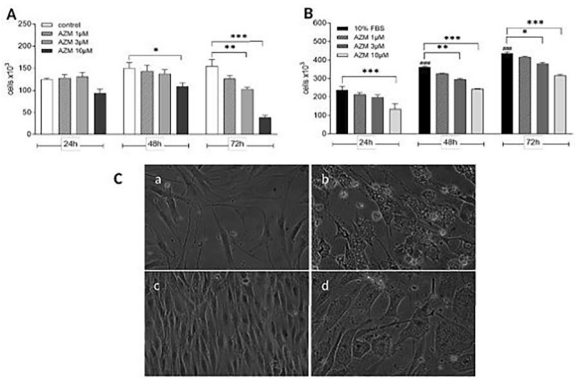


Figure 1 **A, B** Effect of azithromycin (AZM 1 μM, 3 μM and 10μM) on VSMC number after 24h, 48h and 72h of incubation, in non-proliferating (A) or proliferating in the presence of 10%FBS cells (**B**). Values are presented as means (SE) of 4 independent experiments. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$, compared to values of the relative control or 10% FBS alone and ###$p < 0.001$, compared to cells incubated in the presence of 10% FBS for 24h
AZM 10-7M
AZM 10-5M
C Effect of azithromycin (10μM) for 72h on VSMC morphology. Non-proliferating cells were incubated in the absence (a) or presence of AZM (b) or proliferating cells incubated in 10% FBS alone (c) and 10% FBS with AZM (d). Photos were taken with inverted microscope at 40 × magnification.

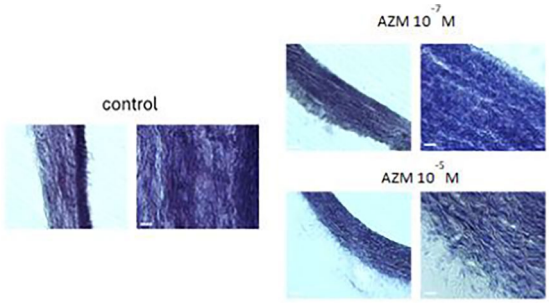


Figure 2 Histochemistry in rabbit aortic ring slices using cresyl violet. Photos are taken under an optical microscope in 10 × magnification (left panel, scale = 100μm) or 40x (right panel, scale = 20μm).

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Topic: Pharmacology and Toxicology/Poisoning.

001591

Comparison of neuron-specific enolase, tau-protein, neuro-filament light chain, galectin-3 values and their combination for early outcome prediction in cardiac arrest survivors

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Introduction: Early and precise prognosis determination in cardiac arrest survivors remains challenging despite multimodal approach. Currently, the only guidelines-recommended biomarker for early prognostication is neuron-specific enolase (NSE).
Objectives: The aim of this study was to compare prognostic values of NSE with novel biomarkers serum tau protein (Tau), neuro-filament light chain (Nfl) and Galectin-3 (Gal) at different timepoints after cardiac arrest and with combination of all four biomarkers.
Methods: This single-center prospective study included out-of-hospital cardiac arrest survivors. All patients underwent targeted temperature management (33 °C for 24 h) using an endovascular cooling device. Blood samples for measuring NSE, Tau, NfL, and Gal levels were collected at 24 h (D1), 48 h (D2), 72 h (D3), and 96 h (D4) after hospital admission. Neurological outcomes at 30 days were assessed using the Modified Rankin Scale (mRS), with poor outcomes defined as mRS scores of 4–6. The prognostic value of each biomarker for predicting poor outcomes was evaluated using receiver operating characteristic (ROC) analysis.
Results: A total of 82 cardiac arrest survivors (mean age 62 years) were enrolled in the study. The area under the ROC curve (AUC) for NSE was 0.793 ($P < 0.0001$) at D1, 0.911 ($P < 0.0001$) at D2, 0.966 ($P < 0.0001$) at D3, and 0.976 ($P < 0.0001$) at D4. For Tau, the AUC was 0.798 ($P < 0.0001$) at D1, 0.914 ($P < 0.0001$) at D2, 0.925 ($P < 0.0001$) at D3, and 0.952 ($P < 0.0001$) at D4. The AUC for NfL was 0.727 ($P = 0.0001$) at D1, 0.873 ($P < 0.0001$) at D2, 0.935 ($P < 0.0001$) at D3, and 0.932 ($P < 0.0001$) at D4. Gal showed an AUC of 0.644 ($P = 0.0259$) at D1, but was not significant at later timepoints (D2–D4).
Comparison of ROC curves revealed significantly lower AUC for Gal in comparison to other biomarkers from D2 to D4. Numerically, Tau had the highest AUC at D1, while NSE showed the highest AUC at D2, D3, and D4. The highest sensitivity for the prediction of poor prognosis with 100% specificity was detected for Tau at D1 (14.3%) and for NSE at D2 (69.4%) D3 (79.3%) or D4 (82.6%). Multiple logistic regression revealed that combination of all four biomarkers may predict poor prognosis already at D1 with 100% specificity and 21% sensitivity (AUC 0.8291, $P < 0.0001$).
Conclusions: Our findings suggest that the novel biomarkers Tau and NfL have comparable prognostic value to NSE between 48 and 96 h after cardiac arrest. On the first day, Tau demonstrates the highest predictive accuracy, followed by NSE. Gal provides prognostic information only at 24 h. Combining all four biomarkers may enhance early outcome prediction, offering high predictive value as early as the first day post-admission.

Topic: Cardiac arrest.

001593

Comparison of vasopressin-first weaning vs. norepinephrine-first weaning in critically ill patients

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Introduction: Septic shock is a critical condition requiring vasopressor support and mechanical ventilation. The sequence of vasopressor weaning may affect clinical outcomes, such as mechanical ventilation duration and patient survival.
Objectives: This study assesses how vasopressor weaning order affects hemodynamic stability, clinical outcomes, and the length of mechanical ventilation in critically sick septic shock patients.
Methods: A retrospective cohort study was conducted at Prince Sultan Military Medical City, Riyadh, Saudi Arabia, from January 2022 to December 2023. Critically ill adult patients receiving intravenous norepinephrine and vasopressin for septic shock and requiring mechanical ventilation were included. Patients were classified into two groups: vasopressin weaned first or norepinephrine weaned first. The duration of mechanical ventilation was the main outcome. These were secondary outcomes: mean arterial pressure (MAP) stability, 30-day in-hospital mortality, length of stay (LOS) in the intensive care unit and hospital, and rates of reintubation.
Results: Among 100 patients (mean age: 65.1 ± 19.7 years; 58% male), vasopressin was weaned first in 47 patients (47%) and norepinephrine first in 53 (53%). Patients extubated while on vasopressors (vasopressin weaned first) had a shorter median duration of mechanical ventilation (4 days) and lower odds of mortality (adjusted OR = 0.30, 95% CI 0.09–0.98; $P = 0.046$) compared to those weaned off norepinephrine first. No significant differences were observed in MAP stability, reintubation rates, or LOS.
Conclusions: Weaning vasopressin before norepinephrine may be associated with improved survival and reduced mechanical ventilation duration in septic shock patients, although further research is needed to validate these findings and optimize vasopressor weaning strategies.

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Topic: Acute respiratory failure and mechanical ventilation.

001595

BV100 (Rifabutin for infusion) as a rescue therapy in ventilator associated pneumonia caused by carbapenem resistant *Acinetobacter baumannii*

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Introduction: Ventilator-associated pneumonia (VAP) caused by carbapenem-resistant *Acinetobacter baumannii* (CRAB), is a difficult to treat infection associated with significant morbidity and mortality. BV100 (Rifabutin for infusion) is under development for treatment of serious infections caused by CRAB and was recently evaluated in a Phase 2 clinical trial consisting of Part A mainly focused on PK in VAP patients and in a Part B designed as rescue therapy.
Objectives: We evaluated the efficacy, safety and tolerability of BV100 in Part B, as rescue therapy, in critically ill patients with VAP, caused by CRAB, in whom empiric treatment has failed, and/or CRAB was also resistant to colistin.
Methods: In the study were included adult patients with signs and symptoms of VAP caused by CRAB in whom empiric treatment has failed, and/or CRAB was additionally resistant to colistin. Initial diagnosis of CRAB was performed by a rapid diagnostic test and consequently confirmed by endotracheal aspirates (ETA) culture developing *A. baumannii*. BV100 300 mg twice daily was added to best available treatment. Follow-up ETA cultures were obtained and treatment duration ranged from 7 to 14 days. Microbiological success was defined as eradication of CRAB from ETA cultures and clinical success as remission of signs and symptoms of VAP.
Results: A total of eight patients were included in the study. Median APACHE II, SOFA, and CPIS score were 15, 6, and 8, respectively. In three patients, ETA cultures revealed polymicrobial infections, caused by *K. pneumonia*, *P. aeruginosa,* and *S. marcescens*. Best available treatment consisted of meropenem, colistin, linezolide, ampicilline/sulbactam, or ceftazidime/avibactam. Two patients succumbed due to septic shock: 1–2 days after initiation of treatment and the other post-treatment because of acalculus cholocystitis. Six patients survived achieving both microbiological and clinical cure. No treatment related serious adverse events or adverse events were reported.
Conclusions: BV100 demonstrated good tolerance and a favorable safety profile. It emerges as a promising therapeutic option for VAP caused by multidrug-resistant *A. baumannii*, thereby necessitating further investigation.

Topic: Infections and prevention.

001598

Too old for ICU? predictors of hospital mortality in a mixed intensive care unit

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Introduction: Over the past decade, the number of patients aged 80 years or older admitted to intensive care units (ICUs) has steadily increased. This demographic trend raises important clinical and ethical challenges, as "very old" patients frequently present with multiple comorbidities and are at increased risk of poor outcomes, including high mortality and significant functional decline following ICU care.
Methods: We conducted a retrospective cohort study of 172 very old patients admitted to a mixed European ICU over a 3-year period. Primary outcome was hospital mortality. Demographic and clinical variables, including SAPS II and SOFA scores, were analysed to identify predictors of mortality. Discrimination was assessed using receiver operating characteristic (ROC) curves; calibration was evaluated using the Hosmer–Lemeshow test.
Results: The median age was 84 years (IQR, 82–87), and 64.5% were male. Hospital mortality was 48.8%. Median SAPS II and SOFA scores were 52 (IQR, 41–64) and 6 (IQR, 4–8.75), respectively, with a standardized mortality ratio of 0.94. Mortality was not associated with age, ICU stay, or hospital length of stay, but was significantly associated with male sex ($p = 0.030$), higher level of care, endotracheal intubation, and vasopressor use (all $p < 0.001$). SAPS II and SOFA scores were significantly higher among non-survivors ($p < 0.001$), demonstrated good discrimination (AUC = 0.735 and 0.737, respectively), and showed adequate calibration (Hosmer–Lemeshow $\chi^2 = 7.114$, $p = 0.524$). Both scores remained independent predictors of hospital mortality in multivariate analysis (SAPS II: adjusted OR 1.038, 95% CI 1.008–1.068; $p = 0.013$; SOFA: adjusted OR 1.161, 95% CI 1.012–1.331; $p = 0.033$). Point-biserial correlations confirmed moderate, significant associations between both scores and mortality ($r = 0.400$ and 0.403; $p < 0.001$).
Conclusions: In "very old" ICU patients, higher severity scores, level of care, and invasive interventions are strongly associated with hospital mortality. Further studies are warranted to clarify whether these variables reflect only acute severity of disease or also underlying functional status prior to admission. Prospectivestudies should also explore long-term impact on functional outcomes and quality of life after hospital discharge.

Topic: Health Services Research and Outcome.

001600

Reassessing the role of tracheostomy in TBI management: survival advantage without functional compromise?

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Intensive Care Medicine Experimental 2025,* 13(1)*:001600

Introduction: Traumatic brain injury (TBI) remains a major indication for admission to Intensive Care Units (ICUs) worldwide. The requirement for prolonged invasive mechanical ventilation (IMV) in this context often raises the consideration for tracheostomy (TQ). However, its influence on long-term outcomes such as mortality and neurological recovery continues to be debated.
Objectives: To investigate the association between tracheostomy and key clinical outcomes in patients with TBI, including duration of IMV, ICU length of stay, mortality, and functional recovery assessed using the Glasgow Outcome Scale (GOS). A secondary objective was to examine whether the severity of TBI at admission influences mortality or functional prognosis.
Methods: We conducted a retrospective observational study of 82 adult patients admitted with TBI to a mixed medical-surgical ICU between 2021 and 2023. Collected variables included demographic characteristics, TBI severity (mild, moderate, severe), duration of IMV, ICU stay, occurrence of reintubation, TQ performance and timing, in-hospital mortality, and functional outcomes at 3 and 6 months. Favorable neurological recovery was defined as GOS 4 or 5.
Results: Among the 82 patients, 28 (34%) underwent TQ. Patients in the TQ group had significantly prolonged ICU stays (22.9 vs. 6.6 days, $p < 0.00001$) and IMV duration (18.8 vs. 5.4 days, $p < 0.00001$), reflecting greater clinical complexity. Notably, in-hospital mortality was markedly lower in the tracheostomised group (7% vs. 59%, $p = 0.000003$). Although the proportion of patients achieving favorable functional outcomes at 6 months was higher in the TQ group (32% vs. 24%), this

difference was not statistically significant ($p = 0.44$). TBI severity at ICU admission was positively correlated with mortality ($p = 0.003$), but not with long-term functional recovery ($p = 0.36$). A trend toward lower TBI severity in the TQ group was observed, though this did not reach statistical significance ($p = 0.066$), suggesting that the observed mortality benefit may not be entirely attributable to baseline injury severity.
Conclusions: Patients with TBI who underwent tracheostomy exhibited significantly lower mortality rates. Despite the absence of a statistically significant difference in favorable functional outcomes, a positive trend was noted in the TQ group. The mortality benefit observed does not appear to be solely explained by differences in initial TBI severity, supporting the potential role of tracheostomy as a beneficial intervention in the intensive care management of severe TBI.

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Topic: Neurointensive care.

001601

Neurosurgery in TBI: intervening early, but are we impacting late?

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Introduction: Traumatic brain injury (TBI) remains a leading cause of morbidity and mortality in critically ill patients. Neurosurgical interventions are often required in moderate to severe cases, yet their independent impact on patient outcomes remains debated, especially when accounting for baseline severity. Understanding the real-world effect of neurosurgery in the context of modern intensive care is essential to guide decision-making and resource allocation.
Objectives: To evaluate the impact of neurosurgical intervention on clinical outcomes in TBI patients admitted to the intensive care unit (ICU), with a specific focus on functional outcome at 3 and 6 months, ICU and hospital mortality, and the influence of intracranial pressure (ICP), Glasgow Coma Scale (GCS), and other prognostic markers.
Methods: We conducted a retrospective observational study over 3 years, including 82 patients admitted to a general ICU with a diagnosis of TBI. Patients were divided in two groups: those who underwent neurosurgical intervention within the first 24 h of ICU admission ($n = 40$), and those managed conservatively (n = 42). Variables analyzed included age, sex, GCS on admission, initial lactate, ICP (when monitored), length of ICU stay, type of neurosurgery, and outcomes such as Glasgow Outcome Scale (GOS) at 3 and 6 months, ICU and hospital mortality.
Results: Neurosurgical patients had a higher median GCS on admission compared to the non-surgical group (7 vs. 6, $p = 0.08$) and significantly longer ICU stays (13 vs. 7 days, $p = 0.02$). No statistically significant differences were observed in ICU mortality (35% with neurosurgery vs. 47.6% without, $p = 0.35$) or hospital mortality (26.9% vs. 13%, $p = 0.48$). The proportion of patients achieving a favorable functional outcome (GOS 4–5) at 6 months was 37% in the neurosurgical group, compared to 33% in the non-surgical group ($p = 0.53$). In multivariate regression analysis, neurosurgical intervention was not independently associated with improved GOS or mortality. Age and elevated ICP at admission were the strongest predictors of poor outcome ($p < 0.01$ and $p = 0.04$, respectively). GCS and lactate showed only marginal associations.
Conclusions: In routine ICU practice involving patients with TBI, neurosurgical intervention was not associated with a statistically significant difference in mortality or functional outcomes after adjusting for key prognostic variables. Age and intracranial pressure remain the most powerful independent predictors of prognosis. These findings underscore the need for individualized decision-making and further prospective studies to clarify the role of surgical intervention in specific TBI subpopulations.

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Topic: Neurointensive care.

001603

Cross-flow plasmapheresis in long-COVID: preliminary results from a double-blind, placebo controlled randomized clinical trial

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Intensive Care Medicine Experimental 2025, 13(1)*:001603*

Introduction: Background:
Long COVID presents a significant clinical and socioeconomic burden, often marked by persistent fatigue, cognitive impairment, and reduced physical function (1). Emerging evidence suggests a role for fibrin microclots and autoantibodies in its pathogenesis (1, 2, 3). Cross-flow plasmapheresis (PF) using gravity-driven microfiltration may offer a novel, scalable, and low-cost treatment by removing pathogenic plasma components (4).

Methods: A single-center, double-blind, placebo-controlled randomized clinical trial was conducted to evaluate the efficacy, safety, and feasibility of PF in patients with Long COVID. Twenty-four adults meeting specific diagnostic thresholds (Chalder Fatigue Scale $\geq$ 6/11; SF-36 Physical Function $\leq$ 65/100) were randomized (1:1) to receive five sessions of either PF (n = 12) or sham treatment (placebo, n = 12). The primary endpoint was defined as a $\geq$ 30% reduction in Chalder Fatigue Scale scores at 90-day post-treatment (5, 6). Secondary outcomes included absolute and relative changes in fatigue, physical function (SF-36), laboratory biomarkers, adverse events, and procedural feasibility.
Results: Fourteen participants completed 90-day assessments (PF: n = 9; placebo: n = 5). PF led to a statistically significant relative reduction of 55% in fatigue scores (mean Chalder score decreased from 21.1 to 9.56; p = 0.0004, with a p = 0.0004) (Fig. 1). In contrast, the placebo group saw a 37% reduction (20.4–12.8; p = 0.1879). Improvement in physical function (SF-36) was also observed, with PF patients demonstrating a 70% increase (305.1–519.7; p = 0.0019) vs. 47% in the placebo group (316.6–465.2; p = 0.0630). Between-group differences, however, did not reach statistical significance for Chalder score (p = 0.8194) and SF-36 score (p = 0.8094). The intervention was well-tolerated, with no severe adverse events or procedural complications. Vascular access was successfully achieved in all patients using only peripheral lines.
Conclusions: Interim results suggest that cross-flow plasmapheresis may offer a safe and effective approach to alleviating fatigue in long COVID patients. While improvements in physical function were promising, statistical significance was limited by a small sample size.

The procedure's technical feasibility and absence of adverse events further support its potential utility. Final results from the full trial cohort (n = 24) are awaited to confirm therapeutic efficacy and inform broader clinical application.

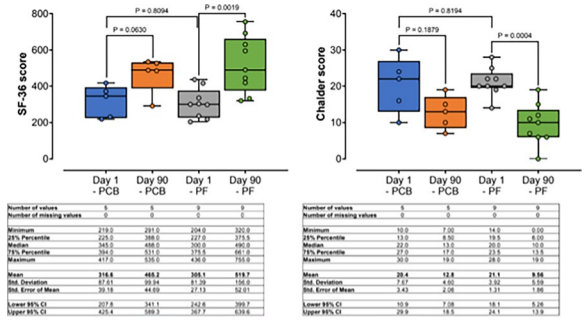


Figure 1 Boxplots of SF-36 score and Chalders score on day 1 and day 90 for plasmapheresis (PF) group vs. placebo (PCB) group

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7. This research is supported by Academic Hospital Paramaribo

Topic: Health Services Research and Outcome.

001605

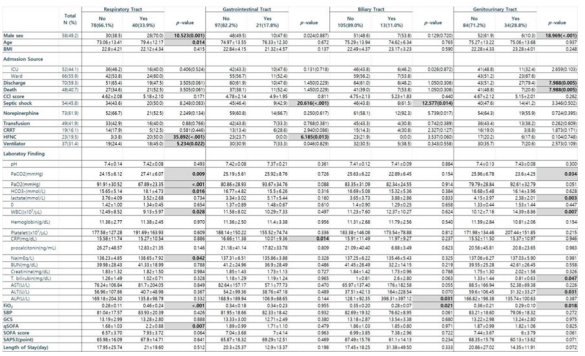
Clinical differences by infection site in sepsis and septic shock patients

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Intensive Care Medicine Experimental 2025,* 13(1)*:001605

Introduction: Sepsis is defined as life-threatening organ dysfunction triggered by an underlying infection. Sepsis includes a broad spectrum of conditions with various clinical manifestations and patterns of acute organ dysfunction. In this study, we evaluated the clinical difference and trends associated with sites of infection in sepsis and septic shock patients.

Objectives: The purpose of this study is to evaluate the clinical differences and trends according to the site of infection in patients with sepsis and septic shock.
Methods: This single-center, retrospective cohort study involved 118 adult patients (age ≥ 18 years) diagnosed with sepsis or septic shock at Kangwon National University Hospital between January 2023 and December 2023. We classified the infections into six main types typically found in hospitalized patients: respiratory, gastrointestinal, biliary, genitourinary tract infections, skin and undifferentiated. The four infection categories with statistically significant differences in patient characteristics are presented in Table 1.
Results: Approximately 49.2% of the patients were male. Among them, 44.1% were admitted to the ICU, 45.8% were diagnosed with septic shock, and 40.7% died. In cases of respiratory infection, variables such as $PaCO_2$, PaO_2, HCO_3^-, FiO_2, and qSOFA showed statistically significant differences depending on the presence or absence of infection. For gastrointestinal tract infections, CRP levels were significantly lower in the infected group compared to the non-infected group. In biliary tract infections, ALP demonstrated statistical significance based on infection status, while in genitourinary tract infections, WBC levels showed a significant difference depending on infection. Procalcitonin, SOFA score, SAPS 3 score, and length of stay did not show statistical significance based on infection site involvement.
Conclusions: This study examined variables related to infection sites and found notable trends in respiratory infections depending on infection status. Further large-scale studies are needed to clarify site-specific characteristics.

Table 1 Baseline characteristics of four infection categories



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Topic: Sepsis.

001606

Prevalence of the risk of pulmonary hypertension by echocardiography in critically ill patients

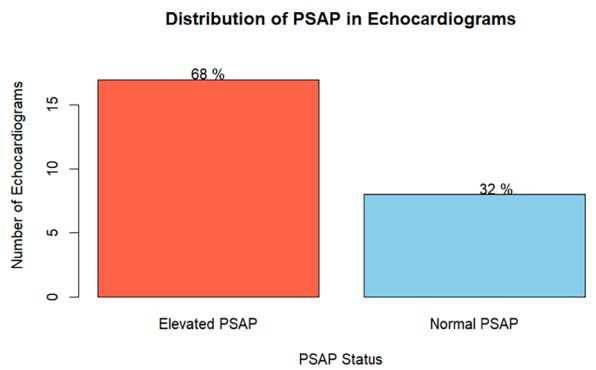
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***Intensive Care Medicine Experimental* 2025, 13(1):001606**

Introduction:
Pulmonary hypertension (PH) is a hemodynamic disorder defined by an abnormal increase in pulmonary arterial pressure and pulmonary arteriolar vascular resistance, resulting from multifactorial endothelial dysfunction and pathological vascular remodeling. It is a progressive and severe disease. PH is a frequent complication in critically ill patients and is associated with a poorer prognosis. Echocardiographic evaluation has become an essential tool for the non-invasive detection of signs suggestive of pulmonary hypertension, especially in settings, where clinical conditions preclude invasive methods. Early diagnosis of pulmonary hypertension is important, and transthoracic echocardiography stands out as the primary tool for detecting this disease in an early and non-invasive manner. Pulmonary hypertension in the critically ill patient, although sharing some similarities, is a distinct entity. Properly managing an acutely ill patient with PH is quite a challenge.

Objectives: To determine the prevalence of the risk of pulmonary hypertension in critically ill patients using echocardiography in the intensive care unit of ABC Medical Center.
Methods: This is a single-center, observational, descriptive, longitudinal, prospective study conducted from January 2025 to June 2025. Critically ill patients over 18 years of age, without a previous diagnosis of pulmonary hypertension, admitted to the Intensive Care Unit, will be included. The parameter used was the estimated pulmonary arterial systolic pressure, with a cutoff value above 35 mm Hg. All echocardiograms were performed by cardiologists specialized in echocardiography. The information collected from the clinical records, as well as the echocardiogram findings, was gathered by the principal investigators.
Results: Twenty-five echocardiograms were analyzed, of which 17 exhibited elevated pulmonary arterial systolic pressure (greater than 35), resulting in a prevalence of 68%, as illustrated in Graph 1. In this scenario, the mortality rate in the group with elevated PSAP is approximately 17.6% (3/17), whereas in the group with normal PSAP, it is 0%.
Conclusions: In this study, we found a prevalence of elevated PSAP of 68%, which is slightly higher than the 46.6% reported by Ñamendys-Silva. Likewise, the mortality rate in the elevated PSAP group was 17.6%. Although these findings contrast with the reported incidence of pulmonary arterial hypertension in the general population, they underscore the need for larger studies to determine the true prevalence at admission to intensive care units, the necessity of individualizing management in certain circumstances, and the importance of subsequent follow-up for these patients.



Graph1. Distribution of PSAP in echocardiogram according to their value.

Table 1 Distribution of deaths and survivors according to value of PSAP

PSAP Category	Deaths	Survivors	Total
Elevated PSAP	3	14	17
Normal PSAP	0	8	8
Total	3	22	25

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Topic: Cardiovascular issues in ICU.

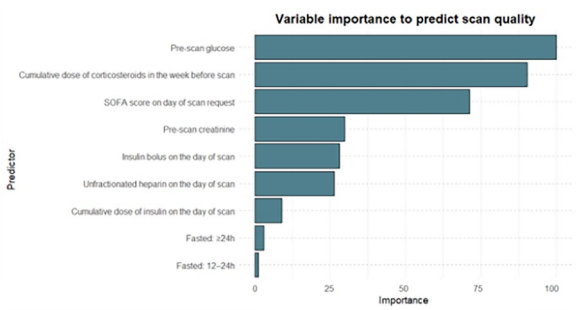
001607

Preparation and diagnostic yield of FDG–PET/CT in critically ill patients with systemic inflammation

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Intensive Care Medicine Experimental 2025,* 13(1)*:001607

Introduction: [18F]fluoro-2-deoxy-D-glucose–positron emission tomography (FDG–PET) combined with computed tomography (CT) is a widely used imaging modality for detecting inflammatory lesions in patients admitted to the ward. However, its diagnostic yield and utility in the ICU remain unclear. Moreover, FDG–PET/CT requires adequate patient preparation which can be challenging in the ICU.
Objectives: We evaluated the diagnostic yield of FDG–PET/CT in ICU patients with systemic inflammation and assessed the effect of patient preparation on scan quality.
Methods: In this multicenter, retrospective cohort study, we included all adult ICU patients who underwent FDG–PET/CT for systemic inflammation in two academic and two non-academic teaching hospitals in the Netherlands between December 2013 and December 2023. The primary endpoints were diagnostic yield (new diagnoses and changes in patient management resulting from FDG-PET/CT findings) and scan quality as assessed on a 3-point scale by an expert panel of nuclear

medicine physicians. We used binary logistic regression to identify predictors of new diagnoses and changes in patient management. Predictors of scan quality were analyzed using ordinal random forest analysis.
Results: A total of 151 patients and 169 FDG–PET/CT scans were included. A diagnosis was made in 112 scans (66.3%), with 82 scans (48.5%) identifying new diagnoses. FDG–PET/CT led to a change in patient management in 99 cases (58.6%). A history of diabetes was associated with fewer new diagnoses (OR 0.47, 95% CI 0.22–0.97). Higher CRP levels (OR 1.002, 95% CI 1.000–1.005), use of renal replacement therapy (RRT) (OR 2.36, 95% CI 1.13–5.04), fever on the day of the scan request (OR 1.84, 95% CI 0.94–3.66) and total body FDG–PET/CT (OR 1.93, 95% CI 0.99–3.82) were independently associated with more new diagnoses. Similarly, total body scans (OR 2.23, 95% CI 1.16–4.36), use of RRT (OR 2.60, 95% CI 1.17–6.05), and fever on the day of the scan request (OR 2.00, 95% CI 1.00- 4.06) were positively associated with changes in patient management. No association was found between scan quality and diagnostic yield. Pre-scan glucose, cumulative dose of corticosteroids and SOFA score on the day of scan request were identified as the most important predictors of scan quality (Fig. 1). However, inter-observer agreement on scan quality was moderate (Cohen's $\kappa = 0.46$), resulting in limited predictive accuracy of the random forest model (54%).
Conclusions: FDG–PET/CT provides valuable diagnostic information and contributes to patient management decisions in the majority of critically ill patients with systemic inflammation. Its diagnostic yield is highest in patients with fever, elevated CRP, and those requiring RRT. Preventing hyperglycemia and limiting corticosteroid exposure may enhance scan quality. The high diagnostic yield and impact on clinical management support broader consideration of FDG–PET/CT in the ICU, particularly in patients with clinical features associated with greater diagnostic benefit.



Variable importance to predict FDG–PET/CT scan quality.

Topic: Imaging in intensive care.

001608

Subarachnoid hemorrhage: epidemiology and outcomes in a tertiary neurocritical center

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Intensive Care Medicine Experimental 2025,* 13(1)*:001608

Introduction: Subarachnoid hemorrhage (SAH) represents a severe neurological condition which poses significant morbidity and mortality, the latter reaching up to 66%. While trauma is the leading cause, non-traumatic SAH predominantly stems from cerebral aneurysms (up to 85%), more frequently in women around 55 years and is associated with risk factors such as hypertension and smoking. Given its complex clinical course, SAH requires intensive management in an ICU setting.
Objectives: This study aims to characterize the clinical features, management and outcomes of ICU patients with SAH. Primary endpoints are ICU mortality and length-of-stay. Secondary endpoints include SAH etiology, complication rates and use of therapeutic modalities such as nimodipine and milrinone.
Methods: We conducted a retrospective analysis including adult patients admitted to the Intensive Care Unit between July 2023 and December 2024 which were diagnosed with SAH. Data collected included demographics, comorbidities, severity scores (SOFA, APACHE II, SAPS II), SAH etiology (traumatic vs. non-traumatic), complications, therapeutic strategies, and outcomes.
Results: We identified 46 ICU admissions. Median age was 59 years (23–85) and 54.35% were female. Common comorbidities included hypertension (21.82%), dyslipidemia (16.36%), and diabetes (12.73%). Median SOFA score was 2, APACHE II 14.5, and SAPS II 31. Non-traumatic SAH accounted for 76.09%, with aneurysmal SAH representing 65.71% of these. Other causes were considered angionegative or undetermined (28.57%), arteriovenous malformations (5.71%). ICU mortality was 15.22%, higher in non-traumatic cases (17.14%) vs. traumatic (9.09%). Early mortality (< 72 h) occurred in 6.52%, all in non-traumatic SAH. Median ICU stay was 15.1 days (1–73), with longer stays in non-traumatic SAH (26.97 vs. 9.88 days).
Cerebral vasospasm was the most frequent complication (36.96%), followed by hydrocephalus ($n = 4$), cerebral ischemia ($n = 3$), and status epilepticus ($n = 1$). Nimodipine was administered enterally in 33 patients and intra-arterially in 6 patients. Mortality was lower in patients receiving nimodipine (12.12%) than in those who did not receive (23.08%). Milrinone was used in 9 patients, with mortality of 11.11% vs. 16.22% in those not treated.
Conclusions: This interim analysis highlights the burden of SAH in the ICU. As with current evidence, the majority of cases occurred in middle-aged women and hypertension was the most prevalent risk factor. High frequency of non-traumatic cases may reflect referral patterns to specialized centers. Cerebral vasospasm remains the most frequent complication. Nimodipine use was associated with lower mortality, supporting its role in vasospasm prevention, and milrinone may offer benefits. Further analysis will explore this possible association and assess possible predictors of poor outcomes.

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Topic: Neurointensive care.

001609

Health-associated infections and antimicrobials' cost in a Tunisian intensive care unit

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Intensive Care Medicine Experimental 2025,* 13(1)*:001609

Introduction: Healthcare-associated infections (HAIs) represent a significant global health challenge, contributing to increased morbimortality and healthcare costs. A major concern is the substantial

burden they place on antimicrobial treatment strategies, as HAIs are frequently caused by multidrug-resistant organisms.
Objectives: The aim of this study is to evaluate the clinical and economic impact of healthcare-associated infections.
Methods: We conducted a retrospective study including all patients admitted to the intensive care unit (ICU) of Zaghouan's regional hospital in Tunisia for over 48 h of the period between November 2024 and April 2025. Demographic, clinical, therapeutic, and evolutionary data were collected. The incidence of health-care infections was calculated and the cost of antimicrobial treatments including antibiotics, antivirals, antifungi, and corticosteroids was estimated in Tunisian Dinar (TND).
Results: We 100 included patients. Median age of 59 years [39–71], predominantly male. At admission, median severity scores SAPSII and APACHE II were 27 [19–40] and 11 [7–19]. The primary reasons for ICU admission were acute respiratory distress syndrome (16%), severe acute exacerbation of chronic obstructive pulmonary disease (13%), and severe traumatic brain injury (13%). The most prevalent comorbidities were chronic obstructive pulmonary disease (25%) and hypertension (21%). Noninvasive ventilation was required in 35% of patients (NIV 35%, HFNC 12%) for a median duration of 3 days, while 57% underwent invasive mechanical ventilation (IMV) upon admission, with a median duration of 10 days [1–45]. The incidence of HAIs was 31%, with the most common infections being lower respiratory tract infections (22%), urinary tract infections (11%), and bloodstream infections (2%). The most frequently identified agents were *Acinetobcter baumannii* (25%). *Klebsiella pneumoniae* (20%), and *Pseudomonas aeruginosa* (16%),
A duration of IMV ≥ 14 days (cut-off derived from ROC analysis in Fig. 1; AUC 0.93 [0.853–1]) was significantly associated with increased HAI risk. Multivariate analysis confirmed IMV (ORa = 8.7, 95%CI [1.513–50.251], p = 0.015), along with corticosteroid therapy (ORa = 6, 95%CI [1.2–30.14], p = 0.028) and renal insufficiency (ORa = 5.5, 95%CI [1.18–25.8], p = 0.03), as independent risk factors. According to the WHO AwaRE (Access, Watch, Reserve) classification restricted classes of Watch/Reserve antibiotics, including imipenem (21%), colistin (19%), and tigecycline (13%), were frequently prescribed, contributing to total antimicrobial costs of 92 342 TND (~ 27 039 EUR) (with a median cost of 2488 TND [903–4312] per patient ~ 728 EUR). Mortality rate was 13%.
Conclusions: A high incidence of HAIs in ICU patients is strongly associated with prolonged mechanical ventilation, corticosteroid use, and renal insufficiency. Strengthening prevention measures and promoting rational antibiotic use are crucial to reducing this economic burden.

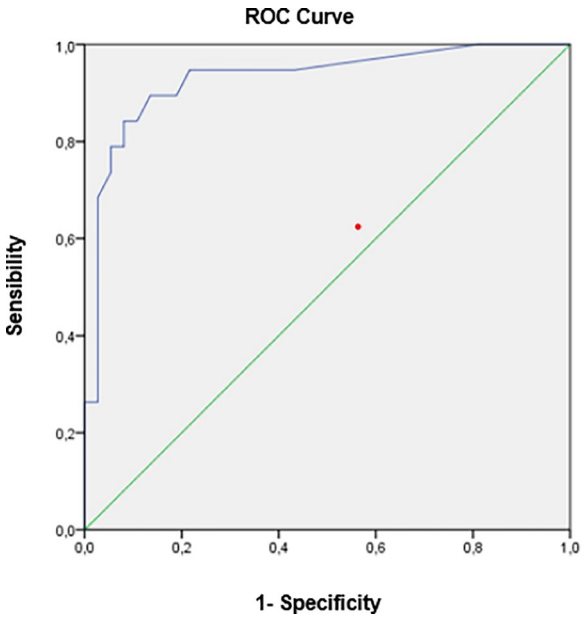


Figure 1 ROC curve analysis for invasive mechanical ventilation prediction model

Topic: Infections and prevention.

001612
Utility of indirect calorimetry and blood gas-derived indices in detecting global anaerobic metabolism in critically ill patients
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Intensive Care Medicine Experimental 2025,* 13(1)*:001612

Introduction: Tissue hypoxia monitoring is crucial for guiding resuscitation. The ratio of the carbon dioxide veno-arterial difference to the oxygen arterial-venous difference ($PvaCO_2/CavO_2$) is considered a surrogate marker of anaerobic metabolism. This parameter requires both central venous and arterial blood gas (BG) analysis. Nevertheless, $PvaCO_2/CavO_2$ reflects the ratio of CO_2 production (VCO_2) to O_2 consumption (VO_2) [respiratory quotient (RQ)] which can also be obtained noninvasively using indirect calorimetry (IC).
Objectives: This study aims to evaluate the ability of the RQ derived from IC (RQic) and the $PvaCO_2/CavO_2$ ratio from BG analysis in identifying anaerobic metabolism in critically ill patients.
Methods: Mechanically ventilated patients with sepsis who had a central venous catheter in place were included. IC and BG measurements, including arterial lactate, were performed simultaneously within the first 3 days of ICU admission. IC-derived variables (VO_2ic, VCO_2ic, and RQic) were recorded over a 20-min measurement period. BG-derived variables (VO_2bg, VCO_2bg, RQbg, $PvaCO_2$, and $PvaCO_2/CavO_2$) were calculated using paired arterial and central venous blood samples. VO_2bg and VCO_2bg were estimated via the Fick principle, using echocardiography-derived cardiac output. Anaerobic metabolism was defined as a lactate level ≥ 4 mmol/L. Receiver operating characteristic (ROC) curve analysis was used to evaluate the predictive performance of RQic, including the area under the curve (AUROC) and optimal cut-off value.
Results: Among 31 patients (mean age 67.5 years; 28-day mortality rate 35%), $PvaCO_2/CavO_2$ showed moderate correlations with RQic and RQbg (r = 0.43 and 0.56; p = 0.017 and 0.001, respectively), but no correlation with lactate (r = 0.07, p = 0.70). Patients with elevated lactate levels (≥ 4 mmol/L) had significantly higher RQic values compared to those with lower lactate levels (< 4 mmol/L) (0.96 ± 0.20 vs. 0.79 ± 0.09, p = 0.004), whereas $PvaCO_2/CavO_2$ and other measured parameters did not differ significantly between the groups (Table 1). In a regression model, RQic showed a moderate positive association with lactate levels and emerged as the most significant predictor (R = 0.5, R^2 = 0.25) (Fig. 1). ROC curve analysis revealed an AUROC of 0.78 (95% CI: 0.59–0.91) for RQic in predicting anaerobic metabolism. An RQic cutoff value of 0.9 yielded a sensitivity of 83% and a specificity of 81%.

Table 1 Comparison of indirect calorimetry- and blood gas-derived parameters between lower and elevated lactate groups. Data are presented as median (interquartile range, IQR) or mean (standard deviation, SD), as appropriate

Parameters	Arterial blood lactate		*p*-value
	< 4 mmol/L (N = 25)	≥ 4 mmol/L (N = 6)	
VO_2ic (ml/min)	231 (189.5–290)	251 (210.8–289.8)	0.57
VCO_2ic (ml/min)	162 (147–219)	235 (194.8–306)	0.09
RQic	0.79 ± 0.09	0.96 ± 0.2	0.004
VO_2bg (ml/min)	166.6 (135.3–262.5)	161 (75.3–187.2)	0.27
VCO_2bg (ml/min)	188.3 ± 93.7	147.4 ± 95.2	0.35
RQbg	0.94 ± 0.31	0.98 ± 0.54	0.84
$PvaCO_2/CavO_2$ (mmHg/ml)	1.8 ± 0.6	2.1 ± 0.8	0.28

Conclusions: In this study, the respiratory quotient derived from indirect calorimetry (RQic) was more effective than blood gas–derived parameters in identifying anaerobic metabolism in septic, mechanically ventilated patients. RQic showed fair predictive performance for lactate levels and may serve as a noninvasive marker for detecting anaerobic metabolism in critically ill patients.

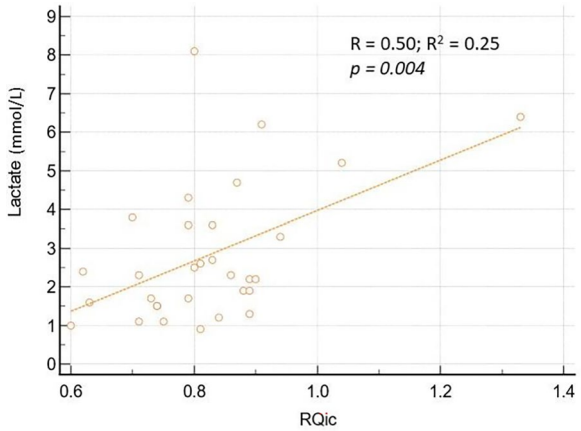


Figure 1 Linear regression analysis showing the relationship between respiratory quotient derived from indirect calorimetry (RQic) and lactate levels

Topic: Cardiovascular issues in ICU.

001613

Junior vs. senior residents: videolaryngoscopy performance in a Tunisian intensive care unit

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Introduction: Endotracheal intubation in the intensive care unit (ICU) is a high-risk procedure, particularly when performed by junior operators. Videolaryngoscopy (VL) has emerged as a tool to improve glottic visualization, but its effectiveness based on operator experience remains poorly understood.

Objectives: This study compares first-pass success rates and complications of video laryngoscopy (VL)-assisted urgent intubation between junior and senior critical care residents.
Methods: We conducted a prospective observational study of emergency intubations performed by residents in the intensive care unit at Zaghouan's regional hospital in Tunisia. Junior (first and second year residents) and senior (third and fourth year residents) operators were compared. Data included patient demographics, indication for intubation, first-pass success, number of attempts, hemodynamic changes, and complications (hypoxemia, hypotension, esophageal intubation, or cardiac arrest).
Results: We included 55 patients with a median age of 54 years [17–78] and a male predominance (sex ratio of 2.1). Among the urgent intubations analyzed (31 by junior residents and 24 by senior residents), the most common indications were combined failure involving two organ systems (37%), acute respiratory failure (27%), neurologic deterioration (26%), and shock (4%). Mallampati class III/IV was documented in 13% of patients, with a similar distribution between junior and senior groups (10% vs. 17%, $p = 0.69$). Overall, patients with Mallampati class III/IV had lower first-pass success rates compared to those with class I/II (43% vs. 90%, $p = 0.01$). In the junior group, first-pass success rates were comparable between Mallampati class III/IV and I/II (67% vs. 82%, $p = 0.49$), whereas in the senior group, Mallampati class III/IV was associated with significantly lower first-pass success (25% vs. 100%, $p = 0.002$). Overall first-pass success rates were similar between junior and senior groups (81% vs. 88%, $p = 0.72$), with both groups requiring a median of 1 attempt. No significant differences were observed in rates of severe hypoxemia (13% vs. 25%, $p = 0.30$), esophageal intubation (3% vs. 4%, $p = 1.00$), or cardiac arrest (10% vs. 4%, $p = 0.62$).
Conclusions: Both junior and senior critical care residents achieved similar first-pass success and complication rates when performing VL-assisted intubations in the ICU. The absence of superior performance by senior residents may stem from slower adaptation to videolaryngoscopy, while junior residents adapted more readily. These findings suggest that structured simulation training and supervised clinical practice could further standardize proficiency across all experience levels, narrowing any residual performance gaps.

Topic: Acute respiratory failure and mechanical ventilation.

001614

A service evaluation for capturing the frequency of the major complications of aneurysmal subarachnoid haemorrhage

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Introduction: Subarachnoid haemorrhage (SAH) is a common cause for admission to critical care. SAH is a life-threatening condition that is often associated with a long ICU stay and places patients at risk of complications. Common complications include: nosocomial infection, vasospasm and delayed cerebral ischaemia, perturbations in serum sodium concentrations and seizures. The evidence bases for interventions to manage the complications of SAH is limited.
Objectives: This service evaluation was designed to capture the frequency of the major complications of SAH at our hospital and the breadth of treatments that are employed.
Methods: Medical records of all patients admitted between 17/04/2020 and 31/01/2023 with aneurysmal subarachnoid haemorrhage admitted to ICU were reviewed. Data were captured covering their ICU stay(s). All non-aneurysmal SAH were excluded from analysis. Frequency of complications of SAH are presented with descriptive statistics of number of events and percentage of all cases and quantitative variables are presented as median and range.

Results: 172 patients' data were reviewed. 62 patients (36%) were male. The median age of the patients was 54. They belonged to the age range of 22 years to 96 years. The Median Charlston Comorbidity Index was 1 (Range of 0 -9). The median Glasgow Coma Score was 14 (Range of 3–15). The median Fisher grade was 4 (Range of 1–4). Aneurysms were found mostly (73%) in anterior circulations (126 patients). 93 patients (54%) of SAH were associated with intraventricular haemorrhage and 65 patients (38%) of them developed hydrocephalus, with 27% requiring ventricular drain. 110 patients (64%) were managed by coiling and 33 patients (19%) were managed by clipping. 2 of the patients had both coiling and clipping and in 10 patients (6%) had other forms of management. 17 patients (10%) did not receive any intervention. Post intervention systolic blood pressure (SBP) targets were found to be extremely variable with 140–160 mmHg being the most common. The range of SBP targets varied between normotension to as high as 160–180 mmHg.
Rebleed happened in 10 patients (6%). 65 patients (38%) developed vasospasm and 43 patients developed delayed cerebral ischaemia (DCI) (25%). Most of the DCI was managed conservatively in 31 patients (74%). In 11 patients (25%) DCI was managed by angioplasties [chemical angioplasty in 8 patients (19%) and mechanical angioplasty in 3 patients (6%)]. In 1 patient, DCI management was not documented. Hyponatraemia occurred in 69 patients (40%). 19 patients (11%) developed diabetes insipidus.
Extended Glasgow Outcome Scores (GOS-E) at 12 weeks were calculated for 104 patients (68 patients were lost to follow-up). Mortality was 16% and good recovery (GOS-E 7 and 8) occurred in 33 patients (31%). 14 patients (13%) had severe disability including vegetative state (GOS-E 2, 3 and 4).
Conclusions: In this case series of aneurysmal subarachnoid haemorrhages form a tertiary referral centre in the United Kingdom, we found that complication rates were broadly in line with those reported in the published literature.

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6. None declared

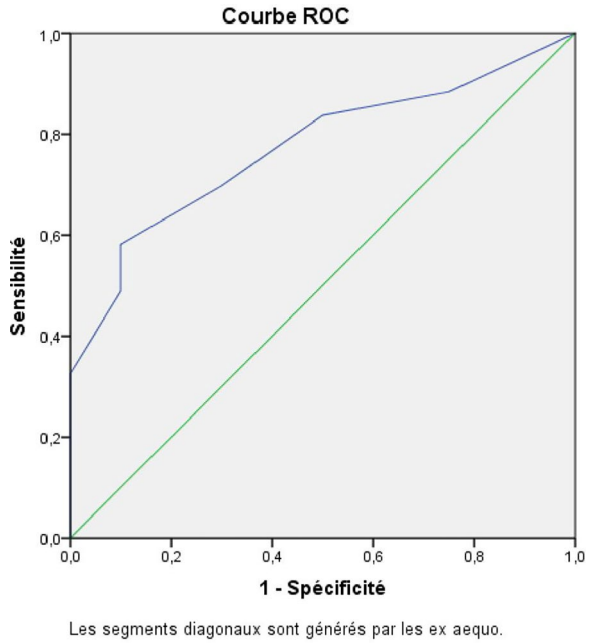
Topic: Neurointensive care.

001615

Can early eosinopenia predict severity in ICU-admitted community-acquired pneumonia?

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Introduction: Eosinopenia is known to reflect systemic inflammation and physiologic stress. However, its prognostic value in community-acquired pneumonia (CAP) requiring intensive care remains unclear.
Objectives: The aim of this study was to assess eosinophil kinetics and their association with clinical severity and outcomes in ICU-admitted CAP patients.
Methods: We conducted a retrospective descriptive study over 2 years (March 2023–March 2025) in a medical ICU. All patients admitted for severe CAP were included. Eosinophil count was measured at ICU admission and monitored throughout the stay. Eosinopenia was defined as < 50 cells/µL. Clinical data and outcomes were recorded. Severity was defined by escalation of oxygen therapy, need for invasive mechanical ventilation, and ICU mortality.
Results: Sixty-three patients were included (mean age 58 ± 18 years; male/female ratio 3.2). Mean SAPS II was 31.6 ± 15; median APACHE II was 10 [20–40]. Hypertension (36.5%) and diabetes (27%) were the most common comorbidities. Pneumonia was bacterial in 68.3%, viral in 41.3%, with co-infection in 24% and fungal in 5%. Eosinopenia at admission was present in 57.1%, with a median eosinophil count of 40 [20–60]/µL. Initial FiO_2 requirement was 54 ± 24%. Bilateral radiological infiltrates were present in 82% (ground-glass opacities 70%, consolidations 45%). Lab tests showed WBC 12,337 ± 6000/mm^3, neutrophils 10,118 [10,970–40,720]/mm^3, and CRP 117 ± 48 mg/L. High-flow oxygen was used in 30%, and non-invasive ventilation in 65%. Invasive mechanical ventilation (IMV) was needed in 55.6% after 5 ± 3 days. Septic shock occurred in 22%, tracheostomy in 19%, extubation in 31%, and mortality reached 32%. Eosinopenia at admission was significantly associated with viral pneumonia ($p = 0.046$), oxygen escalation ($p = 0.003$), and mortality ($p < 0.001$). Risk factors for death included age ($p = 0.018$), APACHE II ($p < 0.001$), SAPS II ($p < 0.001$), septic shock ($p = 0.001$), and IMV ($p = 0.001$). Eosinopenia on day 3 ($p = 0.006$), increasing oxygen needs ($p < 0.001$), and eosinophil collapse during the stay ($p = 0.004$) were strongly associated with poor outcomes. ROC analysis showed an eosinophil cutoff of 45/µL predicted severity with an AUC of 0.77 [0.65–0.88], sensitivity 69%, and specificity 70%(see figure). IMV was significantly associated with diabetes ($p = 0.012$), viral pneumonia ($p = 0.02$), oxygen escalation ($p < 0.001$), and eosinophil decline ($p = 0.041$).
Conclusions: Early eosinopenia and its persistence during ICU stay are strongly associated with clinical deterioration and mortality in severe CAP. Eosinophil count may serve as a simple, early biomarker to help identify high-risk patients and guide management in critical care settings.



ROC Curve of Admission Eosinophil Count for Predicting Mortality.
Topic: Haematologic-oncologic issues in the ICU.

001616

Albumin in the neurocritical care patient: don't look back in anger

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Intensive Care Medicine Experimental 2025,* 13(1)*:001616

Introduction: Albumin is an endogenous plasma protein involved in several physiological processes relevant to the critically ill patient. The therapeutic use in neurocritical care is controversial, due to scarce literature and low-quality evidence, as the neuroprotective benefits have not been consistently demonstrated in clinical trials. The study protocols varied in inclusion criteria, assessment metrics, dosage and even in the formulation used. The latter has particular relevance, as changes in outcome could be explained by the osmolarity differences between 4% and 20% albumin formulations used in the different studies.
Objectives: To evaluate the impact of 20% albumin administration on clinical outcomes in neurocritical patients. The endpoints studied were centered on mortality and length of ICU stay.
Methods: The authors conducted a single center retrospective analysis of patients admitted between 2021 and 2024 for level 3 neurocritical care. Patients admitted for potential organ donation were excluded.
Results: Data analysis returned 749 patients, 38 treated with albumin. Overall ICU mortality was 22.8%, while in the albumin-treated group mortality reached 51.2%. Mortality at 28 days was 38.4% in the albumin group, while in the overall sample was 25.6%, which correlates to the longer ICU stay of these patients—mean ICU length of stay was 12 days for all neurocritical patients, whereas in the albumin-treated group, the mean rose to 22.5.

The groups were also different in terms of demographics and severity of disease. No significant differences were found in gender distribution; however, median age was 62 years in the overall sample vs. 56 years in the albumin group. Severity of disease, calculated by APACHE II and SAPS II, shows an important difference between the groups: while the overall sample had a mean APACHE II of 17.77 and SAPS II of 38.95, the albumin group had a mean APACHE II of 23.05 and SAPS II of 49.64. Admissions for elective surgical, urgent surgical and medical patients were distributed similarly, but trauma admissions were more frequent in the albumin-treated group (36.8% vs. 29.6%). Mortality was lower in trauma patients of the albumin cohort, while in the elective surgery cohort the use of albumin proved detrimental to the outcome (despite a very small sample size of albumin treated cohort).
Conclusions: Data were collected subsequent to 2018, at which point the recommendations by ESICM were made to avoid the use of albumin in neurocritical care. Hence, these results could be interpreted in light of this guidance, i.e., the use of albumin seems to constitute a rescue treatment strategy. Therefore, the authors raise the question of whether, in such a retrospective approach, would it be more useful to conduct a statistical analysis of the impact of albumin administration on survival or to perform a morbimortality review of each clinical context, to establish specific indications supported by appropriately tailored protocols.

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Topic: Neurointensive care.

001617

Developing a protocol for obstetric emergencies in intensive care unit

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Introduction: Severe acute maternal morbidity, or "near misses," refers to life-threatening complications during pregnancy or postpartum that require urgent care. The complexity of managing pregnant patients is increasing due to advanced maternal age and coexisting

conditions. Obstetric ICU admissions, most commonly for major hemorrhage, sepsis, and pre-eclampsia, serve as critical indicators of clinical severity and healthcare quality. Standardized protocols and multidisciplinary coordination improve maternal outcomes and reduce preventable mortality. Despite experienced teams, emergencies may still result in missed interventions, highlighting the need for clear, structured management protocols.
Objectives: To develop standardized, flowsheet-based protocols for common obstetric emergencies in the ICU, aimed at improving rapid assessment, clinical response, and overall maternal and neonatal outcomes.
Methods: We conducted a systematic review of current guidelines and recent studies in maternal critical care. We also analyzed Obstetric Admissions to the Intensive Care Unit in a secondary Portuguese hospital between January 2023 and January 2025 using SPSS. The protocol development process also included a review of an informal internal document and engagement of ICU staff through an expository presentation about Obstetric Emergencies and Emergencies and a feedback questionnaire.
Results: In our hospital, a rate slightly lower than 1% was observed in preliminary data, but in line with the low prevalence described of pregnant and postpartum women who required ICU admission.
Following an internal presentation session, majority of participating ICU staff agreed on the importance of formal protocols and the need for training in this area. Flowsheets for hemorrhage, pre-eclampsia (including HELLP and eclampsia), and maternal sepsis are currently under development, with planned inclusion of Amniotic fluid embolism and Acute fatty liver of pregnancy.

Conclusions:Developing structured, stepwise protocols for obstetric emergencies in ICU settings facilitates early recognition and intervention, reduces clinical errors, and promotes better maternal–fetal outcomes. ICU team engagement in protocol creation supports sustainable implementation.

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5. No external funding was received for this study.

Topic: Health Services Research and Outcome.

001619

Systemic inflammatory response and associated outcomes in cardiac surgery

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Intensive Care Medicine Experimental 2025,* 13(1)*:001619

Introduction: The inflammatory response following cardiac surgery is triggered by a combination of surgical trauma, cardiopulmonary bypass (CPB), endotoxemia, and ischemia–reperfusion injury. 1 Additional contributing factors include temperature variation, anesthetic agents, and oxidative stress. 2 Patients often present with a chronic preoperative inflammatory state related to their cardiac condition or comorbidities such as diabetes and dyslipidemia.
Objectives: To determine whether systemic inflammatory response syndrome (SIRS) criteria are associated with adverse outcomes in patients undergoing cardiac surgery.
Methods: A retrospective observational cohort study was conducted from June 1, 2022, to December 31, 2023. Patients were classified based on compliance with SIRS criteria, and logistic regression was applied to assess associations with clinical outcomes.
Results: A total of 546 patients were included; 174 (31.86%) met SIRS criteria. The mean age was 57 years; 56.8% were male and 43.2% female. The most frequent comorbidities were hypertension (41.6%) and diabetes (22.8%). Patients with SIRS had a significantly longer aortic cross-clamp time (106 vs. 96 min) compared to those without postoperative SIRS. Multivariate analysis adjusted for age and sex revealed that SIRS was significantly associated with increased risk of:

Variable	OR	95% CI	*p*-value
Mediastinal bleeding	2.08	1.24–3.48	0.00
Vasoplegia	1.79	0.92–3.49	0.08
Postcardiotomy low cardiac output	1.71	1.02–2.85	0.04
Hypovolemia	1.44	0.99–2.08	0.05
Blood transfusion	1.54	1.07–2.22	0.02
Acute kidney injury	1.69	1.15–2.48	0.00
Renal replacement therapy	2.10	1.03–4.26	0.04
In-hospital mortality	1.83	0.90–3.72	0.09
Delirium	1.88	1.11–3.16	0.01

Conclusions:
SIRS criteria were present in 31.86% of post-cardiac surgery patients undergoing CPB. This condition was associated with a higher incidence of postoperative complications and hospital mortality, regardless of initial *C*-reactive protein levels or hemodynamic parameters. Early identification of these patients enables closer monitoring and timely intervention, potentially improving clinical outcomes in the cardiovascular intensive care unit.

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Topic: Cardiovascular issues in ICU.

001621

Monitoring of respiratory and non-respiratory muscles at the spontaneous breathing onset of ARDS patients who received controlled mechanical ventilation more than 48 h

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Introduction: Ventilator-induced diaphragmatic dysfunction (VIDD) and Intensive Care Unit-acquired weakness (ICUAW) are common complications associated with prolonged mechanical ventilation (MV) and critical illness in patients with acute respiratory distress syndrome (ARDS). Both conditions contribute significantly to delayed weaning from MV, increased hospital mortality, and long-term functional impairment among survivors. The transition from controlled to spontaneous breathing (SB) constitutes a critical—and still underexplored—phase for the early identification of VIDD and ICUAW.
Objectives: To characterize the respiratory pattern and functional status of the diaphragm, accessory respiratory muscles, and non-respiratory muscles at the onset of spontaneous breathing in patients with ARDS who received prolonged controlled MV.
Methods: Patients with ARDS who had undergone protective controlled MV for more than 48 h, with stable hemodynamic status and adequate consciousness and effort to initiate SB under pressure support ventilation, were prospectively enrolled. We performed a multimodal physiological assessment included conventional electromyography (EMG) of the external intercostal and anterior tibial muscles, electrical activity of the diaphragm (EAdi), diaphragmatic ultrasound, and measurement of respiratory mechanics—including esophageal and gastric pressures—to evaluate expiratory muscle activation.
Results: Nine patients were included (56 ± 14 years; PaO_2/FiO_2 210 [200–217] mmHg; 4 ± 2 days on MV); one of them was excluded due to the new diagnosis of Steinert myotonic dystrophy. EMG revealed that all patients exhibited neuromyopathic involvement. The main findings included increased insertional activity (8/8 patients), fibrillations/positive sharp waves (8/8 patients), early (3/6 patients) or reduced (3/6 patients) recruitment, predominantly polyphasic morphology (6/6 patients), and a poor or interferential pattern (6/6 patients). In 2 cases we observed the absence of voluntary activity. Diaphragmatic ultrasound showed that all patients had at least one parameter suggestive of diaphragmatic dysfunction (shortening fraction < 30% (5/7 patients), end-expiratory thickness < 2 mm (6/7 patients), or excursion < 2 cm (6/7 patients)). Activation of abdominal expiratory muscles was observed in 6 of 8 (75%) patients.
Conclusions: The main findings of the multimodal assessment in this patient population are consistent with denervation processes and/or mild to moderate myopathy, supporting the presence of VIDD and ICUAW. The diaphragm appears to be more severely affected than other respiratory muscles, and activation of expiratory muscles is highly prevalent. Both the apparent degree of myopathy and early signs of reinnervation suggest a favorable potential for functional recovery.

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1. FONDECYT 1221829

Topic: Acute respiratory failure and mechanical ventilation.

001622

Macro- and microvascular effects of preload responsiveness tests and fluid infusion in septic shock patients: the microfluid study

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Introduction: In septic shock patients, the response to a fluid bolus in terms of macrohemodynamic variables, i.e., cardiac output (CO) and mean arterial pressure (MAP), does not guaranty an improvement in tissue perfusion. The latter has been attributed to microvascular alterations. The passive leg raising test (PLR) is widely used to detect a state of preload responsiveness. Whether the assessment of the respiratory variations of red blood cell velocities (RBCv) in the sublingual capillaries may help to define the pattern of microcirculatory flow in different preload conditions is unknown.
Objectives: To compare the relationship between changes in CO and MAP induced by preload responsiveness tests and fluid infusion on the one hand and simultaneous changes in microcirculatory variables on the other hand, at the early and late phases of septic shock resuscitation.
Methods: Prospective, observational, cohort study. We included 15 septic shock patients on mechanical ventilation and 11 healthy volunteers.
Systemic hemodynamics, including continuous CO monitoring (PiCCO2 device), ventilatory parameters, perfusion indexes such as capillary refill time (CRT) and perfusion index (PI), and sublingual microcirculatory variables (IDF videomicroscope), were recorded at the early and late phases of septic shock resuscitation (Fig. 1).
Results: Fifty-three percent of septic patients were preload responders (PR +).
PLR test increased MAP both in PR + and PR- (from 80 ± 11 to 94 ± 21 mm Hg, p-value = 0.01, vs. 85 ± 15–90 ± 13 mm Hg, p-value = 0.03, respectively).
Microvascular parameters did not differ between PR + and PR- on study inclusion. However, during the PLR maneuver, perfused vascular density (PVD) had a trend toward an increase in PR + (from 16.5 [14.8–17.7] to 18.5 [17.2–21.0] mm/mm2, p = 0.07), while it did not change in PR- patients (from 17.0 [16.5–17.2] to 16.0 [14.9–19.0] mm/mm2, p = NS). RBCv, a convective parameter of microvascular flow, had a significant increase from baseline both during PLR test (from 757 [723–793] to 946 [893–995] µm/sec, p-value = 0.001) and after a fluid bolus (from 789 [734–860] to 971 [951–1025) µm/sec, p-value = 0.01).
There was no correlation of microvascular parameters-such as density and proportion of perfused vessels- and MAP or CI both at baseline and during PLR. Conversely, we found a significant correlation between changes in RBCv and variations in CI during the PLR test at admission and after 24 h (R2 = 0.48, p-value = 0.0006, R2 = 0.47 p = 0.014). On the third day, the strength of the simultaneous changes decreased and lost association (R2 = 0.26, p-value = 0.84).
The ratio of percentage of changes of RBCv over percentages of changes of CI (ΔRBCv/ΔCI) was 1.16 ± 0.85 in PR +, while it was larger -5.02 ± 8.15 in PR- (Fig. 4).

In this preliminary study, we found neither significant correlations between CRT and different microvascular parameters nor between CRT and PLR induced changes in MAP or CI.
Conclusions: In states of preload responsiveness, we found a correlation of changes in CI and RBCv of sublingual capillaries during PLR test and a trend toward an improvement in perfused vascular density. This association loses strength over the days. The ΔRBCv/ΔCI ratio could be an indicator of the degree of coherence between microvascular flow and cardiac index.

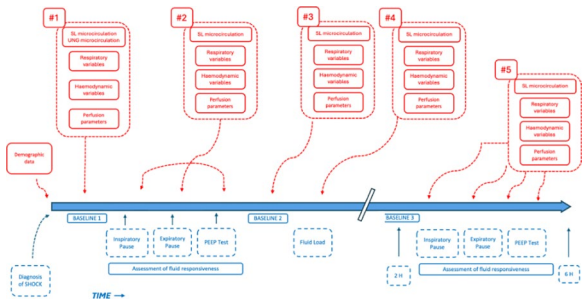


Figure 1 .
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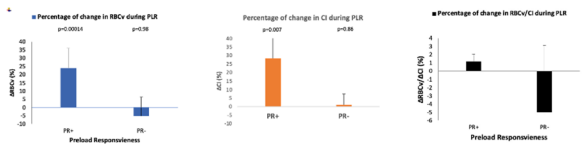


Figure 2 .

Topic: Sepsis.

001623

Effectiveness of artificial intelligence/machine learning in predicting respiratory failure in postoperative patients: a systematic review and meta-analysis

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Introduction: Postoperative respiratory failure (PRF) characterized by the requirements of mechanical ventilation ≥ 48 h or unplanned intubation, is a prevalent complication with high morbidity and mortality. (1) Reliance on administrative data, documentation accuracy, and outdated diagnostic codes, potentially hindering early intervention. Artificial intelligence (AI) and machine learning (ML) models are increasingly utilized in various medical fields to enhance predictive accuracy by integrating complex perioperative data.(2) (3) To address this issue, we conducted a systematic review and meta-analysis to investigate the effectiveness of AI/ML models for predicting respiratory failure in postoperative patients.
Methods: We conducted a comprehensive search of three databases, PubMed, Scopus, and Embase, and identified 139 relevant studies published within the past 10 years. A total of 95 articles underwent screening for detailed review which led to the inclusion of 12 articles in the systematic review, and 7 articles with suitable data were subjected to meta-analysis.
Our analysis included cohort studies comparing the predictive performance of 19 prognostic models (Random Forest, Conventional Deep Learning, GANomaly, LightGBM, XGBoost, Respire, Ariscat, SPORC-1, Lasso, Logistic regression, Generalized Linear Model Approach (GLM), Image-based Deep Learning Model) in identifying respiratory failure in postoperative adult patients.
Results: SPORC-1 achieved the highest sensitivity and identified 87% of patients who developed respiratory failure. Random Forest before the Synthetic Minority Oversampling Technique (SMOTE) which is a technique to handle the issue of data imbalance in the study, achieved the highest specificity and was able to identify 99.80% of patients who did not develop respiratory failure. XGBoost was able to discriminate between positive and negative cases with AUC 93% of the time.
The meta-analysis from seven studies predicted the risk of respiratory failure as a postoperative complication. The pooled sensitivity was 0.618 (95% CI: 0.517–0.71), indicating that the models correctly identified 61.8% of patients who developed respiratory failure.
The pooled specificity was 0.752 (95% CI 0.50–0.902), suggesting that the models correctly identified 75.2% of patients who did not develop respiratory failure.
There was substantial heterogeneity among the studies, as evidenced by the high I2 values for both sensitivity (I^2 = 0.992) and specificity (I^2 = 1).
Conclusions: Overall meta-analysis of the included models demonstrated moderate sensitivity and specificity for predicting respiratory failure in postoperative patients with substantial heterogeneity across the studies.

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Topic: Acute respiratory failure and mechanical ventilation.

001624

Modified psoas muscle index for predicting sarcopenia in critically ill surgical patients

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Introduction: The aim of this study is to assess whether a novel Modified Psoas Muscle Index (mPMI)—calculated by multiplying the longest and shortest diameters of the psoas muscle at L3 and normalizing by height squared—could serve as a reliable predictor of adverse outcomes in critically ill surgical patients.
Objectives: The aim of this study is to assess whether a novel Modified Psoas Muscle Index (mPMI)—calculated by multiplying the

longest and shortest diameters of the psoas muscle at L3 and normalizing by height squared—could serve as a reliable predictor of adverse outcomes in critically ill surgical patients.
Methods: In this retrospective study, 704 patients who underwent abdominal CT scans before intensive care unit (ICU) admission and during or after ICU stay were included. Demographic, clinical, and laboratory data were collected. Conventional psoas measurements and the mPMI were compared using receiver operating characteristic (ROC) analysis. Multivariable logistic regression and correlation analyses were performed to identify independent predictors of mortality and to explore associations between mPMI and clinical variables.
Results: Patients who experienced decreased muscle area had larger baseline psoas measurements ($p < 0.005$) and a higher proportion of females ($p < 0.005$). ROC analysis indicated that the mPMI outperformed conventional area measurements in identifying patients with reduced muscle reserves. After adjusting for confounding factors, the mPMI was independently associated with mortality (Exp(B) = 1.062, $p = 0.014$). Correlation analyses showed modest links between mPMI, age, and certain laboratory markers.
Conclusions: The mPMI offers a practical, imaging-based approach to evaluating sarcopenia in critically ill patients, circumventing the challenges of muscle strength assessment in the ICU. Its predictive value for sarcopenia highlights the potential benefit of including mPMI in routine ICU evaluations. Future prospective studies are warranted to validate these findings and refine sarcopenia management strategies in critically ill populations.

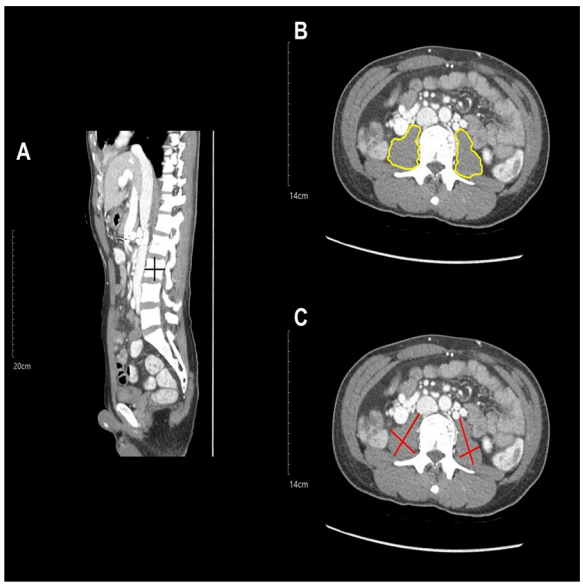


Figure 1 Measurement of the cross-sectional area of the psoas muscle and modified psoas muscle index (mPMI) at the level of the third lumbar vertebra (L3)
A Identification of the level of L3 (black cross) on the sagittal computed tomography (CT) image.
B Cross-sectional area of the bilateral psoas muscles (yellow line) on the axial CT image at the level of L3. The cross-sectional area was measured using the area measurement tool in the Picture Archiving and Communication System.
C Measure the mPMI of the bilateral psoas muscles on the axial CT image at the level of L3 (red lines). The mPMI is calculated by measuring the longest and shortest diameters of the psoas muscles, multiplying these values and normalizing by the square of the patient's height.

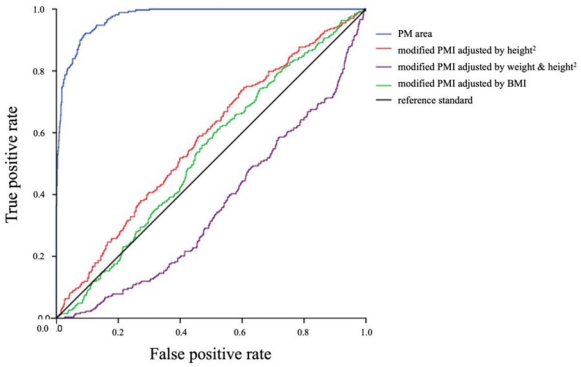


Figure 2 Receiver operating characteristic (ROC) curve comparing the conventional psoas muscle cross-sectional area, multiplication of psoas diameters, and various normalization methods of the modified psoas index (PMI). ROC curves comparing various forms of the PMI in predicting sarcopenia. The *y*-axis represents true positive rate (sensitivity), the *x*-axis represents false positive rate (1-specificity), and the diagonal reference line indicates a test with no discriminative power (area under the curve = 0.5). Each line represents the following, the conventional cross-sectional area of the psoas muscle (blue line); the modified PMI adjusted by height (red line); the modified PMI adjusted by weight and height (purple line); the modified PMI adjusted by body mass index (green line)

Topic: Nursing care and physiotherapy.

001625

Physiological effects of prone positioning and thoraco-abdominal binding on muscle–ventilation dynamics in ARDS patients at the onset of spontaneous breathing

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Introduction: Prone positioning provides lung-protective effects during controlled mechanical ventilation (MV) in patients with acute respiratory distress syndrome (ARDS) (1). However, its role in mitigating effort-related lung and diaphragmatic injury during the transition to spontaneous breathing remains insufficiently characterized. On the other hand, abdominal binding has been shown to enhance the neuromuscular efficiency of the diaphragm in non-ventilated individuals (2), suggesting potential utility in ARDS patients spontaneously breathing with diaphragmatic weakness/dysfunction. Meanwhile, chest binding at the lower part of the thorax may contribute to the attenuation of paradoxical respiratory patterns associated with the recruitment of accessory respiratory muscles in this scenario.
Objectives: To evaluate the physiological effects of prone positioning and thoraco-abdominal binding on neuromuscular coupling, expiratory muscle activation and pendelluft magnitude in ARDS patients with more than 48 h of controlled MV who are initiating spontaneous breathing.

Methods: Study approved by the Institutional ethical committee (N.012/2022), including ARDS patients recovering spontaneous breathing after received at least 2 days of controlled ventilation (NCT05826847). A multimodal assessment of respiratory was performed at baseline. PEEP was individualized using electrical impedance tomography (EIT). Patients, under pressure support ventilation received either semi-recumbent position (SR) without and with thoraco-abdominal binding (BTA) and prone position (PP) in a crossover trial for 1 h each. Respiratory and EIT-related variables were recorded, including electrical activity of the diaphragm (EAdi), transdiaphragmatic pressure (Pdi), neuromuscular coupling (NMC = ΔPdi/ΔEAdi), the increase in expiratory gastric pressure (ΔPga-exp), as well as pendelluft magnitude. These variables were compared between the strategies using Mixed-ANOVA or Friedman test (including post-hoc tests). Spearman's test was used for correlations.
Results: Nine patients were included (56 ± 14 years; PaO_2/FiO_2 210 [200–217] mmHg; 4 ± 2 days on MV). Compared to SR, PP improves NMC (0.42 [0.25–1.08] cmH2O/μV vs. 0.82 [0.44–2.01] cmH2O/μV, $p = 0.004$) and decreases pendelluft magnitude (6.91 ± 4.2% vs. 3.43 ± 1.72%, $p = 0.014$). BTA has a trend to improve NMC with respect to SR (0.42 [0.25–1.08] cmH2O/μV vs. 0.68 [0.25–1.12] cmH2O/μV, $p = 0.119$)], but not reduces significantly pendelluft magnitude (6.91 ± 4.2% vs. 5.92 ± 4.29%, $p = 0.598$). No significant changes on ΔPga-exp are observed with PP or BTA considering the 6 patients who presented expiratory muscles activation (ΔPga-exp in SR, PP and BTA are 1.82 ± 0.78, 1.29 ± 1.48, 1.35 ± 1.13, respectively, $p = 0.410$). However, the decrease in pendelluft magnitude obtained with PP is directly correlated with the decrease in ΔPga exp ($r = 0.857$, $p = 0.024$).
Conclusions: In ARDS patients transitioning to spontaneous breathing after 48 h of controlled MV, PP enhanced neuromechanical coupling and reduced pendelluft magnitude compared to a semi-recumbent position. BTA exhibited a non- systematic effect on NMC and pendelluft. A higher sample size is needed to confirm these findings for the potential impact of simple strategies.

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Topic: Acute respiratory failure and mechanical ventilation.

001627

Effects of individualized PEEP at different levels of pressure support on pendelluft magnitude and expiratory muscle activation at the onset of spontaneous breathing

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Introduction: Higher levels of positive end-expiratory pressure (PEEP) and pressure support have been associated with a reduction in inspiratory effort. However, their impact on the magnitude of pendelluft remains inconsistent (1, 2). This study aimed to assess whether individualized settings of PEEP at different levels of ventilatory assistance can influence the magnitude of pendelluft, and to evaluate whether this effect is modulated by expiratory muscle activity in hypoxemic patients transitioning to spontaneous breathing, following a period of ≥ 48 h of protective controlled mechanical ventilation.
Methods: This physiological randomized crossover study compared individualized PEEP (PEEP-IND), set according to the lowest combination of collapse and overdistension according to electrical impedance tomography (EIT), with standardized PEEP (PEEP-ARDS), set according to the ARDS-Net protocol, in hypoxemic patients resuming spontaneous breathing under pressure support ventilation (PSV). Each patient underwent randomized application of pressure support levels at 5, 10, and 15 cmH_2O (each for 5 min) at both PEEP settings, which were also applied in a randomized order. The analysis was performed on data from the final 2 min of each pressure support level. Pendelluft magnitude was quantified as the percentage of lost volume from the non-dependent lung region displaced to the dependent region during inspiration using an EIT-based approach (3). Expiratory muscle activity was assessed by measuring the expiratory rise in gastric pressure (ΔPga-exp), while inspiratory effort was evaluated using esophageal pressure-derived variables, including muscular pressure (Pmus). Statistical analysis was conducted using repeated measures ANOVA and linear mixed-effects models. A p-value < 0.05 was considered statistically significant.
Results: Fifteen hypoxemic patients resuming spontaneous breathing on PSV (time on mechanical ventilation 9 [5–13] days and PaO2/FiO2 262 ± 51 mmHg, 6 females), were included. PEEP-IND was 11 [8–13] cmH2O and PEEP-ARDS was 6 [5–7] cmH2O. Expiratory muscle activation was observed in 13 patients. The main physiological variables are described in Table 1. Adjusting by pressure support, PEEP-IND was associated with a decrease in pendelluft magnitude (β of -1.99, $p = 0.042$) and an increase in ΔPga-exp (β of 0.56, $p = 0.015$) with respect to PEEP-ARDS. Meanwhile, adjusting by PEEP, pressure support was associated with a decrease in pendelluft magnitude (β of − 3.11, $p < 0.001$) and ΔPga-exp (β of − 0.75, $p < 0.001$). The intensity of the association between PEEP-IND and pendelluft magnitude increased when ΔPga-exp wasincluded in the model (β of − 2.48, $p = 0.027$); we observed an direct association between ΔPga-exp and pendelluft (β unadjusted of 2.13, $p < 0.001$), which remained after adjusting by PEEP and pressure support (β adjusted of 1.57, $p = 0.009$).
Conclusions: An EIT-guided PEEP strategy may reduce pendelluft magnitude in hypoxemic patients resuming spontaneous breathing. However, this potential benefit appears to be counterbalanced by increased expiratory muscle recruitment. The contribution of active expiration should be considered in future studies focused on the individualized titration of PEEP and pressure support during spontaneous breathing.

Table 1 Physiological variables at 5, 10, and 15 cm H2O of pressure support under individualized PEEP (PEEP-IND) and standardized PEEP (PEEP-ARDS). p value: significance of repeated measures ANOVA

	PS 5	PS 10	PS 15	p-value
Tidal volume, ml, mean ± SD				
$PEEP_{ARDS}$	434 ± 89	494 ± 102	572 ± 106	<0.001
$PEEP_{IND}$	466 ± 124	508 ± 120	577 ± 109	<0.001
Respiratory rate, bpm, mean ± SD				
$PEEP_{ARDS}$	23 ± 7	20 ± 6	19 ± 7	0.002
$PEEP_{IND}$	21 ± 7	19 ± 6	17 ± 5	<0.001
P_{MUS}				
$PEEP_{ARDS}$	8.9 ± 6.3	6.7 ± 5.9	4.9 ± 4.5	<0.001
$PEEP_{IND}$	8.8 ± 5.4	5.9 ± 4.7	4.6 ± 4.4	<0.001
ΔPga_{exp}, cm H_2O, mean ± SD				
$PEEP_{ARDS}$	2.1 ± 1.6	1.4 ± 1.2	0.8 ± 1.1	<0.001
$PEEPI_{ND}$	2.9 ± 1.9	1.8 ± 1.4	1.2 ± 1.4	<0.001
Pendelluft magnitude (%)				
$PEEP_{ARDS}$	16.5 ± 15.6	12.0 ± 13.5	10.7 ± 13.1	<0.001
$PEEP_{IND}$	14.8 ± 14.5	10.2 ± 12.6	8.2 ± 11.9	<0.001

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Topic: Acute respiratory failure and mechanical ventilation.

001630

Early vs. delayed parenteral nutrition in sepsis: insights from a 50-patient ICU cohort

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Introduction: Sepsis is a leading cause of mortality in intensive care units, often requiring specialized nutritional support. When enteral nutrition is not feasible or contraindicated, parenteral nutrition (PN) becomes essential. However, the timing (early vs. delayed) and effects of PN in septic patients remain controversial. Recent guidelines advocate for a balanced approach, often favoring delayed or supplemental PN in the sepsit patient. Early initiation of PN, however, may improve nutritional status and immune function but also carries a risk of complications.
Objectives: To investigate the clinical outcome of early vs. delayed initiation of PN in 50 septic patients admitted to the ICU.
Methods: A retrospective observational study was conducted on a 21-bed mixed ICU of a tertiary hospital involving 50 septic patients who received PN due to intolerance or contraindication to enteral feeding. Patients were divided into two groups: early PN (initiation $\leq$ 72 h from ICU admission) and delayed PN (> 72 h). Data collected included demographic characteristics, timing of PN initiation, duration of PN, duration of mechanical ventilation, infection rates, ICU length of stay, 28-day mortality and APACHE II and SOFA scores at admission. Descriptive statistics and comparative analyses were performed to assess differences between groups.
Results: The study population included 32 males (64%) and 18 females (36%), with a mean age of 65.4 $\pm$ 12.7 years. Early PN patients had a mean age of 64.1 $\pm$ 11.9 years, and delayed PN patients had a mean age of 67.0 $\pm$ 13.6 years. Mean APACHE II scores were 23.4 $\pm$ 6.1 in the early group and 22.7 $\pm$ 5.8 in the delayed group. Mean SOFA scores were 9.1 $\pm$ 2.7 and 8.8 $\pm$ 2.9, respectively. Early PN patients had a shorter mean ICU stay (13.2 $\pm$ 4.8 vs. 16.1 $\pm$ 5.7 days) and required PN for a longer duration (10.1 $\pm$ 3.2 vs. 7.4 $\pm$ 2.8 days). The early PN group experienced a higher rate of secondary infections (36% vs. 14%). The 28-day mortality rate was 35.7% in the early group vs. 31.8% in the delayed group. Median ventilation duration was slightly lower with early PN (7 vs. 9 days).
Conclusions: Early PN in septic ICU patients may reduce ICU length of stay and ventilation duration but is associated with a higher incidence infections. Comparable APACHE II and SOFA scores suggest that baseline illness severity did not differ between groups. These results, however, support a personalized approach to PN timing and highlight the need for randomized prospective trials to establish optimal nutritional strategies in sepsis care.

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3. none

Topic: Metabolism, endocrinology, liver failure and nutrition.

001632

Disinfection effects of atomized fine-bubbled ozonated water on ICU beds: effectiveness and safety

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Intensive Care Medicine Experimental 2025,* 13(1)*:001632

Introduction: For all intensive care units, multidrug-resistant bacteria are becoming a serious problem. ICU beds used for an infected patient in hospitals must be cleaned completely before they are used by another patient. For this purpose, disinfection is performed for each patient, but complete cleaning is difficult to achieve. In addition, uniform disinfection is ideal, but it is not easy to achieve either.
Recently, it has been reported that disinfection can be performed efficiently by atomizing a new disinfectant containing a high concentration of fine-bubbled ozonated water.
We have also examined this method using cultured bacteria (S. epidermidis and E. coli) and confirmed that the number of bacteria was reduced by more than 99.99%.
Objectives: In this study, we investigated the disinfection effect of fine-bubbled ozonated water in the intensive care unit using ICU beds.
Methods: Experiments were conducted in our intensive care unit with a closed space enclosed by a vinyl tent. In addition, an experiment was conducted by atomizing fine-bubbled ozonized water using a special atomizer. Humidity and temperature inside the tent were monitored during disinfection. Bacterial counts on the bed surface were measured using commercially available standard agar media. Incubation conditions were 37 °C for 48 h. The monitoring sites considered in this study were the bed railing, the handle operating the fence, and the remote controller.
The amounts of bacteria before and after the atomization disinfection were compared to the area occupied by the agar medium after 48 h of incubation.
The free ozone concentration in the environment during the disinfection treatment was also measured to investigate whether contamination of the ICU environment occurred. We measured the ozone concentration using a suction-type ozone detector. Measurements were taken at a point 5 cm away from the tent.
Results: Significant bacterial culture area reduction was observed on the surfaces of the remote controller. The %change in the area occupied by standard agar medium was 54% on the surface of the remote controller, halving the amount of bacteria. On the other hand, no difference was observed on handrails (114%) and handles (112%).
In addition, free ozone was below detection sensitivity in the environment during disinfection operations.
Conclusions: In the intensive care unit environment, the fine-bubbled ozonated water could reduce bacteria on remote control surfaces.
In addition, free ozone in the environment during the implementation of the disinfection process was below detection sensitivity. Although this method uses ozone, it is safe for medical staff in the ICU.

Topic: Infections and prevention.

001633

Comparison of the thromboelastometry profile in patients with obstetric hemorrhage in the first and third trimester

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Intensive Care Medicine Experimental 2025,* 13(1)*:001633

Introduction: Obstetric hemorrhage continues to be the leading cause of maternal mortality in Mexico. Viscoelastic coagulation tests dynamically assess clotting initiation, clot formation, and lysis. Its use is widely described in different scenarios; however, evidence of its application in obstetric hemorrhage is limited. In critical scenarios, hemostatic alterations coincide with the obstetric pathology that conditions blood loss, which include: ruptured ectopic pregnancy, spontaneous abortion, uterine atony, uterine rupture, placental abruption and uterine tear. The use of viscoelastic testing during goal-directed resuscitation in obstetric haemorrhage has been shown to be useful as long as proper interpretation and post-performance planning is performed. The state of hypercoagulability presented by pregnant women during pregnancy is known, who gradually present an increase in coagulation factors, platelets, and fibrinogen levels; however, there is no adequate characterization depending on the trimester of gestation in which it is found.

Objectives: To characterize the thromboelastometry profile in patients with obstetric hemorrhage in the first and third trimesters of pregnancy admitted to intensive care and to identify the differences between them.

Methods: The following is a retrospective, descriptive, comparative, single-center study that included 19 patients between 15 and 40 years of age, who were admitted to the Intensive Care Unit with a diagnosis of obstetric hemorrhage, who underwent a thromboelatometry test to identify the need for blood component transfusion. A statistical analysis adjusted for covariates (age and BMI) was performed to compare the parameters of the ROTEM (EXTEM and FIBTEM) between the first and third trimesters. Nonparametric tests were used for initial comparison and a linear regression model was used to adjust for covariates. Descriptive statistics (median and IQR) were used for each parameter per group, and the Mann–Whitney test was used to compare parameters between quarters. In addition to multiple linear regression for each significant parameter, adjusting for age and BMI.

Results: The patients had a median age of 24 years and their thromboelastometry profile showed the following values: EXTEM: CFT: clot formation time is significantly shorter in the third trimester (median = 88 vs. 160.5), even after adjusting for age and BMI ($B = -78.2$\BETA $= -78.2$B $= -78.2$, $P = 0.012$). MCF: Maximum clot firmness is significantly higher in the third trimester (median = 67 vs. 52; B = 14.3\BETA = 14.3B = 14.3, $P = 0.008$). A5: amplitude at 5 min is highest in the third trimester (median = 46 vs. 29.5; $B = 13.8$\BETA = 13.8B = 13.8, $P = 0.022$). FIBTEM: no significant differences were found in TC, A5 or MCF.

Conclusions: The differences in CFT and MCF suggest a state of hypercoagulability predominant in the third trimester, which is physiologically expected with the aim of preventing postpartum hemorrhage. It is important to note that age and BMI do not significantly influence the differences observed, which reinforces that gestational age is considered the main factor in these differences, which we consider should be correlated with the clinical evolution of patients.

Table 1 .

Parámetro	Grupo	Mediana (IQR)	Mann-Whitney p	Regresión (β Trimestre, p)	Tamaño del efecto (r)
EXTEM CT	1er trimestre	71.5 (63, 87)	0.073	-	-
	3er trimestre	60 (50, 70)			
EXTEM CFT	1er trimestre	160.5 (84, 189)	0.006*	-78.2, 0.012	0.58
	3er trimestre	88 (70, 106)			
EXTEM A5	1er trimestre	29.5 (27, 49)	0.013	13.8, 0.022	0.52
	3er trimestre	46 (40, 50)			
EXTEM MCF	1er trimestre	52 (49, 67)	0.007*	14.3, 0.008	0.57
	3er trimestre	67 (60, 70)			
FIBTEM CT	1er trimestre	65 (50, 76)	0.225	-	-
	3er trimestre	54 (46, 71)			
FIBTEM A5	1er trimestre	13.5 (9, 14)	0.492	-	-
	3er trimestre	13 (9, 20)			
FIBTEM MCF	1er trimestre	16 (13, 20)	0.492	-	-
	3er trimestre	18 (10, 23)			

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Topic: Transfusion and haemostasis disorders.

001634

Virtual reality does not improve mental health in intensive care unit survivors, but is nonetheless highly valued: an international multicenter randomized controlled trial

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Introduction: Patients recovering from an intensive care unit (ICU) stay frequently experience mental health challenges such as post-traumatic stress disorder (PTSD), anxiety, and depression. These conditions are components of the post-intensive care syndrome (PICS) and adversely affect the survivors' quality of life. Currently, there is a notable gap in effective interventions for these issues [1, 2]. Virtual Reality (VR) has been explored as a safe and potentially beneficial method to provide informational and therapeutic experiences for ICU survivors, showing promise in improving their mental health outcomes [3–5].
Objectives: To investigate the impacts and optimal timing of a specialized VR program designed for ICU survivors—referred to as ICU-specific VR (ICU-VR)—on symptoms of PTSD, anxiety, depression, health-related quality of life (HRQoL), and satisfaction with post-ICU care, over a period of 12-month post-ICU discharge.
Methods: In this international randomized controlled trial with three arms in eleven hospitals, ICU patients who had received mechanical ventilation for at least 24 h and stayed in the ICU for at least 72 h were randomly assigned to either a control group or one of the two ICU-VR intervention groups (early or late). While all subjects received standard post-ICU care, including a 3-month follow-up clinic invitation, the intervention groups also participated in the ICU-VR session either within 2-week post-discharge (early group) or during their follow-up clinic (late group). The study measured participants' mental health and HRQoL at various intervals post-discharge and evaluated their satisfaction with the ICU-VR experience and overall aftercare.
Results: Between December 2021 and June 2024, 344 ICU survivors were included (median age 61; 62% male). No notable differences in PTSD, anxiety, depression symptoms, or HRQoL scores across the groups were found up to 6-month post-ICU discharge. The overall aftercare satisfaction was rated an 8 (95% range 5–10) and the intervention groups rated the contribution of ICU-VR to the aftercare with an 8 (95% range 1–10). The ICU-VR intervention received an overall rating of 8 out of 10 (95% range 3–10) and the likelihood that participants would recommend ICU-VR to other patients was rated an 8 (95% range 4–10). Participants rated whether ICU-VR improved their understanding of the ICU admission with an 8 (95% range 1–10).
Conclusions: The ICU-VR intervention did not improve mental health or HRQoL in ICU survivors up to 6-month post-ICU discharge. ICU-VR was well-received and may improve ICU survivors' comprehension of ICU treatment. Future studies should explore a different ICU-VR approach potentially including AI-driven adaptability.

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6. This study was supported by DSW (for the HORIZON-IC project; no grant number available), Stichting Theia (grant number: 2020286), Stichting SGS (grant number: 2020355) and BeterKeten (for the HORIZON-IC project; no grant number available). The funding sources had no role in the design of the study and collection, analysis, and interpretation of data nor in writing the manuscript.

Topic: Information systems and Data Science.

001635

Impact of extracorporeal membrane oxygenation on inflammatory and haematologic parameters: a retrospective analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001635

Introduction: Extracorporeal membrane oxygenation (ECMO) is a life-saving intervention for severe respiratory or cardiac failure. The inflammatory response induced by the extracorporeal circuit may influence outcomes [1]. This study investigates the effect of ECMO on inflammatory and haematological parameters, considering ECMO mode and COVID-19 status.
Objectives: To determine whether the use of ECMO affects inflammatory and haematological parameters (C-reactive protein, procalcitonin, haemoglobin, and platelets), and to evaluate differences between veno-venous (VV) vs. veno-arterial (VA) ECMO and COVID-19 positive vs. negative patients.
Methods: We analyzed 260 patients supported by ECMO (143 VV, 91 VA, 26 veno-arterial-venous [VAV]; 128 COVID-19 positive). Laboratory parameters were collected on the day of ECMO initiation (day 0) and daily thereafter (days 1–5). After exclusion of VAV-ECMO patients, the Friedman test was used for comparisons from day 0 to day 5, with subgroup analyses for ECMO mode and COVID-19 status, and when $p < 0.05$, we performed comparisons between days.
Results: Three parameters showed significant changes after ECMO: PCT, hemoglobin and platelets (each Friedman $p < 0.001$; day 0 vs. day 5 medians: 0.49 vs. 0.41 ng/mL, 11.6 vs. 10.1 g/dL and 230 vs. 141 $\times$ 10^3/µL, Wilcoxon $p = 0.003$, < 0.001 and < 0.001, respectively; Fig. 1). PCT changed significantly in VV-ECMO patients (Friedman $p < 0.001$; day 0 vs. day 5 medians: 0.595 vs. 0.38 ng/mL, Wilcoxon $p < 0.001$) but not in VA-ECMO patients, and the difference between day 0 and 5 remained significant only in COVID-19 positive VV-ECMO subgroup (medians 0.55 vs. 0.38 ng/mL, Wilcoxon $p = 0.001$). Hemoglobin and platelets deceased significantly in both VA patients and the

VV COVID-19 positive subgroup (each Friedman $p < 0.02$) but not in the VV-ECMO COVID-19 negative subgroup.
Conclusions: Our results confirmed that ECMO support is associated with a decrease in haemoglobin [2] and platelets [3], suggesting a haematological effect. However, the effect on PCT, although significant in VV-ECMO patients, does not appear to reflect an inflammatory response to extracorporeal circuit [4]. It also remains a challenge to distinguish ECMO-related changes from those caused by infection or disease progression.

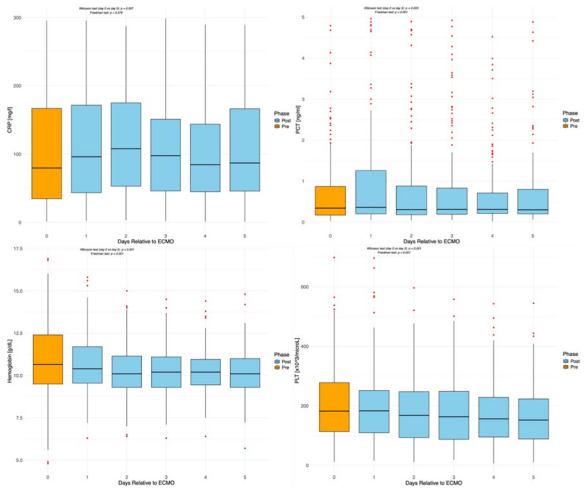


Figure 1 C-reactive protein (CRP), procalcitonin (PCT) and haemoglobin levels (g/dL), and platelet count [PLT] from day 0 to day 5 of ECMO. Medians (horizontal lines), interquartile ranges (IQR; boxes), 1.5 IQR (vertical lines) and outliers (dots) are shown. Friedman test across days and Wilcoxon test for comparisons between days 0 and 5 are calculated

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Topic: Acute respiratory failure and mechanical ventilation.

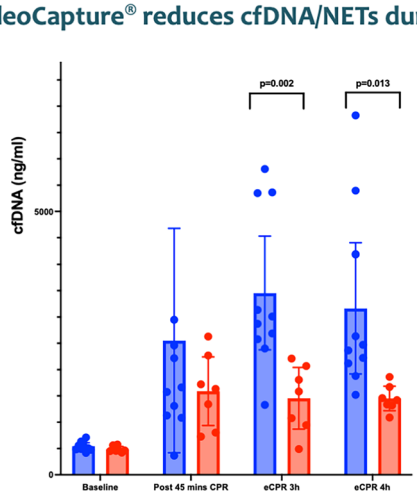
001636

Selective cell-free DNA/NETs apheresis with NucleoCapture® in a clinically relevant porcine extracorporeal cardiopulmonary resuscitation model

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Intensive Care Medicine Experimental 2025,* 13(1)*:001636

Introduction: Cell-free DNA (cfDNA)/neutrophil extracellular traps (NETs) are recently recognised alarmins which are causally linked with ischaemia–reperfusion injury (IRI). We previously demonstrated that NucleoCapture® selective cfDNA/NETs apheresis significantly reduced IRI and improved organ function in poor quality donor liver and lung transplants, potentially making them suitable for transplantation. cfDNA analysis of animals subjected to extracorporeal cardiopulmonary resuscitation (eCPR) has revealed a positive correlation between cfDNA levels after eCPR and brain injury as measured by histology and S100B.
Objectives: To investigate the use of NucleoCapture® in a clinically relevant porcine eCPR model.
Methods: Cardiac arrest was induced in 17 pigs, followed by 45 min of mechanical CPR using the Lucas device. ETCO2 levels at this point were < 1.3 kPa in all animals. eCPR was then commenced for 4 h. Seven pigs were subjected to NucleoCapture® apheresis using the Terumo Optia system during eCPR for 4 h. Ten pigs were subjected to the same protocol without NucleoCapture® apheresis. cfDNA/NETs were measured using the PicoGreen dsDNA assay (Thermofisher, UK).
Results: The baseline levels of circulating cfDNA/NETs measured in the control and NucleoCapture® treated pigs were 544.8 ng/ml and 485.6 ng/ml, respectively. This level rose to 3162 ng/ml after 45 min mechanical CPR and 4 h eCPR in the control pigs. This rise was attenuated in the NucleoCapture® treated pigs to 1451 ng/ml ($p = 0.013$ vs. controls). Mean (95% CI) values shown in graph. Systemic inflammation as measured by TNF alpha was attenuated in the intervention group vs. control at 3 h (255 pg/ml vs. 491 pg/ml, $p = 0.032$).
Conclusions: NucleoCapture® removed cfDNA/NETs from the circulation of pigs subjected to eCPR. This could lead to reduced cfDNA/NETs related brain and other organ injury. Further work to confirm this hypothesis is underway evaluating blood and brain biomarkers, including complete brain histological analysis.



NucleoCapture reduces cfDNA/NETs during eCPR.

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Topic: Cardiac arrest.

001637

Ventilator-associated pneumonia by *pseudomonas aeruginosa* in Italian ICUs

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Intensive Care Medicine Experimental 2025,* 13(1)*:001637

Introduction: Infections sustained by *Pseudomonas aeruginosa* are known for their high morbidity and mortality across multiple patient groups.

Objectives: We sought to quantify the incidence and trend of ventilator associated pneumonia caused by *P. aeruginosa* in Italian ICUs over recent years, along with associated patient outcomes.

Methods: We performed a multicentre registry-based analysis, using the Promoting Patient Safety and Quality Improvement in Critical Care (PROSAFE) nationwide ICU clinical quality database. The primary endpoint was the yearly incidence proportion of ventilator-associated-pneumonia sustained by *P. aeruginosa* (PaVAP) from 1 January 2020 to 31 December 2023. Secondary endpoints included patient-centred outcomes and fraction of carbapenem-susceptible, carbapenem-resistant not-DTR, and difficult-to-treat resistance (DTR) *P. aeruginosa*. Patients with PaVAP were compared to those with VAP sustained by other Gram-negative pathogens (otherVAP). Temporal trends were investigated using the Cochrane-Armitage trend test and generalized linear models.

Results: The study involved 133 intensive care units (ICUs) in Italy, with 36,170 patients who were ventilated from more than 48 h. A total of 4853 (13.4%) patients had VAP with 3595 (74.1%) cases sustained by Gram negative pathogens. Of these 1033 (28.7%) were PaVAP, and 2562 (71.3%) otherVAP. No significant demographic differences were observed between groups. The proportion of VAP sustained by Pseudomonas was stable over the study period (Cochrane–Armitage test $P = 0.436$; mean across years 28.7%). The incidence of the DTR PaVAP increased over time (figure). Crude and standardized mortality ratios did not differ between PaVAP and otherVAP groups. However, PaVAP patients required longer duration of mechanical ventilation, longer ICU and hospital stays ($p < 0.001$). Carbapenem-resistant not-DTR PaVAP had the same mortality as carbapenem-susceptible PaVAP. DTR PaVAP had longer duration of mechanical ventilation, ICU and hospital stays.

Conclusions: While overall incidence of PaVAP remained stable from 2020 to 2023, burden of DTR strains is increasing. Patients with PaVAP show a higher resource use as compared to VAPs caused by other gram negatives organisms.

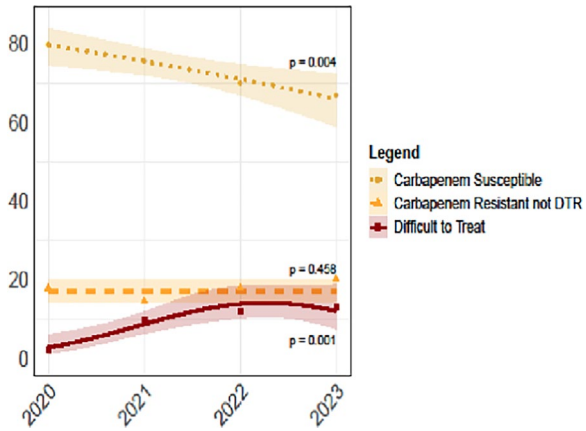


Figure Trends in the proportions of carbapenem-susceptible (CS), carbapenem-resistant not-DTR (CR) and difficult-to-treat resistance (DTR) PaVAP. The lines represent GLM models with corresponding 95% confidence interval, while the points indicate observed yearly proportions. *P* values were calculated using the Cochran–Armitage trend test

Topic: Health Services Research and Outcome.

001638

Beyond lactate: bedside hypoperfusion signs as alternative criteria for septic shock

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Introduction: Under Sepsis-3 criteria, septic shock is defined as persistent sepsis-related hypotension requiring vasopressors and a serum lactate > 2 mmol/L —the latter as a metabolic surrogate for global hypoperfusion. A proportion of patients, however, present early in shock with normal—or simply unmeasured—lactate values, and lactate itself can be modulated by non-hypoperfusion mechanisms. Experimental and clinical studies nonetheless demonstrate that micro- and regional perfusion may remain severely impaired even whithout hyperlactatemia. Bedside signs of hypoperfusion—prolonged capillary-refill time (> 3 s) or mottling—have been shown to reflect microcirculatory derangements and may identify high-risk patients despite low lactate. Nevertheless, the prognostic value of these markers in septic patients with shock in the absence of hyperlactatemia remains poorly characterized.

Objectives: To compare 28-day mortality between (1) Sepsis-3–defined septic shock and (2) patients septic shock patients without hyperlactatemia but with clinical signs of hypoperfusion in a large ICU cohort.

Methods: We conducted a retrospective cohort analysis using large ICU database MIMIC-IV v3.1. Adult, non-cardiac-surgery ICU admissions with suspected infection who began norepinephrine (time zero)

were eligible. Two prespecified phenotypes were constructed from data recorded around time zero: "High Lactate Only "(Septic shock by Sepsis-3: lactate ≥ 2 mmol L^{-1}, no abnormal peripheral perfusion) and Low-lactate + hypoperfusion (lactate < 2 mmol L^{-1} or missing, plus capillary-refill time > 3 s or mottled skin). A third group, "High Lactate + Hypoperfusion", was included for secondary analyses. The primary outcome was 28-day all-cause mortality. Adjusted risk ratios (aRR) comparing "Low Lactate + Hypoperfusion" with "High Lactate Only" were estimated with modified Poisson regression with log link and robust (sandwich) standard errors, adjusting for age, BMI, Charlson comorbidity index, SOFA score at diagnosis, invasive mechanical ventilation, and renal replacement therapy. secondary Tukey-adjusted pairwise comparisons included the third phenotype ("Hyperlactatemia + Hypoperfusion"). Statistical significance was set at $p < 0.05$.

Results: Among 2 066 patients included in the primary analysis, 1 862 (90.1%) were "High Lactate Only" and 204 (9.9%) were "Low Lactate + Hypoperfusion." Baseline characteristics were similar between groups (median age 67 [IQR 56–76] vs. 66 [55–75] years; BMI 27.4 [23.7–32.2] vs. 27.6 [24.0–32.5] kg/m^2; median SOFA 8 [6–10] in both; invasive mechanical ventilation 84% vs. 81%; renal-replacement therapy 22% vs. 15%). Crude 28-day mortality was 42% vs. 39%, respectively. In adjusted modified Poisson regression, "Low Lactate + Hypoperfusion" did not significantly differ from "High Lactate Only" (aRR 1.06; 95% CI 0.87–1.28; $p = 0.56$).

In a secondary analysis of all three phenotypes (n = 2580), 514 (19.9%) had both hyperlactatemia and hypoperfusion ("High Lactate + Hypoperfusion"), with a mean 28-day mortality of 58.0%. Secondary pairwise comparisons showed that patients with hyperlactatemia and hypoperfusion signs showed a significantly higher risk of death than dose without hypoperfusion signs ("High Lactate Only") (aRR 1.34; 95% CI 1.06–1.70; $p = 0.011$).

Conclusions: Clinical signs of hypoperfusion identify a subgroup of vasopressor-dependant septic patients without hyperlactatemia whose 28-day mortality is similar of that of Sepsis-3–defined septic shock. These findings highlight that CRT and mottling may provide additional prognostic information beyond lactate alone. Integrating these clinical markers into septic shock definitions could enable earlier identification of at-risk patients, prompt targeted resuscitation, and ultimately improve patient outcomes.

Table 1 Descriptive Statistics. Patients were separated in two distinct phenotypes

Variable	High Lactate Only N = 1,862	Low Lactate + Hypoperfusion N = 204
Age (years)	67.0 [56.0, 76.0]	68.0 [61.0, 80.0]
Females, n (%)	795 (43%)	93 (46%)
Charlson Comorbidity Index	5.0 [4.0, 8.0]	6.0 [4.0, 8.0]
BMI (kg/m²)	27.4 [23.7, 32.2]	27.1 [22.6, 34.0]
SOFA Score at Diagnosis	8.0 [6.0, 10.0]	7.0 [5.0, 10.0]
Vital Support Time (hours)	3.0 [1.0, 7.0]	3.0 [1.5, 6.0]
Invasive Mechanical Ventilation, n (%)	1,436 (77%)	167 (82%)
Renal Replacement Therapy, n (%)	416 (22%)	30 (15%)
Hospital Length of Stay, (days)	12.3 [6.5, 23.5]	11.7 [7.4, 20.1]
ICU Length of Stay, (days)	4.6 [2.5, 9.6]	5.3 [3.0, 9.9]
28-Day Mortality, n (%)	779 (42%)	79 (39%)
ICU Mortality, n (%)	606 (33%)	53 (26%)

Median [Q1, Q3]; n (%).

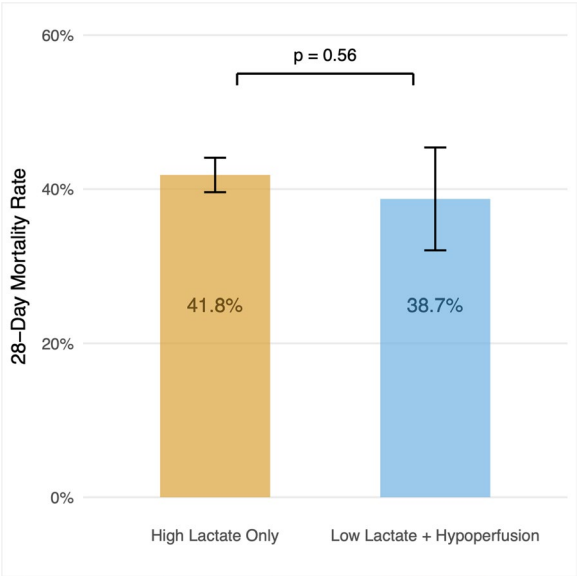


Figure 1 Unadjusted 28-day mortality in the two primary phenotypes. Bars show the proportion of deaths among patients with Sepsis-3 septic shock ("High Lactate Only"; n = 1862) and those with normolactate shock plus bedside hypoperfusion ("Low Lactate + Hypoperfusion"; n = 204). Heights correspond to crude mortality rates (41.8% vs. 38.7%); vertical lines represent 95% confidence intervals. The between-group difference was not statistically significant ($p = 0.56$, modified Poisson regression)

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Topic: Cardiovascular issues in ICU.

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Extracellular vesicles proteomics analysis reveals molecular subtype and metabolism dysregulation in sepsis

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Introduction: Early identification of the severity of sepsis can help improve patient outcomes. Current sepsis guidelines divide sepsis and septic shock according to the severity of the disease, and the concept of "severe sepsis" has been eliminated. In clinical practice, there is no way to accurately define the severity of the disease, and it is difficult

to accurately treat and predict the severity of the disease. Here, we applied a novel EVs proteomics method in the large-scale sepsis cohort with different clinical subtypes, which revealed the potential biomarkers and molecular subtypes of the sepsis.

Objectives: The heterogeneity of sepsis presents significant challenges for early diagnosis and effective treatment. In this study, a proteomic examination of serum extracellular vesicles (EVs) was applied to a large cohort of patients with varying sepsis severity, aiming to identify potential biomarkers and uncover molecular subtypes of the condition.

Methods: Peripheral blood samples from patients with sepsis (Sepsis-only, $n = 100$), sepsis complicated with ARDS (*S*-ARDS group, $n = 50$), sepsis complicated with AKI (*S*-AKI group, $n = 50$), sepsis complicated with both ARDS and AKI (S-ARDS&AKI group, $n = 50$), and healthy controls ($n = 50$) were collected. The successful extraction of EVs was confirmed by transmission electron microscopy, nanoparticle tracking analysis, and western blot assays. Proteins were identified by mass spectrometry. Integrated bioinformatics analyses were performed to explore the vital biomarkers and molecular subtypes of sepsis.

Results: EVs were successfully extracted in different clinical groups. A total of 4754 proteins were detected in 279 samples after quality control. The results revealed that the expression level of CD81, FLOT1, FLOT2, HSP90AA1, and HSP90AB1 were gradually up-regulated during the progression of sepsis and may act as the promising biomarker for predicting the onset and severity of sepsis. Consensus clustering divided Sepsis-only group into four molecular subtypes with distinct clinical severity. Finally, the levels of metabolism-related proteins were associated with the severity and prognosis of sepsis.

Conclusions: This study utilized EVs proteomics on large-scale cohorts to establish molecular subtypes of sepsis, uncovering the inter-individual heterogeneity of the condition. In addition, metabolic dysregulation was found to be closely linked to disease severity and patient survival. Targeting metabolic disorders may, therefore, represent a promising therapeutic strategy for sepsis.

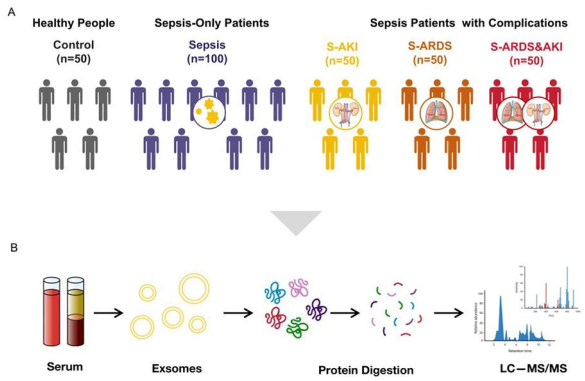


Figure 1 Work flow chart of the study. A Patients enrolled in each group. **B** Process of the EVs proteomics

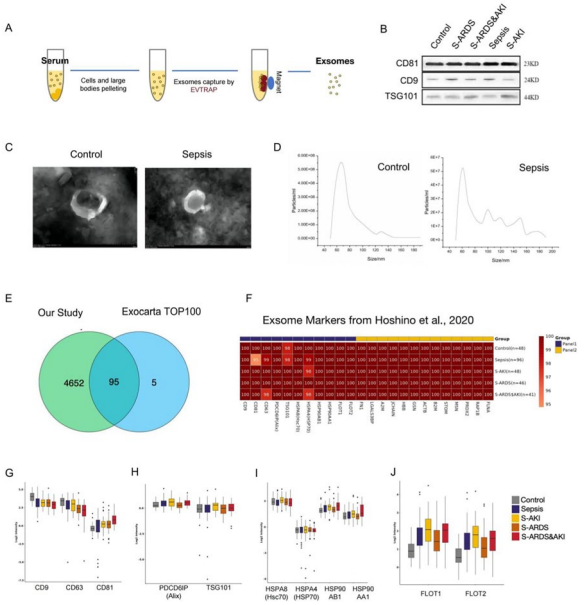


Figure 2 Identification of EVs. A Flow chart of exsome isolation. **B** Western blot assays of CD81, CD9, and TSG101. **C**, **D** TEM (**C**) and NTA (**D**) were employed to detect the structure and the diameter distribution of the EVs-like substances derived from the peripheral blood samples. **E** Venn diagram of this study and Exocarta Top100 proteins. **F** EVs proteins from two panels identified in this study. **G**–**J** Expression level of proteins from three panels

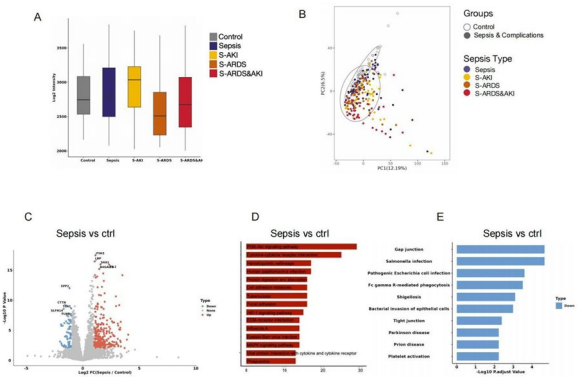


Figure 3 Exsome proteomics analysis of sepsis and sepsis complications. A Identified protein number in five groups. **B** Principal component analysis (PCA) of exsome proteomics. **C** Volcano plot showing the differently expressed proteins between the control group and the four sepsis groups. **D** KEGG analysis showing the enriched pathways based on the differently expressed proteins

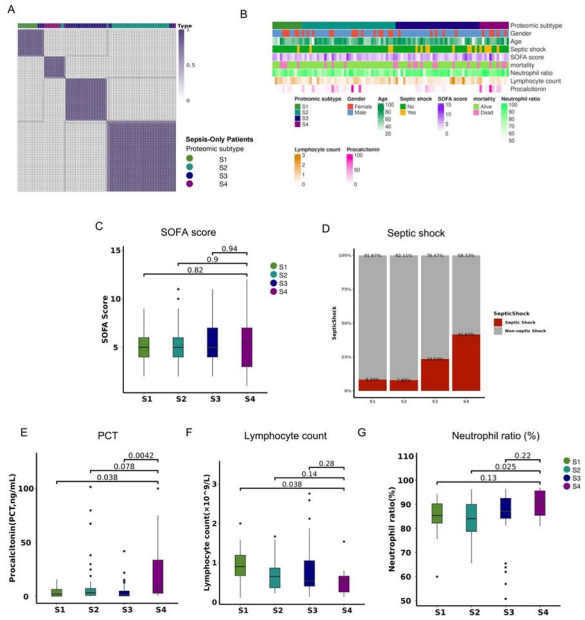


Figure 4 Molecular subtype based on EVs proteomics. A Consistent clustering of four sepsis subtypes. **B** Association of exsome proteomic subtypes with variables. **C** Box plots showing the level of SOFA score in four subtypes. **D** Bar plot showing the rate of septic shock in four subtypes. **E**–**G** Box plots showing the level of PCT (**E**), lymphocyte count (**F**), and neutrophil ratio (**G**) in four subtypes

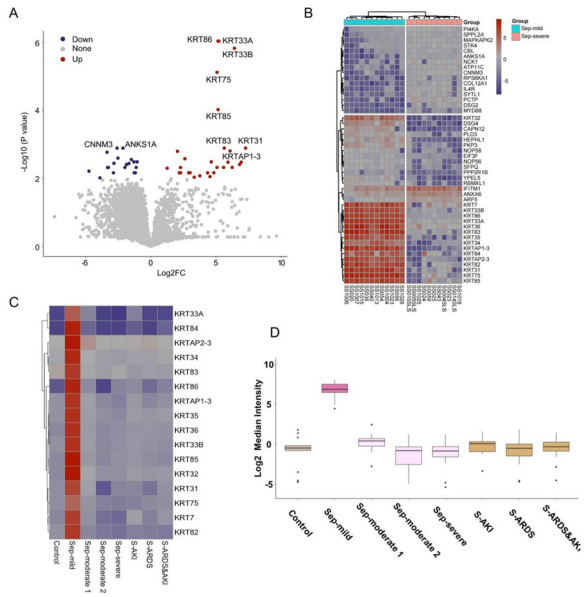


Figure 5 KRT family proteins preventing the progression of sepsis. A, **B** Volcano plot (**A**) and heatmap (**B**) showing the differently expressed proteins between the Sep-mild and Sep-severe groups. **C**, **D** Heatmap (**C**) and box plot (**D**) showing the expression level of KRT family proteins in different groups

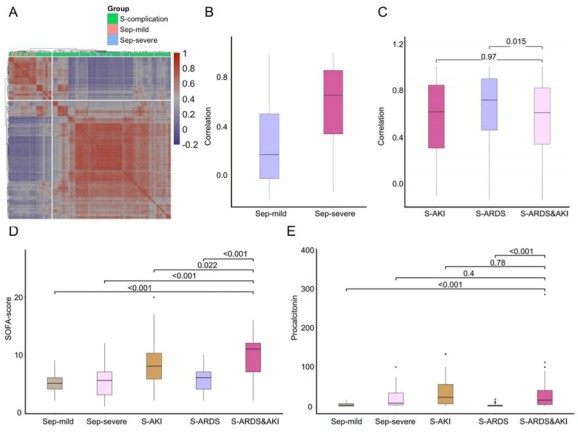


Figure 6 Molecular subtype of sepsis reflecting the clinical condition. A Correlation matrix based on 47 protein panel between Sep-mild, Sep-severe and Sepsis complication samples. **B** Box plot showing the correlation between sepsis with complications group with the Sep-severe group and Sep-mild group. **C** Box plot showing the correlation between Sep-severe group and three sepsis with complications groups. **D**, **E** Box plots showing the levels of SOFA-score (**D**) and PCT (**E**) in different groups

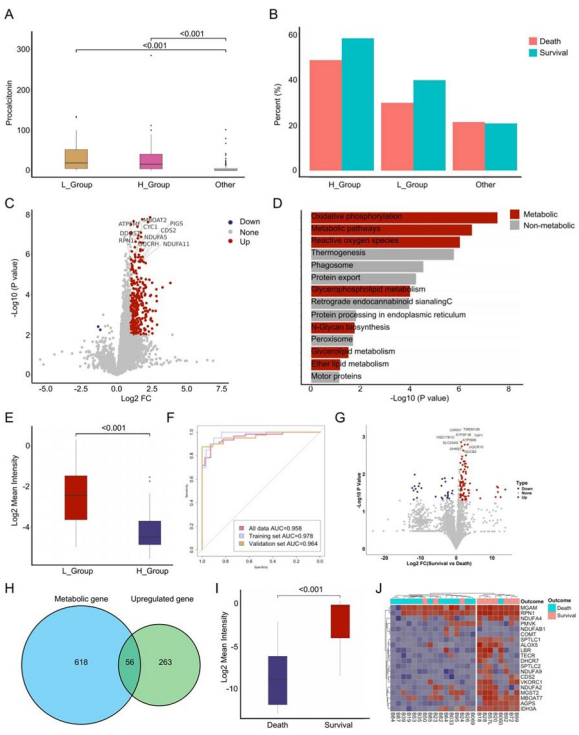


Figure 7 Expression levels of metabolic-related protein associating the severity and survival of sepsis patients. A Box plot showing the levels of PCT in H-group, L-group, and other groups. **B** Bar plot of the death and survival rate in *H*-group, *L*-group, and other groups. **C** Volcano plot showing the differently expressed proteins between the *L*-group and H-group. **D** KEGG analysis showing the enriched pathways in the *L*-groups. **E** Box plot of the expression levels of 62 metabolism-related proteins. **F** The AUCs in training, validation and general cohort. **G** Volcano plot showing the differently expressed proteins based on

the survival status. **H** Venn plot of the metabolism-related proteins and identified up-regulated proteins in the survival group. **I, J** Box plot (**I**) and heatmap (**J**) of the expression levels of intersecting proteins in the survival and death groups

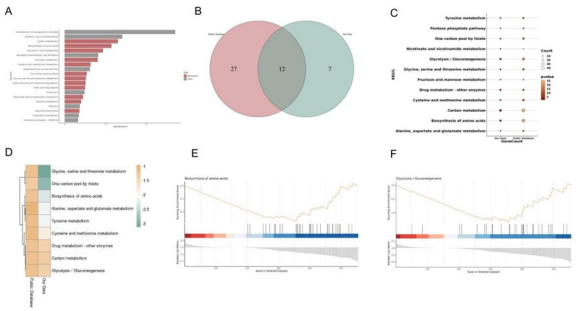


Figure 8 Comparison with an external sepsis cohort. A Public database KEGG analysis focuses on metabolic pathways. **B**) Comparative analysis of metabolic pathways with public database. **C** Comparative analysis of significant metabolic pathway with KEGG method. **D** GSEA analysis of 2 database. **E** GSEA analysis of Biosynthesis of amino acids. **F** GSEA analysis of glycolysis

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Topic: Sepsis.

001640

The effect of ammino alliance supplement on vascular reactivity: an exploratory study in healthy volunteers

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Introduction: As precursor of nitric oxide (NO) production, *L*-Arginine (*L*-Arg) plays a pivotal role in vascular physiology 1 2. In critically ill patients, especially in sepsis, increased NO production results in abnormal vascular reactivity. Persistently abnormal capillary refill time—CRT—a marker of tissue perfusion and vascular reactivity—has been associated with increased morbidity and mortality 2. Oral use of arginine has been associated with cardiovascular effects (i.e., improved endothelial function) 3, but no studies exist on the potentially beneficial effect of oral *L*-Arginine supplementation in tissue perfusion parameters.
Objectives: We aimed to evaluate the effects of a commercially available oral *L*-Arg-based supplement (*Ammino Alliance—AAS*) on vascular reactivity using non-invasive routinely used tests to assess peripheral microcirculation status in patients.
Methods: A prospective, non-randomized, single center, single-arm, minimal risk, exploratory study was conducted at Catholic University Intensive Care Unit (ICU) of Santiago, Chile. Healthy volunteers (HVs) were asked to take 85 mg and 170 mg of AAS on day 1 and day 2, respectively. Macro- and microcirculatory parameters were collected at baseline (T0), after 1 h (T1) and 3 h (T2) from ingestion on both days. Exclusion criteria included vascularization-affecting comorbidities or drugs. Ethical approval was obtained and all HVs signed an informed consent. A descriptive analysis was performed. The Wilcoxon test was used for the statistical analysis.
Results: Overall, thirteen HVs were enrolled in the study, male 8/13 (61.5%) with an average age of 29 (± 4) years (Table 1). A statistically significant reduction in heart rate was observed (5.1 bpm 3 h after ingestion and 0.9 bpm/day on average on experimental days) between T0-T1 (p-value = 0. 009) and T0-T2 (p-value = 0.002). Systolic, diastolic and mean arterial pressure had increased after 3 h from ingestion (3.4; 2.0; 2.4 mmHg, respectively, with no statistical significance), but decreased from day 1 to day 2 (1.4, 0.2, and 0.3 mmHg, respectively). Capillary refill time (CRT) decreased when measured visually (vsCRT) by 1.18 s after ingestion, and 0.15 s from day 1 to day 2, but did not achieved statistical significance. The magnitude of change did not differ significantly comparing day 1 and day 2 in any variable except for the T0-T2 in peripheral index calculated through vsCRT. No difference for any variable was observed between L-Arg single (day 1) and double (day 2) dose at T0, T1, and T2. No adverse events were observed after ingestion.
Conclusions: Oral L-Arginine AAS seems to produce an immediate and lasting- decrease in heart rate and visually measured capillary refill time values in healthy individuals. Blood pressure also appears to be positively affected by the ingestion of AAS. Further studies with a major sample size are needed to confirm these results.

Table 1 Demographic and parametric features of the 13 healthy volunteers (HVs) included in the study. Read: decreased (+) or increased (-). BMI: body mass index. SD: standard deviation

	All HVs (*n* = 13)
Demographic data	
Male gender (n, %)	8/13 (61,5%)
Age (years, mean ± SD)	29 (± 4)
BMI (mean ± SD)	24,9 (± 2,5)
Macrocirculation parameters (mean ± SD)	
Heart rate (HR, *n - beats per minute, bpm*)	
Day 1	
Delta HR T0-T1	6 (± 7)
Delta HR T0-T2	4 (±10)
Day 2	
Delta HR T0-T1	0,9 (±7)
Delta HR T0-T2	6 (±6)
Delta HR at T0 between day 1 and day 2	0,9 (± 8)
Mean delta HR between T0-T2 at day 1 and day 2	5 (± 6)
Systolic Arterial Pressure (SAP, *n - mmHg*)	
Day 1	
Delta SAP T0-T1	0,6 (± 10)
Delta SAP T0-T2	-4 (± 8)
Day 2	
Delta SAP T0-T1	0,9 (±6)
Delta SAP T0-T2	-3 (±7)
Delta SAP at T0 between day 1 and day 2 (mean)	1,4 (±7)
Mean delta SAP between T0-T2 at day 1 and day 2	-3 (± 5)
Diastolic Arterial Pressure (DAP, *n* - mmHg)	
Day 1	
Delta DAP T0-T1	0,5 (± 5)
Delta DAP T0-T2	-2 (±5)
Day 2	
Delta DAP T0-T1	1 (±6)
Delta DAP T0-T2	-2 (±7)
Delta DAP at T0 between day 1 and day 2 (mean ± SD)	0,2 (±7)
Mean delta DAP between T0-T2 at day 1 and day 2 (mean ± SD)	-2 (± 4)
Arterial Pressure (MAP, *n* - mmHg)	
Day 1	
Delta MAP T0-T1	0,2 (±5)
Delta MAP T0-T2	-2 (± 4)
Day 2	
Delta MAP T0-T1	0,5 (± 3)
Delta MAP T0-T2	-2 (± 6)
Delta MAP at T0 between day 1 and day 2 (mean ± SD)	0,3 (± 5,2)
Mean delta MAP between T0-T2 at day 1 and day 2 (mean ± SD)	-2,4 (±3,4)
Microcirculation parameters (mean ± SD)	
Perfusion Index (PI, *n* - seconds)	
Day 1	
Delta PI T0-T1	1,34 (± 2,47)
Delta PI T0-T2	0,91 (± 2,81)
Day 2	
Delta PI T0-T1	-0,37 (± 1,31)
Delta PI T0-T2	0,40 (± 2,80)
Delta PI at T0 between day 1 and day 2 (mean ± SD)	1,33 (± 2,06)
Mean delta PI between T0-T2 at day 1 and day 2 (mean ± SD)	0,65 (±2,35)
Manual Capillary Refill Time (MCRT, *n* - seconds)	
Day 1	
Delta MCRT T0-T1	-0,29 (± 0,62)
Delta MCRT T0-T2	-0,08 (±0,20)
Day 2	
Delta MCRT T0-T1	0,12 (± 0,37)
Delta MCRT T0-T2	-0,20 (±0,46)
Delta MCRT at T0 between day 1 and day 2 (mean ± SD)	-0,21 (± 0,40)
Mean delta MCRT between T0-T2 at day 1 and day 2 (mean ± SD)	-0,14 (±0,25)
Visual Perfusion Index (vsPI, *n* - seconds) and Capillary Refill Time (vsCRT, *n* - seconds)	
Day 1	
Delta vsPI T0-T1	0,52 (± 2,32)
Delta vsPI T0-T2	0,80 (± 0,95)
Delta vsCRT T0-T1	-0,53 (± 1,50)
Delta vsCRT T0-T2	-6,83 (± 1,36)
Day 2	
Delta vsPI T0-T1	-0,37 (± 1,92)
Delta vsPI T0-T2	1,56 (± 1,43)
Delta vsCRT T0-T1	-0,28 (± 1,16)
Delta vsCRT T0-T2	-0,99 (± 2,07)
Delta vsPI at T0 between day 1 and day 2 (mean ± SD)	0,15 (± 2,1)
Delta vsCRT at T0 between day 1 and day 2 (mean ± SD)	0,001 (± 1,3)
Mean delta vsPI between T0-T2 at day 1 and day 2 (mean ± SD)	1,18 (± 0,84)
Mean delta vsCRT between T0-T2 at day 1 and day 2 (mean ± SD)	-0,56(±1,38)

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Topic: Sepsis.

001641

Virtual reality-based family support system for delirium mitigation in mechanically ventilated ICU patients: an interventional study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001641

Introduction: Delirium is a common acute brain dysfunction characterized by fluctuating mental status with temporal and spatial disorientation, inattention, and disorganized thinking. It is associated with negative impacts on prolonged intensive care unit (ICU) and hospital stay, increased days of mechanical ventilation, short-term or long-term cognitive decline, and excess death. However, common therapeutic methods are often ineffective.
Methods: In this study, we developed a virtual reality (VR)-based family support system (VRFS) for non-pharmacological intervention in delirious patients. The VRFS provides a protective barrier from the ICU ward environment by immersing patients in a simulated natural setting. In this setting, virtual family members offer companionship and soothe patients. We conducted interventions on patients with post-cardiac surgery delirium using VRFS. Quantitative EEG (qEEG) analysis revealed that VRFS intervention, particularly in the "VR-Family" mode, induced changes in qEEG indices of delirious participants toward the mean values observed in non-delirious participants.
Results: Persistent delirium occurred following 35% post-cardiac surgery patients. VR interventions were administered on when delirium happened. EEG data was collected under sedation within VR interventions. Increased slow-wave activity percentage on EEG correlated with reduced sedation depth. With VR intervention, patients decreased agitation and increased responsiveness to family interactions and the post-VR EEG demonstrated marked reduction in slow-wave activity (Δβ/θ ratio + 32%).
Conclusions: This suggests a potential regulatory effect on brain activity. These findings demonstrate the potential of VRFS as a non-pharmacological tool for managing delirium. However, further validation through large-sample studies is necessary to confirm these preliminary results.



Figure 1 VR and EEG setup

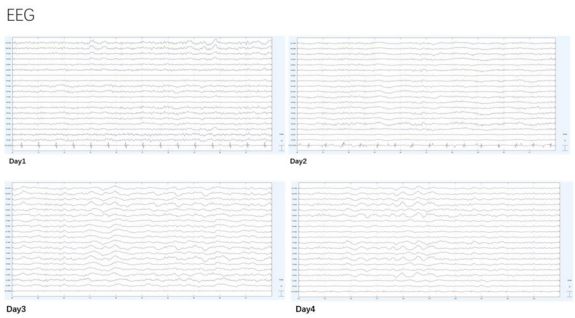


Figure 2 Daily EEG monitor

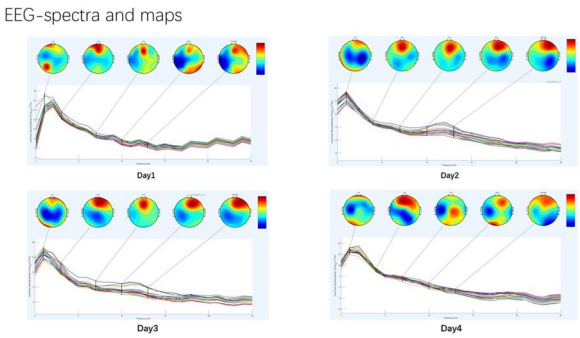


Figure 3 Daily EEG spectra and maps

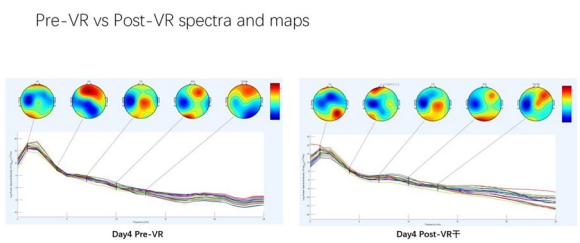


Figure 4 VR intervation pre-EEG vs. post-EEG

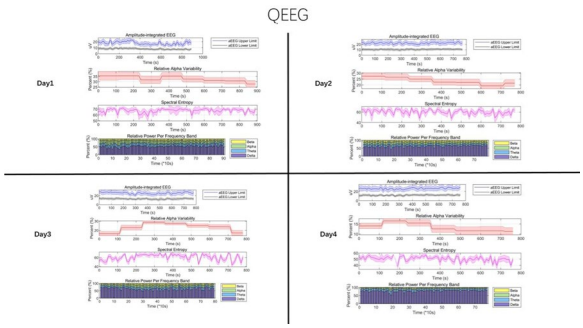


Figure 5 VR intervation pre-qEEG vs. post-qEEG

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Topic: Sedation, analgesia and delirium.

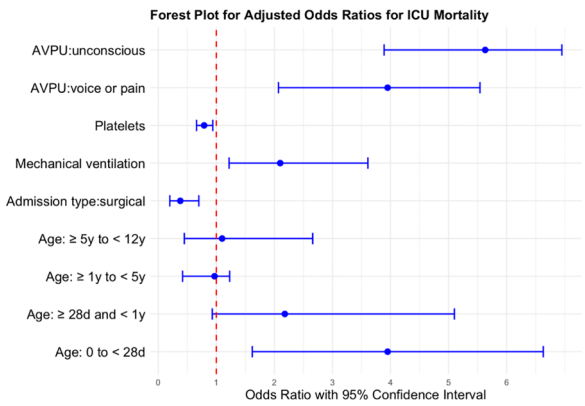
001642

Clinical features and risk factors for mortality of pediatric admissions to adult ICUs in Kenya

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Intensive Care Medicine Experimental 2025,* 13(1):*001642

Introduction: In many parts of Africa, critically ill children are frequently admitted to adult intensive care units (ICUs) or high dependency units (HDUs), underscoring the challenges of providing pediatric critical care in resource–limited settings.
Objectives: To better understand this issue, we analyzed the demographics, clinical characteristics, and outcomes of critically ill children admitted to adult ICU or HDU in Kenya.
Methods: We conducted a registry-based study in six ICUs and five HDUs in Kenya. We included consecutive patients aged under the age of 18 years, admitted to an ICU or HDU participating in the Kenya

Critical Care Registry [1], between January 2021 and June 2022. The primary outcome was ICU or HDU mortality; secondary outcomes included clinical management, duration of invasive ventilation, and length of stay. Risk factors for mortality were analyzed using multivariable logistic regression.
Results: Of the 5012 ICU or HDU admissions, 455 (9.1%) involved critically ill children. The median age was 2.0 [0.4–8.5] years, with 172 (37.8%) children being under 1 year. Medical admissions accounted for and 346 (76.0%) cases, while 109 (23.9%) were surgical. Almost half of the children received invasive ventilation, whereas noninvasive ventilation was rarely used. The use of cardiovascular support and renal replacement therapy were also limited. Approximately one quarter of children were sedated on admission, and more than 80% received at least one antibiotic. The overall ICU–mortality rate was 34.7%, higher in medical cases than in surgical cases (39.9 vs. 18.3%, $P < 0.01$). Independent risk factors for mortality were medical admission, age under 1 year, invasive ventilation, altered consciousness and a low platelet count (figure).
Conclusions: In Kenya, one out of ten admissions to adult ICUs and HDUs concerns a child, which often receive invasive ventilation and a high mortality rate. Children admitted for medical reasons and under age of 1 year are at high risk of a poor outcome. All risk factors for poor outcome are non–modifiable.



Forest plot of odds ratios for death in ICU for significant factors affecting ICU mortality

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1. This research was funded in whole, or in part, by the Wellcome Trust. The Kenya Critical Care Registry is funded by Wellcome Flagship Innovations award ("Collaboration for Research, Implementation and Training in Critical Care in Asia and Africa", reference 224048/Z/21/Z).
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Topic: Health Services Research and Outcome.

001643

AmsterdamUMCdb 2.0: a multi-EHR, OMOP-mapped European ICU research database

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Intensive Care Medicine Experimental 2025, **13(1)**:*001643*

Introduction: AmsterdamUMCdb 1.0, released in 2020, consisted solely of ICU data from the VUmc campus of Amsterdam UMC. The forthcoming AmsterdamUMCdb 2.0 combines data from both campuses of the now-merged hospital—VUmc and AMC—and incorporates the Epic EHR, substantially enlarging the cohort and broadening temporal coverage. All tables are converted to the OMOP common data model, making the data set fully FAIR (Findable, Accessible, Interoperable, Re-usable).
Its public release is planned before ESICM LIVES 2025.
Objectives: To describe the architecture, de-identification strategy and preliminary patient characteristics of AmsterdamUMCdb 2.0
Methods: Data sources:
1. Metavision PDMS, VUmc.
2. Metavision PDMS, AMC.
3. Epic EHR at the merged Amsterdam UMC.
A harmonised extract–transform–load pipeline mapped all clinical, device and laboratory tables to OMOP. We reused the risk-based de-identification framework validated for v1.0 ($k \geq 2$, $l \geq 2$ strict average risk, mandatory end-user licence and scientific-integrity training). Anonymisation and final quality-assurance steps are in progress and will follow the same protocol.
Results: Preliminary data at the time of abstract submission includes 23,081 admissions from VUmc (20,081 unique patients), 29,432 admissions from AMC (21,341 unique patients), and 27,538 admissions from Epic (25,381 unique patients). In total, AmsterdamUMCdb 2.0 currently comprises 80,051 ICU admissions from 66,803 unique patients. This represents a more than threefold increase in size compared to version 1.0. The data set contains high-frequency data such as, laboratory measurements, vital signs, and medication administrations. All variables are mapped to OMOP standard concepts. Final risk metrics will be included in the full manuscript.
Conclusions: AmsterdamUMCdb 2.0 will become the largest openly accessible European ICU database to date. It integrates data from three different EHR systems into a single GDPR-compliant and OMOP-mapped data set. By including both campuses of Amsterdam UMC, it significantly increases cohort size and heterogeneity. The resource will enable reproducible machine learning research, cross-center benchmarking, and external validation of clinical AI tools. Final de-identification and public release are expected in Q3 2025. A full description of methods and data characteristics will be submitted alongside the conference.

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1. https://pubmed.ncbi.nlm.nih.gov/33625129/
2. Institutional funding only

Topic: Information systems and Data Science.

001644

Mortality, functional outcome, and health-related quality of life in patients with necrotizing skin and soft tissue infections in the ICU: a multinational prospective cohort study (SKIN-ICU)

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Intensive Care Medicine Experimental 2025,* 13(1)*:001644

Introduction: Necrotizing soft tissue infections (NSTI) are rare and life-threatening bacterial infections characterised by necrosis of subcutaneous tissue, fascia or muscle. Few prospective studies have been conducted.
Objectives: The primary objective is to assess the 90-day mortality rate and identify prognostic factors in patients with NSTI in an international setting. Secondary objectives are (i) to characterise the clinical and microbiological presentation and management; (ii) to assess the risk of limb amputation and associated factors; and (iii) to assess functional and health-related quality of life (HRQoL) outcomes and associated factors.
Methods: We conduct a multinational, prospective, non-interventional cohort study (NCT05116956, registered on 2021-11-02). Data have been collected prospectively on a secure web-based server. The primary outcome measure is day-90 mortality. Secondary outcomes include need for limb amputation, the activity of daily living scale and health-related quality of life at day-90 (EQ-5D-5L questionnaire). Baseline characteristics associated with outcomes will be identified by multivariable analyses. Exploratory analyses will be conducted to assess the impact of therapeutic interventions on day-90 mortality and secondary outcomes. A statistical analysis plan has been published listing the variables to be included in the models (1). Analysis will be reported according to STROBE guidelines for observational cohort studies. The flow of patients will be displayed in a Consolidated Standard of Reporting Trials (CONSORT) diagram. The study protocol has been approved by an ethics committee in each participating country.
Results: We enrolled 1033 consecutive patients admitted to 85 hospitals with surgically proven NSTI between November 2021 and December 2024 in 17 countries over three continents. The last patient was enrolled on 31 December 2024 with a last follow-up date of 30 March 2025. Analyses are ongoing and results will be presented at LIVES 2025 according to the previously published protocol and statistical plan (1).
Conclusions: SKIN-ICU aims at being the largest multicentre multinational prospective cohort study on NSTI. A large amount of high-quality prospectively-collected data from multinational centres will allow for filling important gaps in our current knowledge on this devastating disease.

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2. Nicolas de Prost received the 2020 ESICM NEXT Start-Up Grant 2020

Topic: Sepsis.

001645

An evaluation of aminoglycoside dosing and monitoring in a large cardiac intensive care service

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Intensive Care Medicine Experimental 2025,* 13(1)*:001645

Introduction: Aminoglycosides, such as amikacin and gentamicin, are commonly used in intensive care (ICU) for the treatment of gram-negative bacterial infections in life-threatening conditions such as sepsis and infective endocarditis. Aminoglycosides are hydrophilic drugs which have a low volume of distribution and are renally cleared. Therefore, doses should be calculated based on lean body weight—or corrected body weight if patients are obese—and may require dose adjustment in renal impairment. Furthermore, as these drugs have a narrow therapeutic range and carry a significant risk of nephrotoxicity and ototoxicity at high levels, therapeutic drug monitoring (TDM) is essential. In critically ill patients, correct aminoglycoside dosing to achieve therapeutic concentrations which adequately treat infections is vital, however, appropriate monitoring must also be performed to manage the risk of adverse effects. In practice, aminoglycoside prescribing and monitoring varies widely. This service evaluation aims to assess current practice and identify options to optimise aminoglycoside use.
Objectives: To evaluate whether the correct dose of aminoglycoside was prescribed based on weight and renal function, and to evaluate whether drug levels were taken, when indicated, at the appropriate time.
Methods: Data were retrospectively collected for patients administered an aminoglycoside on ICU at St. Bartholomew's Hospital from 1/9/24 until 12/3/25. A total of 212 patients and 287 doses were included. Data wERE collected using a Microsoft Excel data collection tool, with patient-identifiable data anonymised. Data collected included patient demographics, prescription information, creatinine clearance and timing of levels taken. Levels were deemed appropriate if taken 18–24 h after the previous dose. Levels were not considered necessary for STAT doses as per local guidance.
Results: 287 doses were evaluated with 60% (172) of doses prescribed correctly and 40% (115) prescribed incorrectly based on local hospital guidelines. Among the incorrect doses, 58 were subtherapeutic and 57 were supratherapeutic (Fig. 1). TDM was performed for 94 of the 287 doses. Of these, 29% (27) were taken correctly based on the timing, while 71% (67) were taken incorrectly. Among the inappropriate levels, 34 were not indicated and 33 were taken at the incorrect time (Fig. 2).
Conclusions: Our results show there is significant variation in dosing and monitoring of aminoglycosides in ICU, with only 60% of doses prescribed correctly and 30% of levels taken appropriately at the correct time. To improve practice, a critical care specific guideline detailing dosing and monitoring practices for aminoglycosides should be developed. Furthermore, optimisation of the electronic prescribing system should be considered to guide correct dosing as well as timing of levels.

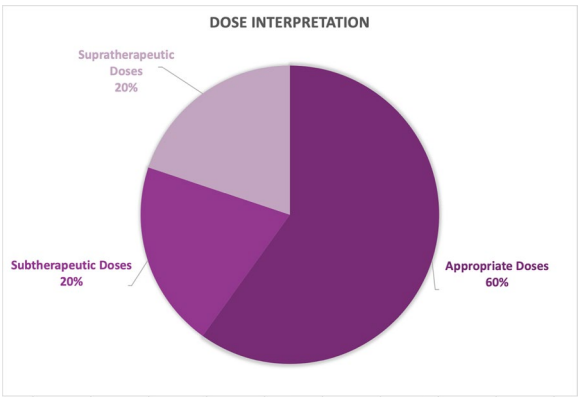


Figure 1 Appropriateness of aminoglycoside prescribing

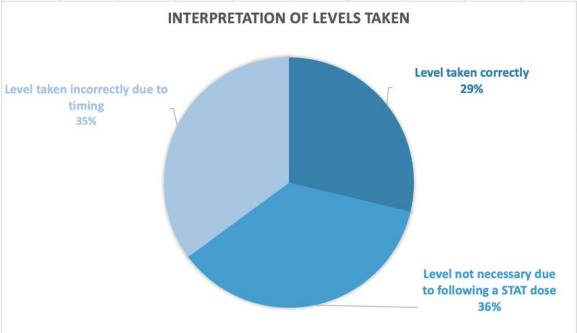


Figure 2 Appropriateness of aminoglycoside TDM

Topic: Pharmacology and Toxicology/Poisoning.

001646

Prognostic value of severity scores in spontaneous supratentorial intracerebral haemorrhage: a retrospective cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001646

Introduction: Spontaneous supratentorial intracerebral haemorrhage (ICH) remains a devastating neurological emergency with high morbidity and mortality. Accurate early prognostication is critical in guiding treatment intensity, resource allocation, and family counselling. While scoring systems are widely used, their discriminative value in small, focused neurocritical populations remains under-explored.
Objectives: To assess the association between established severity scores and age with hospital mortality in all spontaneous supratentorial ICH patients admitted to an intensive care unit in 2024.
Methods: We conducted a retrospective single-centre analysis of 33 adult patients with spontaneous supratentorial ICH admitted to the ICU. Patients were stratified by age (< 65 vs. ≥ 65 years) and GCS at admission (3–4, 5–12, 13–15). Severity scores (SOFA, APACHE II, SAPS II and ICH) were calculated for each patient based on established criteria. Mortality was defined as death prior to hospital discharge. Univariate analysis with Mann–Whitney *U* and Kruskal–Wallis tests was used to compare continuous variables across groups. We considered statistically significant results with $p < 0.05$.
Results: Among the 33 patients, the hospital mortality rate was 27% (9 out of 33). Mortality was significantly more frequent in patients aged 65 years or older ($p < 0.05$), and in those presenting with a GCS score of 3–4 upon admission ($p < 0.05$). Non-survivors exhibited significantly elevated severity scores compared to survivors: the median APACHE II score was 25 in non-survivors vs. 15 in survivors ($p < 0.05$); the median SOFA score at admission was 12 vs. 6 ($p < 0.05$), and the SAPS II score reached a median of 60 in non-survivors compared to 35 in those who survived ($p = 0.031$). Severity scores were clearly stratified across GCS categories, with patients in the GCS 3–4 group displaying the highest scores across all indices. ICH score distribution ranged from 0 to 4. Higher ICH scores were significantly associated with increased hospital mortality, with a stepwise rise in mortality from 0% in patients with ICH Score 0–100% in those with score 4.
Conclusions: In this focused cohort of 33 spontaneous supratentorial ICH patients, GCS 3–4 and elevated APACHE II, SOFA, SAPS II and ICH Scores were significantly associated with hospital mortality. These findings support the utility of general ICU severity scores alongside disease-specific tools in the neurocritical context. Integration of both physiologic and neurologic markers, including the ICH Score, may enhance early risk stratification and decision-making. Further prospective validation in larger ICH cohorts is warranted.

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9. Nothing to disclose

Topic: Neurointensive care.

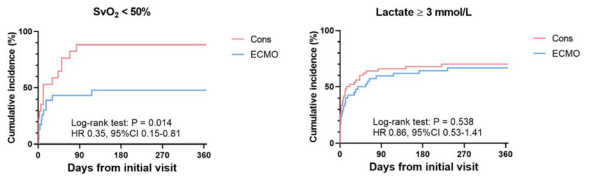
001647

Low SvO2, but not elevated lactate, identifies patients who may benefit from ECMO in cardiogenic shock: post-hoc analysis of the multicenter randomized ECMO-CS trial

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Intensive Care Medicine Experimental 2025,* 13(1)*:001647

Introduction: Immediate initiation of extracorporeal membrane oxygenation (ECMO) has not shown a consistent benefit in patients diagnosed with cardiogenic shock based on the presence of hypotension and hypoperfusion. In the Extracorporeal Membrane Oxygenation in the Therapy of Cardiogenic Shock (ECMO-CS) trial, tissue hypoperfusion was defined as evidence of either low venous oxygen saturation (SvO2) or elevated lactate levels. However, the relationship between these parameters and clinical outcomes, with or without ECMO, remains incompletely understood.
Objectives: This study aimed to evaluate the effect of immediate ECMO initiation in patients with cardiogenic shock and evidence of low SvO2 or elevated lactate levels.
Methods: In the ECMO-CS trial, 117 patients with cardiogenic shock were randomized to either immediate ECMO initiation or an early conservative strategy. This post-hoc analysis assessed the clinical efficacy of immediate ECMO in subgroups defined by baseline SvO2 < 50% or lactate ≥ 3 mmol/L. The primary endpoint was all-cause mortality at 1 year. The secondary endpoint was a composite of all-cause mortality or hemodynamic deterioration requiring ECMO.

Results: Baseline SvO2 data were available for 95 patients. Among those with SvO2 < 50% (n = 40), immediate ECMO initiation was associated with a significantly lower risk of all-cause mortality (HR 0.35; 95% CI 0.15–0.81; p = 0.014; Fig. 1) and the composite secondary endpoint (HR 0.34; 95% CI 0.15–0.76; p = 0.003). Lactate data were available for all 117 patients. In the subgroup with lactate ≥ 3 mmol/L (n = 92), immediate ECMO did not significantly reduce 1-year all-cause mortality compared to the conservative strategy (HR 0.86; 95% CI 0.53–1.41; p = 0.538; Fig. 1). Similarly, there was no significant difference in the composite secondary endpoint (HR 0.65; 95% CI 0.41–1.05; p = 0.067).
Conclusions: Immediate ECMO initiation was associated with improved clinical outcomes in patients presenting with low SvO2, but not in those with elevated lactate. These findings may help identify patients in cardiogenic shock who might benefit from mechanical circulatory support.



Cumulative incidences of all-cause mortality according to baseline venous oxygen saturation (SvO2) and baseline lactate. CI confidence interval; Cons, early conservative arm; ECMO, immediate extracorporeal membrane oxygenation arm; HR, hazard ratio.

Reference
1. The ECMO-CS study was supported by a grant from the Czech Health Research Council No. 15-27994A. The present analysis was co-funded by the Charles University Research Program "Cooperatio Cardiovascular Sciences".

Topic: Cardiovascular issues in ICU.

001648

Are there differences in catheter-related infections between patients undergoing hemofiltration and those undergoing conventional dialysis in our unit?"

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Intensive Care Medicine Experimental 2025,* 13(1)*:001648

Introduction: The patient in the ICU requiring extracorporeal renal replacement therapy is typically either a patient in shock who develops acute renal failure (ARF), initially requiring hemofiltration and later possibly dialysis, or a patient with chronic kidney disease undergoing dialysis who decompensates and needs to continue dialysis if their hemodynamic status allows or use hemofiltration for a few days until they recover and can return to dialysis.
Objectives: To study over 6 months (July-December 2024) in the ICU of HCUVA all patients admitted who required dialysis and/or hemofiltration and/or both, assessing whether there are differences in the development of catheter-related infections between the two groups, considering that many of them go through an initial phase of hemofiltration followed by dialysis.
Methods: A prospective observational cohort study without intervention, from July to December (current date) 2024. It studies two groups of patients followed throughout their stay in our unit, assessing dialysis or hemofiltration and whether they develop catheter-related infections.
Results: 49 patients were included, of which 17 required dialysis during their entire ICU stay, and 32 required.
hemofiltration, with 12 of them later undergoing several sessions of dialysis before discharge.
Dialysis—17 patients; **hemofiltration**—32 patients.
Dialysis group:- **Sex**: 66.6% male, 33.3% female **Mean age**: 70.83 years.
· **APACHE II**: 21.25, ·
FR: 41.66% chronic kidney disease (CKD) on dialysis 32% diabetes, hypertension, ·
Average stay: 18.3 days.
· **Reasons for admission**: ARF: 41.66%, Septic shock: 25%. CKD complications: 11.76%, admitted with infected catheter.
· **ICU mortality**: 16.6%

Hemofiltration group: Sex: 57.14% male, 42.85% female, Mean age: 68.80 years

- **APACHE II**: 27.90, **FR**: 6.25% CKD on dialysis
- **47%** diabetes, hypertension
- **Average stay**: 11.9 days
- **Reasons for admission**: AKI: 23.80%
  - Septic shock: 37%
  - Medication intoxication: 14.28%
- **CKD complications**: 3.12%
- **ICU mortality**: 28.57%

Conclusions:

- In both groups, the development of catheter-related infection is minimal; only 1 out of 49 patients developed this complication. In the dialysis group, the 2 patients with CKD had their tunneled catheters,
- which were infected and had to be removed after being transferred from the ward.
- Adherence to the Zero projects in the ICU units helps improve and maintain very low catheter-related infection rates.
- The profile of the patient with hemofiltration is more severe, with a higher APACHE score (27.9) and
- higher mortality (28.57%), 10 points above the dialysis group. This severity, combined with a higher prevalence of diabetes, could partly explain the slight increase in infectious complications.

Topic: Acute Kidney Injury and haemofiltration.

001650

Extracorporeal membrane oxygenation (ECMO) trends: an analysis of patient demographics, clinical characteristics, and outcomes

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Intensive Care Medicine Experimental 2025,* 13(1)*:001650

Introduction: Extracorporeal membrane oxygenation (ECMO) is a life-saving intervention used for patients with severe cardiac and/or

respiratory failure. This study aimed to analyse patient demographics, clinical characteristics, and outcomes associated with ECMO.
Objectives: The aim of this study was to analyze patient demographics, clinical characteristics, and outcomes associated with ECMO.
Methods: A retrospective analysis of 540 consecutive ECMO patients was conducted. Data on demographics, primary diagnoses, ECMO modalities, length of ECMO support, and mortality were collected. Statistical analysis included ANOVA, chi-square tests, and ROC analysis.
Results: The mean age of patients was 50.4 years (IQR 42–62), with a male predominance (70.9%). The most frequent primary diagnoses were cardiac arrest (20.9%), COVID-19 (17.1%), and post-operative status (12.4%). VV ECMO was the most common modality (44.4%), followed by VA ECMO (30.5%) and DCP (14.8%). The mean duration of ECMO support was 13.3 days. Overall mortality was 33.1% ($n = 179$). Among the patients, 45.7% ($n = 247$) were discharged alive. Post-ECMO mortality (4.1%, $n = 22$), aborted procedures (6.1%, $n = 33$), and cases, where cannulation was not performed (5.2%, $n = 28$). Age differed significantly across ECMO modalities (ANOVA, $F = 4.82$, $p < 0.0001$). No significant association was found between sex and ECMO type ($p = 0.089$). Primary diagnosis and mortality varied significantly across modalities (Chi-square, $p < 0.0001$). ECMO duration also differed significantly by modality ($F = 29.97$, $p < 0.0001$). VV ECMO was the most commonly utilized modality (44.4%, $n = 255$), followed by VA ECMO (30.5%, $n = 175$) and distal perfusion catheter (DCP) (14.8%, $n = 85$). Less frequently used modalities included ECPR (6.1%, $n = 35$) and VVA ECMO (0.7%, $n = 4$). The performance of a logistic regression model for predicting mortality was evaluated using Receiver Operating Characteristic (ROC) analysis. The model, incorporating Age and ECMO Modality as predictors, achieved an Area Under the Curve (AUC) of 0.73 (95% CI 0.66–0.80), indicating fair discriminatory power. These findings suggest the model's moderate ability to distinguish between survival and mortality, highlighting its potential utility in clinical decision-making.
Conclusions: This study provides a comprehensive overview of ECMO utilization, highlighting the variability in patient characteristics and outcomes across different ECMO modalities. Further research is needed to identify predictors of survival and optimize patient selection for ECMO therapy.

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4. None

Topic: Cardiovascular issues in ICU.

001651

Understanding AI acceptance in European critical care: a cross-sectional survey study exploring physician perspectives

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Intensive Care Medicine Experimental 2025,* 13(1):*001651

Introduction: Artificial intelligence (AI) holds promise for improving patient care and decision-making in intensive care units (ICUs). However, successful adoption remains limited, partly due to a lack of insight into ICU physicians' acceptance and trust in AI. Identifying the factors that shape these attitudes is essential to understand the needs and concerns of ICU professionals and to ensure effective AI integration.
Objectives: This study aims (1) to identify factors influencing ICU physicians' acceptance of clinical AI, (2) to explore ethical considerations relevant to AI implementation based on WHO principles, and (3) to assess specific needs for AI implementation in ICUs.
Methods: A multicenter, cross-sectional survey was conducted among ICU physicians across 20 European hospitals collaborating in the INDICATE consortium. The survey included 51 items based on the Unified Theory of Acceptance and Use of Technology (UTAUT), Status Quo Bias theory, and WHO ethical AI guidance. Constructs included performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, inertia, perceived threat, resistance to change, and ethical principles. In addition, 10 items were included to explore physicians' views on a proposed solution that provides transparency in AI model characteristics, assessing if this matched their professional needs.
Results: In total, 320 ICU physicians responded, comprising 221 consultants (69%) and 99 residents (31%). Respondents represented a diverse European sample, predominantly from Italy (23%), Austria (16%), and the Netherlands (12%). Most were aged 31–40 years (48%) and worked primarily in adult ICUs (86%). Over 60% had less than 10 years of ICU experience. Overall, 67% of respondents believed the benefits of AI outweigh the potential risks, and 71% indicated they would use AI models to support clinical decision-making. Acceptance for administrative tasks was even higher (85%). Resistance to changes in clinical decision support due to AI was limited (19%) and even lower for administrative tasks (12%). However, familiarity with key AI concepts was limited. Forty-three percent were unfamiliar with performance metrics such as accuracy and specificity. Similarly, 37% lacked understanding of generalizability, and 44% were unfamiliar with fairness in AI.
Conclusions: ICU physicians showed a generally positive attitude toward AI, particularly for administrative support. Despite this, knowledge gaps remain regarding essential AI concepts. These findings emphasize the need for targeted education and transparent communication to support successful AI adoption. By identifying barriers, facilitators, and ethical concerns, this study informs strategies to improve AI implementation in intensive care settings.

Reference

1. This research is part of the INDICATE consortium.

Topic: Information systems and Data Science.

001652

Mortality and complications of intoxicated patients in the intensive care unit of hospital Juarez de Mexico

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Intensive Care Medicine Experimental 2025,* 13(1)*:001652

Introduction: Epidemiologically, acute poisoning data vary, directly dependent on cultural, social, and geographic factors, including the type of toxic substances involved.
Despite this, poisonings are a progressively growing public health problem, regardless of the increased referral and management capacity for each of these pathologies. Among the identified causes of acute poisonings admitted to ICUs worldwide are psychotropic drugs, drugs of abuse, alcohol, antidepressants, and analgesics.
Currently, there is no multicenter, practice-based database on poisoned patients admitted to intensive care units (ICUs). However, admission to the intensive care unit due to poisoning is a relevant topic due to the profile of the admitted patient, the length of hospital stay, and the resulting mortality.
Objectives: To evaluate the relationship between the cause of poisoning, the use of CRRT, days of hospital stay and mortality in patients with acute poisoning, adjusting for age, sex, APACHE II and SOFA, to identify factors associated with worse outcomes in the intensive care unit at the Juárez de México Hospital between January 1, 2022 and February 28, 2025.
The sample included patients admitted to the intensive care unit: men and women with suspected poisoning. The study consisted of eight men (50%) and eight women (50%). The total sample included patients between the ages of 16 and 66, with a range of 50 years and a mode of 31 years.
An electronic case report form was used to collect data on demographics, exposure, clinical characteristics, investigations, treatment, and in-hospital mortality of poisoned patients.
Methods: Retrospective cohort study, descriptive statistics and bivariate analysis were performed to detect significant associations, logistic regression for mortality and linear regression for length of stay.
Results: Days of stay: There are no significant differences by CRRT or cause of poisoning.
Mortality: The only death is associated with CRRT and Amanita phalloides, but the low frequency prevents conclusions. The trend ($p = 0.125$) suggests that CRRT may be associated with higher mortality, consistent with studies reporting 50–70% mortality in CRR.
CRRT: Not significantly associated with the cause of poisoning, but use is infrequent.
Cause of poisoning: The diversity of substances limits the analysis; the pharmacological/non-pharmacological grouping showed no differences.
Conclusions: Among the complications analyzed, the most common complication is the need for invasive mechanical ventilation; this is also associated with the need for vasopressor support. Less frequently, it is associated with the need for renal replacement therapy (regardless of whether it is intermittent and/or continuous) in 37.5% of cases. The third decade of life was the most affected population. The mortality observed in the overall population was 6.25%.
No significant differences were found ($p < 0.05$), most likely due to the sample size ($n = 16$) and low frequency of events (1 death, 2 CRRT).

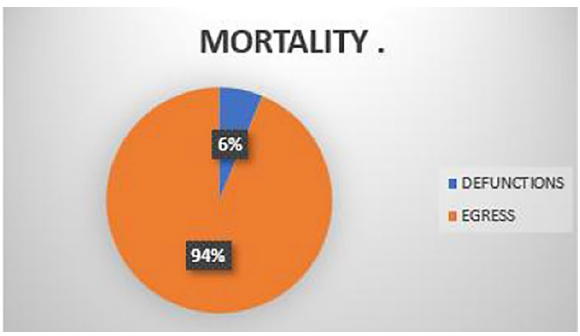
Análisis	Variable	Estadístico	IC 95%	p-valor
Bivariado (Mortalidad)	CRRT (sí vs. no)	Fisher p = 0.125	-	0.125
Bivariado (Días de estancia)	CRRT (sí vs. no)	U = 12	-	0.597
	Causa (no farmacológica vs. farmacológica)	U = 20	-	0.556
	APACHE II (correlación)	ρ = 0.28	-	0.295
Regresión logística (Mortalidad)	CRRT	OR = 4.5	0.12–171.2	0.424
	APACHE II	OR = 1.2	0.98–1.47	0.074
Regresión lineal (Log Días de estancia)	CRRT	β = 0.41	-0.22, 1.04	0.178
	APACHE II	β = 0.02	-0.01, 0.05	0.159

Notas:
- U: Mann-Whitney U; OR: Odds ratio; β: Coeficiente de regresión.

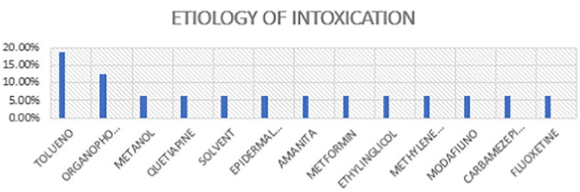
analysis.

CHARACTERISTICS	
AGE	- RANGE (50 YEARS)
SEX - FEMALE - MALE	- FEMALE 50% (8) - MALE 50% (8)
ROUTE OF INGESTION ORAL	- ORAL 100% (16)
COMORBIDITIES: - DIABETES - HYPERTENSION - OBESITY	- DIABETES 12.5% (2) - HYPERTENSION 12.5% (2) - OBESITY 0%
SMOKING	- 25% (4)
ALCOHOL CONSUMPTION	18.75 % (3)
Drug use - DOPE - COCAINE - SOLVENTS	- MARIJUANA 12.5% (2) - COCAINE 12.5% (2) - SOLVENTS 18.75% (3)
EXTRACORPOREAL THERAPY: - INTERMITTENT HEMODIALYSIS - PLASMAPHERESIS - CONTINUOUS RENAL REPLACEMENT THERAPY	- INTERMITTENT HEMODIALYSIS 25 %(4) - TRRC 12.5% (2) - PLASMAPHERESIS 6.25% (1)
DAYS OF STAY IN UCIA	- 4.3 DAYS
MECHANICAL VENTILATION - DAYS - TRACHEOSTOMY	- DAYS OF MECHANICAL VENTILATION 93.7% (15) - TRACHEOSTOMY 6.25% (1)
VENTILATION-ASSOCIATED PNEUMONIA	- 12.5% (2)

characterеristics.



MORTALITY



ETIOLOGY OF INTOXICATION

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Topic: Pharmacology and Toxicology/Poisoning.

001653

Comparative outcomes of fibrinolytic therapy vs. standard anticoagulation in acute pulmonary embolism: a retrospective cohort study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001653

Introduction: Pulmonary embolism (PE) is a life-threatening cardiovascular emergency frequently encountered in the ICU. While anticoagulation is the standard treatment, systemic fibrinolysis is indicated for patients with high-risk PE, particularly those presenting with obstructive shock.
Objectives: To compare clinical outcomes between patients treated with fibrinolytic therapy and those receiving standard anticoagulation, focusing on disease severity (PESI classification), right ventricular (RV) dysfunction, hemodynamic instability due to schock, bleeding complications, and short-term recovery.
Methods: A retrospective cohort analysis was conducted at a secondary hospital in Portugal, including adult patients diagnosed with acute PE from January 2023 to December 2024. Diagnosis was confirmed by computer tomography pulmonary angiography. Patients were stratified into two groups: fibrinolysis (IV alteplase 100 mg over 2 h followed by anticoagulation with low molecular weight heparin—LMWH) and standard anticoagulation (LMWH alone, 1 mg/kg every 12 h or 1 mg/kg daily in renal impairment). PESI scores were calculated at admission. RV function was assessed by echocardiography. Obstructive shock was defined as hypotension requiring vasopressors due to RV failure. Primary endpoints were in-hospital and 30-day mortality and major bleeding. Secondary endpoints included ICU admission, hospital length of stay, and 90-day VTE recurrence.
Results: Fifty-four patients were included: 12 received fibrinolysis, and 42 received standard anticoagulation. Fibrinolysis was administered in all patients with obstructive shock, except one due to formal contraindication. Therapy was interrupted in two cases due to suspected hemorrhagic complications. Patients in the fibrinolysis group had higher PESI scores (mostly class IV–V), more RV dysfunction, and greater hemodynamic compromise. ICU admission and hospital stay were significantly longer (mean 4.2 vs. 2.9 days, SD ± 1.5), likely reflecting disease severity and multiorgan dysfunction. In-hospital mortality was 25% in the fibrinolysis group vs. 16% in the anticoagulation group. Major bleeding occurred in 4% of fibrinolysis cases, with no fatal events. No significant difference in 90-day VTE recurrence was observed.
Conclusions: Fibrinolytic therapy was selectively used in patients with high-risk PE and obstructive shock, aligned with international guidelines. While associated with slightly increased bleeding risk and longer hospitalization, it did not significantly reduce short-term mortality. These results support the cautious use of fibrinolysis in critically ill patients and highlight the need for individualized risk–benefit assessment. Long-term follow-up, particularly with RV function monitoring, remains essential to evaluate recovery and prevent chronic complications.

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5. No external funding was received for this study

Topic: Cardiovascular issues in ICU.

001654

Assessment of thyromental height as a predictor of difficult laryngoscopic view in neurosurgical patients: a prospective observational study

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Intensive Care Medicine Experimental 2025,* 13(1)*:001654

Introduction: The assessment of airway may be challenging in neurosurgical patients, because airway assessment test need patients to cooperate and move their necks, which might not be possible with altered mental status or a cervical spine injury.1 Hence, thyromental Height (TMH) may be useful alternative in these challenging subset of patients, which can be measured in neutral head position and does not required patient's co-operation.2
Objectives: The objective of this study was to validate TMH as a predictor of Difficult Laryngoscopic View (DLV) and also to evaluate other routinely practised bedside airway assessment parameters for prediction of DLV in neurosurgical patients.
Methods: A total of 562 Patients aged 18–65 years, either gender, ASA physical status 1–3, who requiring neurosurgical procedures under general anaesthesia were included in this study. The patients were assessed preoperatively after getting written informed consent. TMH was assessed in supine position and head in neutral position. The TMH was measured as vertical distance from the anterior mentum to the thyroid notch using vernier calipers. For conscious and cooperative patient, other airway parameters such as mouth opening (MO), modified Mallampati (MMP), Thyromental distance (TMD), Upper lip bite test (ULBT) and Sternomental diostance (SMD) were also recorded. General anaesthesia was commenced as per institutional protocol. Intubation was done mackintosh blade by an experienced anaesthesiologist who has at least 3 years of anaesthesia experience to omit interobserver bias. Laryngoscopic view will be noted as per Cormack Lehane (CL) grade 1–4 where CL grade 3–4 was defines the difficult laryngoscopic view.
Results: Out of 562 participants, 97 (17%) patients had difficult laryngoscopic view (CL grade 3 & 4) in the study. The cut-off value to predict DLV was 4.9 cm of TMH, 2 FB of MO, 3 & 4 Class of MMT, TMD of ≤ 7 cm, and SMD of ≤ 12.7 cm with various sensitivity, Specificity, Positive predictive value, negative predictive value and diagnostic accuracy (Table 1). For unadjusted odds (univariate analysis), a TMH, hypertension, diabetes mallitus, height, ULBT, MMT, TMD, SMD has a statistically significant odds to predict DLV ($p < 0.05$). Following multivariate regression analysis, only TMH, MMT and TMD were statistically significant to predict DLV ($p < 0.05$). The multivariate adjusted odds of TMH was maximum 5.18 followed by MMT 1.84 and TMD 0.45.

Table 1 Performance metrics of the primary diagnostic parameters

Variable	Sensitivity	Specificity	PPV	NPV	Diagnostic Accuracy
TMH (≤ 4.9 cm)	75.3%	67.1%	32.3%	92.9%	68.5%
MO (2 FB)	10.3%	88.8%	16.1%	82.6%	75.3%
ULBT (Grade 2)	8.2%	97.4%	40.0%	83.6%	82.0%
MMT (Class 3&4)	23.7%	87.7%	28.8%	84.6%	76.7%
TMD (≤ 7 cm)	85.6%	24.1%	19.0%	88.9%	34.7%
SMD ≤ 12.7 cm)	80.4%	37.8%	21.3%	90.3%	45.2%

TMH Thyromental height; MO Mouth opening; ULBT Upper lip bite test; TMD Thyromental distance; SMD Sternomental distance; MMT Modified mallampatti test), FB Finger Bredth; Values expressed as percentage.

Conclusions: Thyromental height had a highest negative predictive value and multivariate adjusted odds to predict DLV in patients undergoing neurosurgical procedures. TMH can be measured in supine postion and hence, can be added to battery of airway assessment tool to get the optimal airway assessment.

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3. No Grant or funding recieved for the study

Topic: Perioperative care.

001655

Gaps between guidelines and practice: a cross-sectional survey on VAP prevention among Italian ICU nurses

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Introduction: Ventilator-associated pneumonia (VAP) incidence is estimated as 5–40% with attributable mortality of 10% 1. Nurses have a pivotal role in their prevention, but no data on their current adherence to latest guidelines are available in Italy.

Objectives: We aimed to assess Italian ICU nurses' adherence to recommended hygiene practices to prevent VAP development mentioned in the latest ERS/ESICM/ESCMID/ALAT guidelines of 2017 for VAP management.

Methods: A cross-sectional study was conducted using an auto-administered, online, and anonyme questionnaire elaborated and distributed to ICU nurses of Italy. Participants agreed freely to join the survey. An observational analysis was performed.

Results: Of 53 ICU nurses who completed the survey (37/53; 70% females), 18/53 (34%) had more than 10 years of experience working in ICU with a good representation of the Italian country (North 14 (26.4%); Center 19 (35.8%); South 9 (17.0%); Islands (20.8%)).

In the Real-Life section of the survey, only 54.7% (29/53) of ICU nurses reported not wearing jewelry during clinical practice, neglecting its role in infection transmission. Despite the 71.7% being aware about the latest ERS/ESICM/ESCMID/ALAT guidelines (2017) on VAP management and prevention, the 60.4% (32/53) had never read, and institutional updates were offered in only 4/53 (7.5%) of cases.

Regarding WHO's "Five Moments for Hand Hygiene," high adherence was reported after exposure to body fluids (53/53, 100%), after patient contact (52/53, 98.1%), and before aseptic procedures (48/53, 90.6%). However, only 62.3% (33/53) of nurses performed hand hygiene before patient contact, and just 67.9% (36/53) did so after touching the patient's surroundings.

Considering VAP prevention-specific measures, 49/53 (92.4%) confirmed proper head-of-bed elevation (30–45°), and 49/53 (92.4%) used 0.12% chlorhexidine for oral hygiene. However, only 30/53 (56.6%) consistently performed antiseptic handwashing before oral care. Routine oral care three times per day was reported by 21/53 respondents (39.6%). Bronchial suctioning practices were mostly aligned with standard recommendations: 43/53 (81.1%) performed it only when necessary, 41/53 (77.3%) limited the duration to ≤ 15 s, and 46/53 (86.8%) applied aseptic technique. Use of closed suction systems was reported by 39/53 nurses (73.6%), though only 21/53 (39.6%) performed hand hygiene before closed-circuit suctioning. Finally, 44/53 (83.0%) maintained tracheostomy cuff pressures at 20–25 cmH_2O, and 48/53 (90.6%) managed endotracheal cuff pressures at 25–30 cmH_2O. Cuff pressure monitoring every 8 h was performed by just over half of respondents (28/53, 52.8%). In the Propositive Section, an 'obligatory course about VAP prevention at hiring' was rated as 'best solution', a 'trimestral refresh course' was considered as the 'most effective solution' by respondents.

Conclusions: Hands hygiene compliance remains fairly limited as long as awareness and knowledge of current guidelines among ICU nurses in Italy. Nurses' proposals on how to improve adherence to guidelines should be taken into consideration for future educational efforts to be implemented.

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2. No financial support was received to conduct the above-mentioned study.

Topic: Nursing care and physiotherapy.

001656

Deploying and applying automated quality indicators for acute kidney injury in the ICU: an initial concept study

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Introduction: Acute kidney injury (AKI) is a frequent and serious complication in critically ill patients. Despite the availability of guidelines, the implementation and monitoring of AKI-related quality indicators remain limited.

Objectives: The aim of this study was to develop and to evaluate the use of automated quality indicators (AQI) based on variables obtained from the clinical information system (CSI) to measure compliance with clinical practice guidelines in the field of intensive care nephrology.

Methods: A multidisciplinary team (intensivists and biomedical engineers) developed the indicators based on the 2012 KDIGO guidelines and the 2017 SEMICYUC quality indicators. The AQI were then applied in a retrospective, single-centre analysis in a 30-bed general ICU. All adults patients with an ICU stay > 48 h were included. Patients with chronic renal failure (CRF according to ICD-9/10) were excluded.

AKI was diagnosed and staged according to KDIGO criteria based on daily serum creatinine and diuresis assessed at 6-h intervals. In the absence of pre-admission laboratory values, baseline creatinine was estimated using the age- and sex-adjusted MDRD formula for the Caucasian population.

Results: Ten AQIs were selected (Table 1), six AQIs were outcome-related, assessing the diagnosis, progression, and recovery of AKI and renal function, and four AQIs were process-related, assessing compliance with international recommendations.

Of the 7661 patients included, 1239 for CRF were excluded. The final cohort was 6422 patients with baseline characteristics detailed in Table 2.

In the whole population AKI developed in 32.2% of patients during their stay in the ICU. Among them, 26.9% presented with persistent AKI for more than 7 days. 27.3% of patients progressed to AKI stages II-III, 17.95% required continuous renal replacement therapy (CRRT) and 77.4% recovered baseline renal function.
13.5% of patients spent more than 17% of their time in the ICU with a mean arterial pressure (MAP) below the recommended target, and this rose significantly to 81.2% in patients with a history of hypertension. Only 49.0% had early glycaemic control, only 33.2% had nephrotoxic drugs discontinued within the first 24 h alone, and only 6.6% had creatinine clearance measured to adjust drug doses.
Conclusions: The application of the AQI made it possible to identify low compliance with international recommendations. Having quality indicators in this area has helped to identify areas for improvement and will make it possible to assess the impact of the measures implemented.

Table 1 Automated quality indicators for acute kidney injury

	Indicator Name	Formula	Results
1	ICU-Acquired Acute Kidney Injury Rate (%)	Number of patients who developed AKI[1] during ICU stay / Total number of ICU-admitted patients without AKI on admission[2] × 100	32.21
2	AKI Diagnosis Documentation Rate (%)	Number of patients with ICD-9/10 coded AKI in the discharge report / Total number of patients with AKI × 100	17.76
3	Progression from AKI to Acute Kidney Disease (AKD) (%)	Number of patients with AKI lasting > 7 days during ICU stay / Total number of patients with AKI x 100	26.95
4	Progression from AKI to KDIGO Stage II/III (%)	Number of patients with AKI stage I progressing to stage II–III [1] / Total number of patients with AKI stage I x 100	27.33
5	Renal Replacement Therapy (RRT) Requirement (%)	Number of patients undergoing hemodialysis or RRT / Total number of AKI patients without limitation for RRT x 100	17.95
6	Renal Function Recovery (%)	Number of AKI patients who return to baseline [3] < baseline creatinine before ICU discharge / Total number of AKI patients × 100	77.49
7	Hemodynamic Monitoring in AKI (%)	Number of AKI patients with MAP below target [4]>17% of ICU stay / Number of AKI patients with continuous BP monitoring and no treatment limitations ×100	13.59 (non- hypertensive) 81.21 (hypertensive patients)
8	Correction of Hyperglycemia (%)	Number of episodes with 2 consecutive glucose peaks >180 mg/dL followed by insulin initiation or dose increase / Number of episode with 2 consecutive glucose peaks >180 mg/dL ×100	49.06
9	Nephrotoxic Drug Discontinuation Rate (%)	Number of nephrotoxic drugs[5] discontinued within 24 h of AKI diagnosis / Total number of nephrotoxic drugs prescribed in AKI patients ×100	33.23
10	GFR Estimation via Creatinine Clearance (%) (%)	Number of AKI patients with measured creatinine clearance) / Total number of AKI patients ×100	6.63

(1) AKI diagnosis and staging were based on the 2012 KDIGO criteria, using daily serum creatinine and urine output normalized for ideal body weight in 6-hour intervals. (2) AKI on admission was defined as serum creatinine within 24 hours of ICU admission ≥150% of the estimated baseline value. (3) Baseline creatinine was estimated using the MDRD formula, adjusted for age and sex, in the Caucasian population. (4) Target mean arterial pressure (MAP) was >65 mmHg in the general population and >80 mmHg in hypertensive patients. (5) Nephrotoxic drugs included NSAIDs, metamizole, ACE inhibitors, ARBs, vancomycin, amphotericin B, and aminoglycosides.

Table 2 Baseline characteristics of general population

Age, median [Q1,Q3]	61 [48-71]
Male sex, n (%)	5511 (63.8)
ICU days, median [Q1,Q3]	4 [2-9]
Mortality, n (%)	1256 (14.5)
Chronic cardiac failure, n (%)	431 (5.0)
Liber cirrrhosis, n (%)	755 (8.7)
diabetes, n (%)	1754 (20.3)
Arterial hypertension, n (%)	3856 (44.6)
Chronica anemia, n (%)	1473 (17.0)
Dehydratation, n (%)	15 (0.2)
Sepsis, n (%)	1179 (13.6)
APACHE II, median [Q1,Q3]	19 [14-25]
Charlson index, median [Q1,Q3]	3 [1-5]
SOFA, median [Q1,Q3]	2 [1-4]
Coronari, n (%)	92 (1.1)
Mèdic (%)	6111 (70.7)
Quirùrgic n (%)	2298 (26.6)
Traumàtic n (%)	110 (1.3)
imv DAYS, median [Q1,Q3]	0 [0-4]
Vasoactive drugs, n (%)	86 (1.0)
BMI, median [Q1,Q3]	26 [24,29]
IMV, n (%)	4047 (46.8)

Topic: Acute Kidney Injury and haemofiltration.

001657

Status epilepticus severity score a tool to predict mortality in status epilepticus

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Introduction: Status epilepticus (SE) treatment ranges from small benzodiazepine doses to coma induction. For some SE subgroups, it is unclear how the risk of an aggressive therapeutic approach balances with outcome improvement. We recently developed a prognostic score (Status Epilepticus Severity Score, STESS), relying on four outcome predictors (age, history of seizures, seizure type and extent of consciousness impairment), determined before treatment institution.
Objectives: Our aim was to assess whether the score might have a role in the treatment strategy choice.
Methods: We conducted a retrospective observational study over 3 years, from January 2022 to December 2024. All consecutive patients aged more than 18 years admitted to the medical ICU of Habib Thamer University hospital for a status epilepticus were included. We collected baseline demographics and clinical characteristics. Therapeutic management and ICU stay related complications were recorded. The primary outcome was the correlation between STESS and the prognosis of SE.
Results: During the study period, we included 80 patients with a median age at 52 [18–90] years. Mainly males (62 patients) with a genre ratio at 3.4. Patients had a known epilepsy in 37.5% of cases (n = 30). Major other comorbidities were hypertension 23.8% and diabetes 22.5%. The median of STESS score at 3 [2–4]. Status epilepticus was caused by an acute stroke in 30.4% of cases followed by poor controlled epilepsy due to medicine withdrawl in 24.1%, meningoencephalitis in 8.9%, metabolic disorder and acute intoxication in 3 cases each. No specific etiology was found in 20.3% of cases. Invasive mechanical ventilation was required in 74.7% of the cohort and the mortality rate was 31.3% (n = 25).
The analysis of the curve ROC demonstrates a STESS score higher than 2 correlated with mortality with aire under curve at 0.67, p = 0.004, 55% of sensibility and 60% of specificity. We noted 23/25 of died patients with a STESS score > 2 points.
Conclusions: STESS can represent a useful tool in assessing the gravity of SE episodes and that immediate aggressive treatment, might possibly be avoided in the majority of patients with a low score, who will almost certainly survive their SE episode, and likely return to clinical baseline.

Topic: Neurointensive care.

001660

Efficacy of subcutaneous sumatriptan in post-craniotomy pain: a systematic review and meta-analysis

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Intensive Care Medicine Experimental 2025,* 13(1)*:001660

Introduction: Post-craniotomy pain (PCP) remains a significant clinical challenge. Subcutaneous sumatriptan (SC-SMT) has emerged as a potential non-opioid alternative for PCP management, with promising results in reducing pain scores. Despite these findings, no meta-analysis has exclusively evaluated SC-SMT for PCP management. To address this gap, we conducted a systematic review and meta-analysis to evaluate the role of SC-SMT in PCP after an elective craniotomy procedure.
Methods: We performed a systematic review and meta-analysis of studies retrieved from PubMed, Embase, Cochrane Library, and Web of Science. Studies were included if they assessed SC-SMT in the intervention group. Trials without a control group or with incompatible outcome measures were excluded. The outcomes analyzed were changes in the Numeric Pain Rating Scale at 12 and 24 h postoperatively, postoperative opioid consumption at 6 and 24 h, and scores in the Pain domain of the Quality of Recovery-40 (QoR-40) questionnaire. Statistical analyses were performed using Review Manager version 5.4.1. Heterogeneity among studies was assessed using the I^2 statistic.
Results: Two randomized controlled trials (RCTs) and two observational studies were included, totaling 423 patients, of whom 201 take SC-SMT alone or with opioids, and in the rest were administered placebo or opioids. The mean age in all patients was 55.74 years. The included populations comprised individuals undergoing craniotomy for a range of conditions, including trigeminal neuralgia, intracranial aneurysms, tumors, cerebrovascular diseases, and other neurosurgical indications. Studies follow-up periods ranged from 24 h to 3 months, and they were conducted in North America. Compared to control groups (placebo or opioid-based analgesia), SC-SMT was associated with a statistically significant reduction in pain scores at 12 h (MD = − 0.59; 95% CI − 0.89 to − 0.30; $p < 0.0001$) and at 24 h (MD = − 1.18; 95% CI − 2.06 to − 0.29; $p = 0.009$). Postoperative opioid consumption was significantly reduced in the SC-SMT group at 6 h (MD = − 4.34; 95% CI − 6.76 to − 1.91; $p = 0.0005$). However, the opioid consumption was not significant at 24 h (MD = − 1.40; 95% CI − 5.27–2.48; $p = 0.48$). QoR-40 scores in the pain domain were significantly higher in the SC-SMT group (MD = 6.02; 95% CI 0.14–11.90; $p = 0.04$).
Conclusions: Our systematic review and meta-analysis indicate that SC-SMT is an effective intervention for the management of PCP, with additional benefits observed in the reduction of opioid consumption and enhancement of postoperative recovery quality. However, these findings should be interpreted with care due to limitations in the included studies. We strongly recommend the conduction of further RCTs to more comprehensively assess the efficacy of SC-SMT in the management of PCP, thereby allowing for more definitive conclusions regarding this therapeutic approach.

Topic: Neurointensive care.

001661

Induction teaching on attending emergencies as part of the ITU team for non-anaesthetist resident doctors

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Intensive Care Medicine Experimental 2025,* 13(1)*:001661

Introduction: Resident doctors (SHOs) from non-anaesthetic backgrounds rotating onto Colchester Hospital Critical Care Unit (CCU) are expected to support CCU registrars in emergencies, by drawing up anaesthetic drugs and gathering intubation equipment. Anaesthetics forms only a small part of undergraduate medicine courses; a 2024 review of SHOs shows that 38.5% agreed their undergraduate anaesthetics teaching was sufficient, and only 6% of Foundation Programme jobs include anaesthetics [1]. This means most are not familiar with these roles and in turn, mistakes can occur, in addition to delaying time-critical management of unwell patients. SHOs have expressed anxiety over this, and CCU registrars have reported feeling distracted having to supervise and dictate drug/equipment preparation as well as resuscitation management.
Objectives: To increase the average self-assessed confidence and knowledge scores of non-anaesthetist Resident Doctors at Colchester Hospital when attending CCU emergencies by 25% by August 2025 to optimise the delivery of care to patients.
Methods: We held teaching sessions at every CCU SHO induction since August 2024. We used pre- and post- session surveys on a five-point scale from "not confident" to "confident", to assess level of comfortability in attending arrest calls as part of the CCU team; assisting intubations; recognising CCU candidates; knowledge of anaesthetic equipment, induction and emergency drugs. We also created and distributed quick reference lanyard cards for drug preparations (Fig. 1).
Results: We had eleven and twelve responses for the pre and post surveys, respectively. Scoring the scale between one to five, pre teaching ($n = 11$) trainees generally felt unfamiliar and unconfident with all examined aspects, ranging from average score of 1.9–2.36 out of 5. In the post teaching survey ($n = 12$), an improvement is noted with the score ranging between 3.4 and 3.83, with no participant answering "not confident" to any domain.
Conclusions: Our survey confirms the idea that intensive care medicine is a daunting rotation for resident doctors from a non-anaesthetic background. Many key concepts and procedures are primarily used only in anaesthetics, thus SHOs often feel ill-prepared for the challenges of managing unwell patients, especially those needing emergency intubations. We developed a programme that starts with an induction taught session, supplemented by quick recall lanyard cards, both designed to minimise cognitive overload at the learning stage and in an acute setting. Our post-course survey shows that following our programme, SHOs feel more comfortable and knowledgeable when participating in emergencies as part of the CCU team.

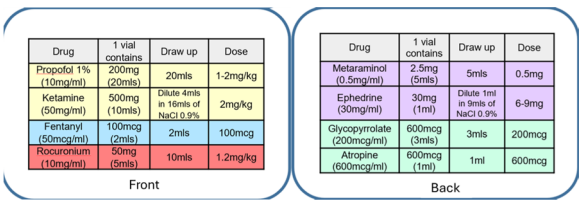


Figure 1 Quick reference lanyard card

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2. No grants. Thank you to Dr. Stephen Cole, our overseeing consultant, and Mr. Nigel Mason, our QI lead.

Topic: Health Services Research and Outcome.

Author contributions

KG and IIS had full access to all of the data and take responsibility for the integrity of the data and the accuracy of the analyses. EC, KG, and IIS conceived and designed the study. EC, KG, EP, SO, ID, AK, and IIS acquired and/or interpreted the data. KG performed the statistical analyses. EC and KG drafted the manuscript. EP, SO, ID, AK, and IIS critically revised the manuscript for important intellectual content. IIS supervised the study. All authors read and approved the final manuscript.

Data availability

This secondary analysis used de-identified participant-level data from the LOTUS FRUIT, VIOLET, CLOVERS, and ASTER PETAL trials, obtained from the National Heart, Lung, and Blood Institute's Biologic Specimen and Data Repository Information Coordinating Center (BioLINCC). These datasets are available to qualified researchers upon application and approval through BioLINCC, in accordance with NHLBI data-use

policies. Additional information is available from the corresponding author upon reasonable request.

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