



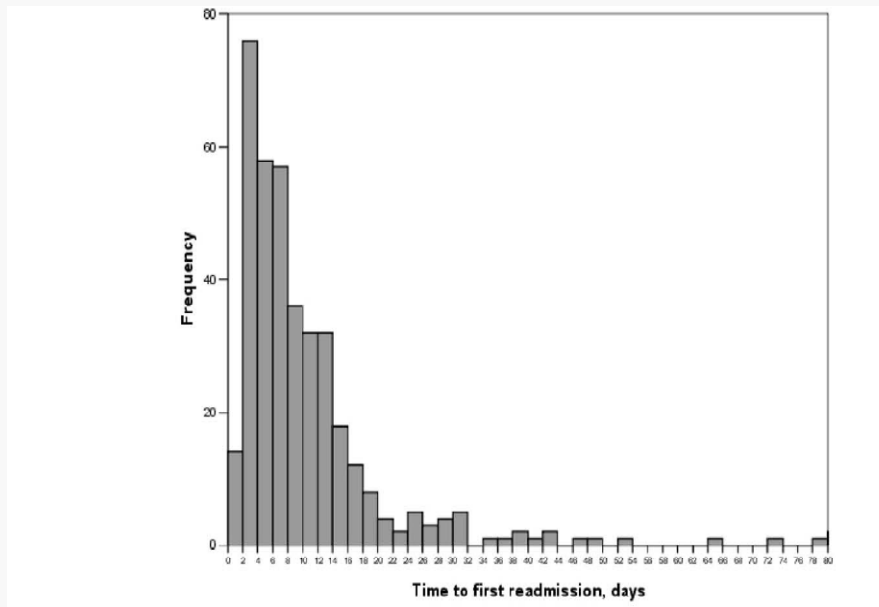
Admission
Discharge
Readmission

CHARITÉ
UNIVERSITÄTSMEDIZIN BERLIN

Readmission to a surgical intensive care unit: incidence, outcome and risk factors

Axel Kaben¹, Fabiano Corrêa¹, Konrad Reinhart¹, Utz Settmacher², Jan Gummert³, Rolf Kalff⁴ and Yasser Sakr¹

- 13.4 % Readmission
- 5-times increased mortality
- Independent risk factors in day of discharge:
 1. SOFAMax Score
 2. Age of the patient



Kaben et al Crit Care 2008

Readmission ICUs

Medline-Database 1966-1999 Suchwort: patient readmission-ICU, 26 Artikel, insg. 8 Studien ausgewertet

Table 2—ICU Readmission Rates in Multi-institutional Studies of ICU Outcomes*

Study	Type of Study	Study Period	Total Admissions	ICU Readmission†
Knaus et al ³¹	APACHE II	1979–1982	5,015	9.7
Knaus et al ³²	APACHE III	1988–1990	17,105	4.6
Zimmerman et al ³³	APACHE III update	1993–1996	42,950	5.6
International				
Rowan et al ³⁴	APACHE II study in Britain and Ireland	1987–1989	10,841	4.2
Markgraf et al ³⁵	German ICUs SAPs and APACHE study	1991–1994	3,382	8.1
Rivera-Fernandez et al ³⁶	Spanish APACHE III study	1992–1996	12,174	3.6
Goldhill and Sumner ³⁷	United Kingdom	1992–1996	23,331	7.9
Moreno and Morais ³⁸	EURICUS I	1994–1995	15,445	4.2

*EURICUS = European Intensive Care Units Studies.

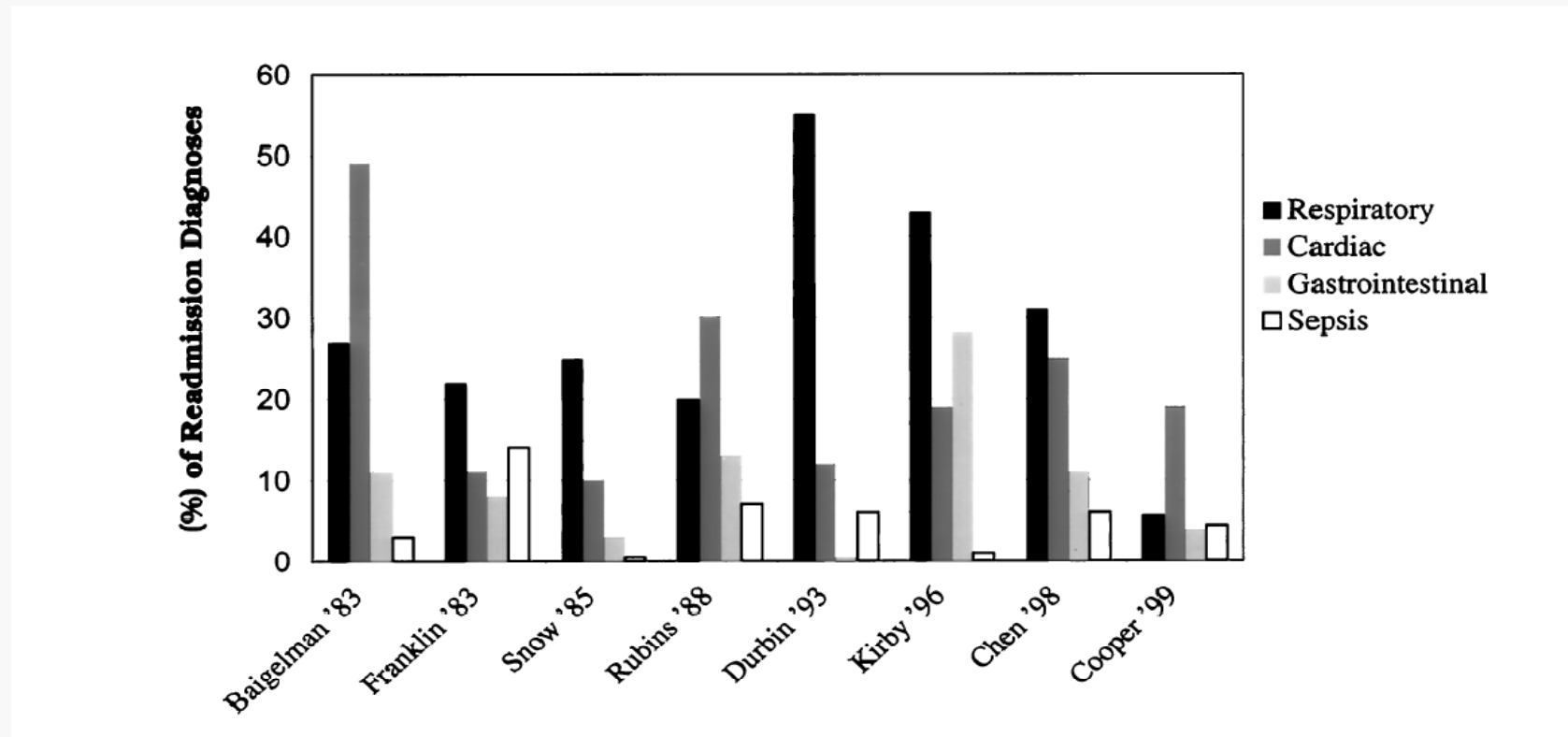
†Percent of total ICU admissions.

**Readmission 7% (4-10 %),
in USA increasing rates!**

Rosenberg AL et al Chest 2000; 11.492-502

Reasons for ICU Readmission

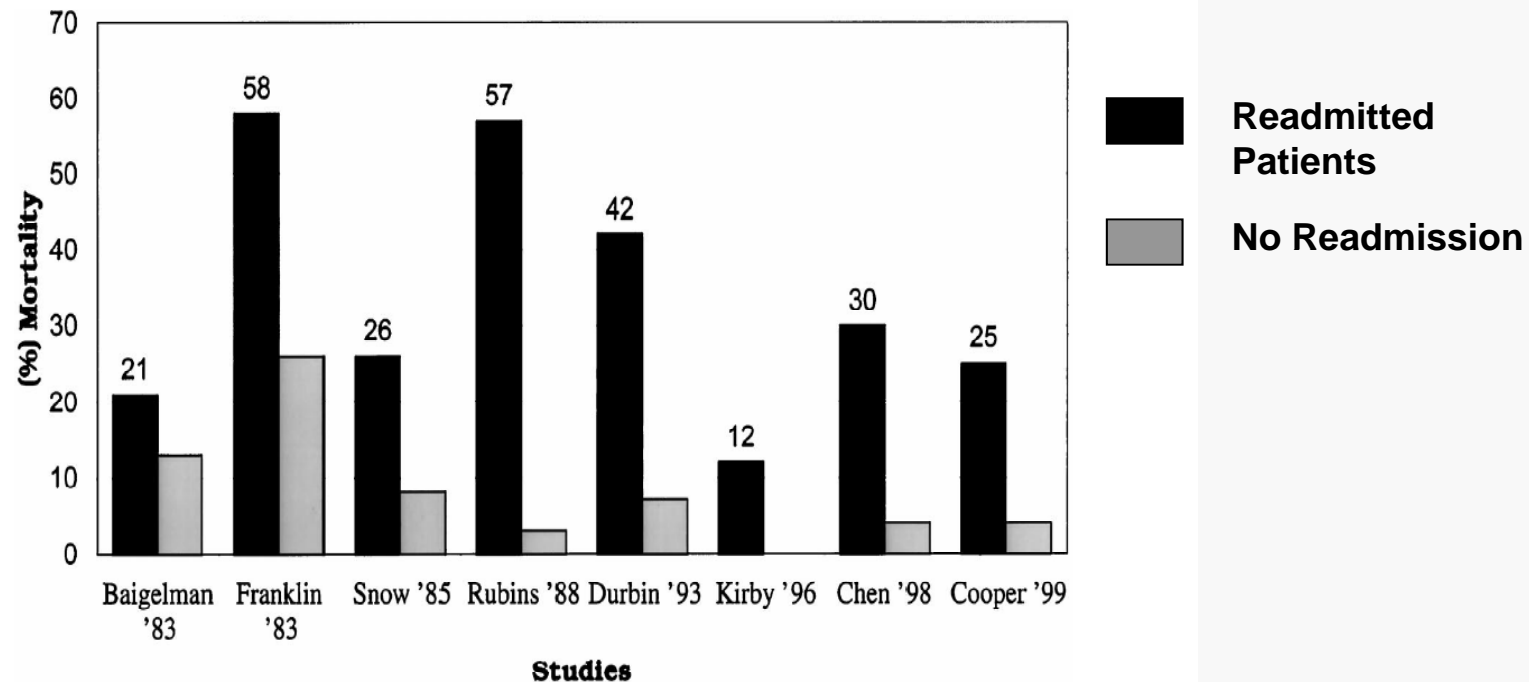
1. Respiratory !
2. Cardiac (arrhythmias, angina pectoris)
3. Neurologic
4. Upper GI bleeding
5. Sepsis



Rosenberg AL et al Chest 2000; 11:492-502

Outcome after ICU Readmission

- ICU LOS↑
- Hospital LOS ↑
- Mortality 1,5-10-times increased



Rosenberg AL et al Chest 2000; 11.492-502

Risk factors ICU Readmission

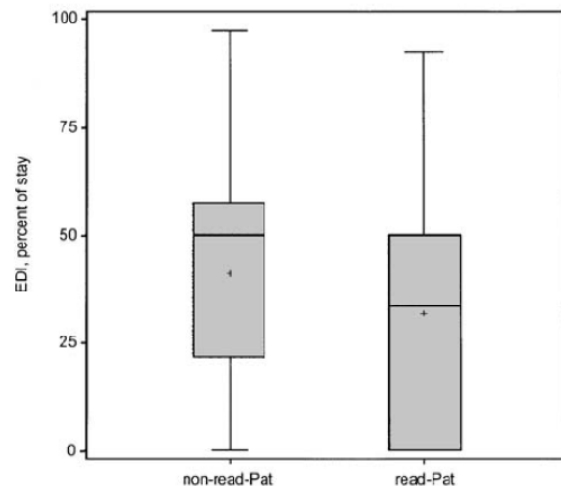
	Non-read pat		Read pat		p value
	No.	%	No.	%	
Patients					
Number of patients	14400		780		
Age, years (mean ±SD)	62.6±17.0		64.8±14.9		<0.001
Male sex	8684	60.3	509	65.3	<0.001
LOD score (median and quartiles)	2 (1–4)		2 (1–4)		<0.001
Number of organ failures (median and quartiles)	2 (1–2)		2 (1–3)		<0.001
SAPS II score (median and quartiles)	25 (18–35)		28 (21–38)		<0.001
SAPS II – expected deaths	2054	14.3	130	16.7	0.031
Observed hospital mortality	753	5.2	169	21.7	<0.001
Type of admission					
Medical	7055	49.2	357	46.1	
Scheduled surgical	4407	30.7	242	31.2	
Unscheduled surgical	2881	20.1	176	22.7	n.s.
Comorbidities					
Hematologic disease	159	1.1	7	0.9	n.s.
AIDS	29	0.2	0	0.0	n.s.
Metastasizing cancer	622	4.3	22	2.8	0.022
Chronic renal failure	725	5.0	56	7.2	0.004
Chronic respiratory failure	1162	8.1	67	8.6	n.s.
Chronic cardiac failure	2110	14.7	100	12.8	n.s.
Resources use					
ICU length of stay (days; median and quartiles)	3 (2–6)		3 (2–7)		0.003
TISS-28 score per patient per stay (median and quartiles)	71 (44–167)		85 (52–211)		<0.001
TISS-28 score per patient per day (median and quartiles)	25.3 (18.0–32.6)		29.4 (20.0–36.3)		<0.001
TISS-28 score last ICU day (median and quartiles)	22 (16–28)		26 (18–32)		<0.001

4-times mortality

Metnitz et al ICM 2002

Supportive Measure / On Day ICU Discharge

	% of all patients	% of non-read pat	% of read pat	p value
Ventilatory support				
Mechanical ventilation	7.8	7.4	16.2	<0.001
Supplementary ventilatory support	56.8	56.4	63.2	<0.001
Treatments for improving lung function	64.5	64.0	73.5	<0.001
Cardiovascular support				
Single vasoactive medication	16.9	16.7	21.7	<0.001
Multiple vasoactive medication	6.6	6.3	11.3	<0.001
Intravenous replacement of large fluid losses	2.6	2.6	3.5	0.061
Peripheral arterial catheter	8.4	7.9	17.9	<0.001
Central venous line	46.4	45.7	58.3	<0.001
Renal support				
Renal replacement therapy	1.1	1.1	1.7	0.068
Active diuresis	17.7	17.4	24.5	<0.001



EDI = Extubation-Discharge-Interval

Metnitz et al ICM 2003

Independent Risk factors - multivariate analysis

Variable	<i>p</i> value	Odds ratio	95% CI
Age	<0.001	1.08	1.03–1.14
Male sex	<0.001	1.36	1.17–1.59
Number of organ failures at first admission	<0.001	1.11	1.04–1.18
Supplementary ventilatory support (last ICU day)	<0.001	1.72	1.43–2.06
Mechanical ventilation (last ICU day)	<0.001	3.00	2.31–3.89
Multiple vasoactive medications (last ICU day)	0.020	1.33	1.05–1.70
Active diuresis (last ICU day)	0.007	1.28	1.07–1.52

Metnitz et al ICM 2003

ICU Readmission ↑- Reasons?

- ICU: too early discharge even if clinically instable?
- Missing discharge criteria
- Poor quality of patient care on normal ward?

Quality assurance ?

Nothing in Germany except one BQS Indicator CAP



Core data set in the ICU - DGA

- Strukturdaten der Klinik; Angaben zur ITS
- Aufnahme­daten: Patientendaten, Art der Aufnahme
- SAPS II
- TISS 28, SOFA
- Entlassungsdaten: Verlegungsort, Zustand bei Verlegung

- Wiederaufnahme auf ICU
 - < 48 h ja/nein
 - > 48 h ja/nein
- Trauma

4. Entlassung

4.1 Entlassung von der Intensivstation

- Entlassungsdatum
- Entlassungszeit
- Maximale Therapie während des Intensivaufenthaltes ja nein
- Patient verstorben

- Verlegt nach
 - Normalstation ja nein
 - Wachstation ja nein
 - andere Intensivstation ja nein
 - anderes Krankenhaus (Spezialklinik) ja nein
 - anderes Krankenhaus ja nein
 - nach Hause ja nein
- Zustand bei Verlegung
 - Restitutio ad integrum (d.h. wie vorher) ja nein
 - mit geringfügigen (passageren) Defekten ja nein
 - mit geringfügigen dauerhaften Defekten ja nein
 - mit erheblichen Defekten ja nein
 - keine Angabe ja nein
- Obduktion durchgeführt ja nein
- Therapie minima ja nein
- ICD-10-Diagnose(n) bei Entlassung (Nebendiagnosen)



Quality Indicators - DIVI

- Discharge high TISS values
- Discharge very low TISS values
- Reintubation rate
- Duration of weaning
- Duration of persistent CVC

- **ICU Readmission missing**

Lefering R et al. Intensivmed 2002 39:334–340

SWIFT Score as Decision Aid for Discharge Decision

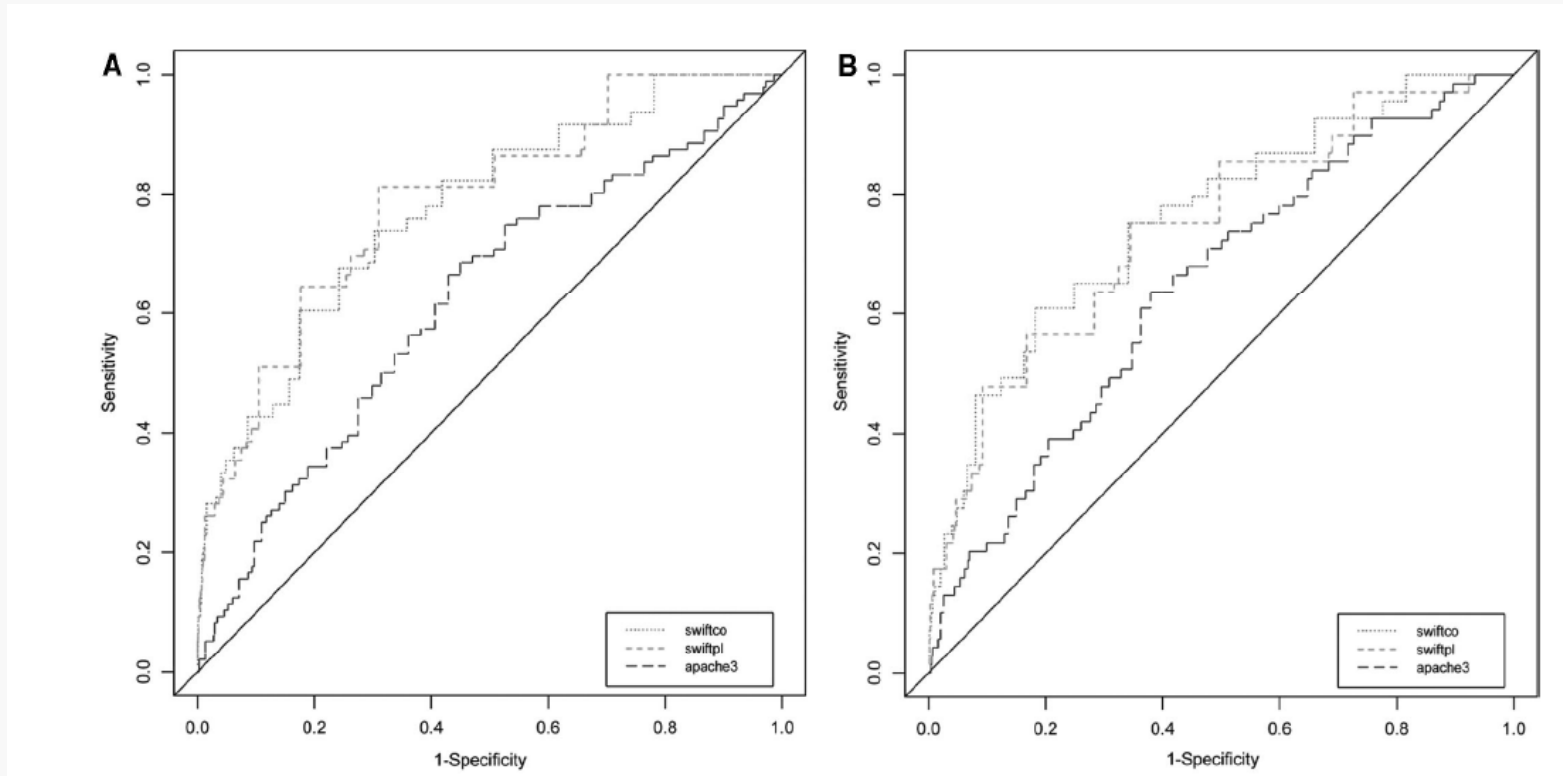
Table 6. Stability and Workload Index for Transfer (SWIFT) score calculation worksheet

Variable	SWIFT Points
Original source of this ICU admission	
● Emergency department	0
● Transfer from a ward or outside hospital (any type of nursing care unit)	8
Total ICU length of stay (duration in days)	
● <2	0
● 2–10	1
● >10	14
Last measured Pao ₂ /FIO ₂ ratio (during this ICU admission)	
● >400	0
● <400 and ≥150	5
● <150 and ≥100	10
● <100	13
Glasgow Coma Scale at time of ICU discharge	
● >14	0
● 11–14	6
● 8–10	14
● <8	24
Last arterial blood gas Paco ₂	
● <45 mm Hg	0
● >45 mm Hg	5

ICU, intensive care unit.

Gajic et al Crit Care Med 2008

SWIFT-Score versus APACHE III Score



Relevant for OUTCOME ? Readmission-Rate ↓?

Gajic et al Crit Care Med 2008

Outreach and Early Warning Systems (EWS) for the prevention of Intensive Care admission and death of critically ill adult patients on general hospital wards (Review)

McGaughey J, Alderdice F, Fowler R, Kapila A, Mayhew A, Moutray M



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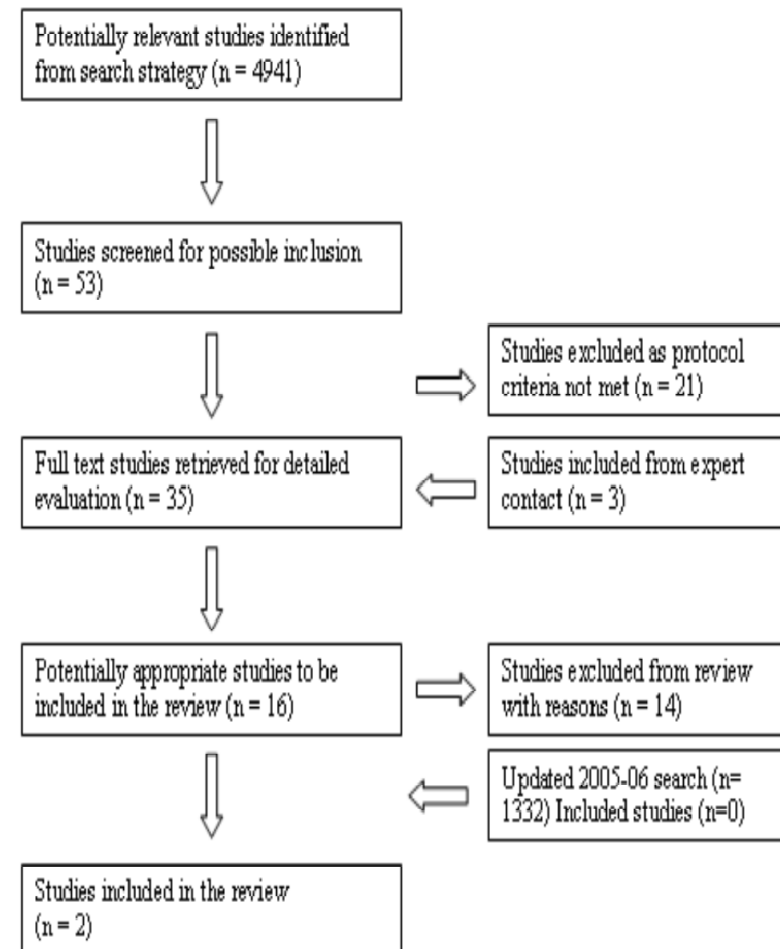
Cochrane Database of Systematic Reviews 2007, Issue 3. Art. No.: CD005529. DOI: 10.1002/14651858.CD005529.pub2.

„Outreach Teams“

- Multidisziplinäre „Crit Care Team“
- CCOT (crit care outreach team)- UK
- PART (patient at risk team)- UK
- (MET) Medical Emergency Teams – Australia
- Rapid Response Teams – USA

Tasks:

- Early adequate therapy in deteriorating status of patient ten
- Avoidance of ICU admission ?
- Education of nurses



- Hillmann et al., Lancet 2005
- Priestley et al. , ICM 2004

Mortality rate ↓

Ø Reduction of hospital LOS

Ø Reduction of unexpected ICU readmission