Project title and acronym: Diagnostic aPpRoaches In Severe pneuMonia -the D-PRISM survey study

Principal investigator/s: Andrew Conway Morris, Cambridge, UK

1. Project background/ Introduction

D-PRISM is a survey-based study endorsed by, and distributed by, the ESICM. The aim of the D-PRISM study is to establish, in a multi-national cohort of intensivists, the current state of practice in the diagnosis and antimicrobial management of severe pneumonia arising from community, hospital and ICU-acquired settings. The primary objective of this study is to inform future clinical trials concerning diagnostics in pneumonia. In order to design such studies, it is important to understand current practice, both in terms of variability in diagnostic approaches (for designing inclusion criteria) and approaches to microbiological sampling (for instance, is using a diagnostic that requires invasive bronchoscopic lung sampling likely to be a barrier to unit inclusion). Understanding how widespread molecular testing is will also help identify if these tests are already in widespread use, or if as seems likely, there remains uncertainty as to their utility.

2. Project Scope

A global survey of diagnostic practices in pneumonia, covering community, hospital, and ventilator-associated pneumonia.

3. Methodology

Online survey distributed via ESICM, partner societies and national coordinators

4. Results/ Expected results

Due to complete data collection 18/11/2022, will provide data on what investigations clinicians used to make a diagnosis of pneumonia, their use of invasive and non-invasive sampling techniques and access to molecular diagnostics

5. Timeframe

September 2022-November 2022

6. Additional information (if applicable)

a. *How can I participate in the project? Recruitment completed*

b. *Do I need an IRB approval? No*

c. *Acknowledgment (contributors and collaborators)*
Steering committee

1) *Andrew Conway Morris, Cambridge, UK -chair*
2) *Pedro Povoa, Lisbon, Portugal*
3) *Nathan Nielsen, Albuquerque, NM, USA*

4) Jordi Rello, Barcelona, Spain
5) Mervyn Mer, Johannesburg, South Africa
6) Zhongheng Zhang, Hangzhou, China
7) Despoina Koulenti, Athens, Greece
8) Alexis Tabah, Brisbane, Australia
9) Otavio T Ranzani, Sao Paolo, Brazil
10) Luis F Reyes, Colombia
11) Arthur Kwizera, Kampala, Uganda
12) Nesreen Shaban, Cambridge, UK – ICU fellow
13) Islam Hamed, Cambridge, UK -ICU/Anaesthesia fellow

7. Additional documents

Protocol

Diagnostic aPpRoaches In Severe pneuMonia -the D-PRISM survey study

Introduction

Pneumonia is both the commonest infective reason to ICU admission1, and also the commonest infection to develop in ICU2. It is, therefore, a major source of morbidity and mortality amongst ICU patients, and a significant driver of antibiotic prescription. Severe pneumonia can be defined as a life-threatening pneumonia necessitating enhanced monitoring and/or life support in an intensive care unit 3.

The essential pathological nature of infective pneumonia is clear, being an infection of the distal bronchi and alveolar airspace leading to inflammatory infiltration and impaired gas exchange, is not in doubt. However, how a clinical diagnosis should be achieved remains a matter of debate, with multiple, conflicting definitions advanced by different learned bodies. The matter becomes more complex when considering the differing diagnostic guidelines on pneumonia arising from community-acquired4,5, hospital-acquired and ventilator-associated sources 6-9 and pneumonia in immunocompromised patients, all of which are encountered amongst patients in ICU. Differential practice between and within countries may also reflect differential availability of laboratory and diagnostic techniques.

In 2014 a single-country survey of diagnostic approaches in ventilator-associated pneumonia (VAP) revealed a wide diversity in practice, with variable use of clinical and radiological criteria10. Whilst all respondents obtained samples for microbiological culture, the nature of that sample varied considerably. There was also a diversity of approaches in the use of radiology to guide diagnosis, with a substantial proportion not requiring radiographic evidence to diagnose VAP.

Since the conduct of this survey there have been a number of changes, including the development and dissemination of concept of 'ventilator-associated events' (VAE) by the US Centres for Disease Control (CDC) 11. Although these definitions were designed for automated surveillance purposes, their notable removal of the need for radiographic evaluation may have influenced diagnostic practice as well. 2016 and 2017 saw the issuing of revised guidance on the management of Hospital and Ventilator-associated pneumonia from the ATS/IDSA8 and from a collective of European and South American learned societies respectively9 .

In the field of microbiological diagnostics, a number of molecular diagnostic platforms have been developed which offer rapid, sensitive tests aimed at both community- and hospital -associated respiratory organisms12. It therefore seems appropriate to repeat and expand the previous survey, so that it covers all severe pneumonia managed in ICU and also draws on a wider pool of countries to give a more representative view of current practice.

D-PRISM is a survey-based study endorsed by, and distributed by, the ESICM. The aim of the D-PRISM study is to establish, in a multi-national cohort of intensivists, the current state of practice in the diagnosis and antimicrobial management of severe pneumonia arising from community, hospital and ICU-acquired settings. The primary objective of this study is to inform future clinical trials concerning diagnostics in pneumonia. In order to design such studies it is important to understand current practice, both in terms of variability in diagnostic approaches (for designing inclusion criteria) and approach to microbiological sampling (for instance, is using a diagnostic that requires invasive bronchoscopic lung sampling likely to be a barrier to unit inclusion). Understanding how

widespread molecular testing is will also help identify if these tests are already in widespread use, or if as seems likely, there remains uncertainty as to their utility.

Study design

The study will consist of two components

1) Collation and review of existing national and international guidelines on the diagnosis of pneumonia covering CAP, HAP and VAP. The focus of this section will be on comparing and contrasting the different diagnostic criteria between clinical entities (CAP, HAP and VAP) and the different diagnostic criteria between guidelines within each entity.

2) A survey of current practice amongst a multi-national cohort of intensivists, the current state of practice in the diagnosis and initial antimicrobial management of severe pneumonia arising from community, hospital and ICU-acquired settings.

The final report will cover the analysis of the diagnostic criteria, report the results of the survey and assess to what extent clinical practice accords with the guidelines.

Conduct of the study

The study will be overseen by an internationally based steering committee consisting of intensivists with clinical and research interest in the diagnosis and management of severe pneumonia. National co-ordinators will be sought to distribute the survey to intensivists in their country, with particular emphasis on countries which are not well represented within the ESICM (e.g. China, South Africa, Australia, India, Brazil), anticipating that responses from ESICM members will be better. Steering committee members will be asked to suggest individuals who may be approached to perform the national coordinator role although it is not intended that all countries will have national coordinators.

The study steering committee are

1) Andrew Conway Morris, Cambridge, UK -chair

2) Pedro Povoa, Lisbon, Portugal

3) Nathan Nielsen, Albuquerque, NM, USA

4) Jordi Rello, Barcelona, Spain

5) Mervyn Mer, Johannesburg, South Africa

6) Zhongheng Zhang, Hangzhou, China

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11) Arthur Kwizera, Kampala, Uganda

12) Nesreen Shaban, Cambridge, UK – ICU fellow

13) Islam Hamed, Cambridge, UK -ICU/Anaesthesia fellow

Guideline review

Through literature search and expert knowledge of the steering committee, national and international guidelines regarding the diagnosis of pneumonia (CAP, HAP and VAP) will be identified. Guidelines may be from learned societies, health ministries or clinical guideline and health evaluation bodies but must cover national or multi-national territories. Guidelines should have been produced in the past 10 years (since 2010). Where older guidelines (pre 2010) have been identified but not updated this will be noted, but in-depth evaluation will not occur.

Data will be extracted from the guidelines regarding the diagnostic criteria recommended for hospitalised pneumonia covering clinical, radiological, microbiological and non-microbiological laboratory/biomarker criteria. Where criteria are given for 'severe' pneumonia these will also be collated. The analysis will consist of a comparison of the different criteria, looking for common elements and notable differences. This work will primarily be undertaken by Drs Nesreen Shaban and Islam Hamed, ICU fellows at Addenbrooke's Hospital, Cambridge, co-ordinated by Dr Andrew Conway Morris and reviewed by the steering committee.

Survey

The survey will be conducted via the survey-monkey platform. The conduct and analysis of the survey will be undertaken by Dr Shaban and Dr Hamed, under the supervision of Dr Conway Morris. The results will be reviewed by the steering committee before being prepared for presentation and publication.

The survey is included as appendix 3 in this document.

Analysis plan

Data will be extracted in .csv format spreadsheet and analysed in SPSS. Descriptive frequencies will be reported for all questions broken down by complete and incomplete survey response.

Descriptive frequencies will be reported by continent (Asia, Australasia, Africa and Middle East, Europe, North America, South America) subject to a minimum 10 responses. Descriptive frequencies will be reported by country income status, dichotomised into LMIC and Higher income countries.

Where national or international guidelines are identified, the concordance with 'local' guidelines will be assessed (e.g. for European and South American respondents, concordance with the ERS/ESICM/ESCMID/ALAT guideline on hospital and ventilator associated pneumonia) .

Access to and use of diagnostic bronchoscopy and multiplex respiratory PCR will be assessed by hospital type, high frequency of immunocompromised patients and country income status. Self-rated confidence in bronchoscopy will be assessed against clinical seniority and specialism of training.

Publication

The results of the survey and guideline review will be submitted for presentation at a forthcoming ESICM LIVES meeting and prepared for publication in a peer-reviewed journal.

The authorship will be a corporate authorship of 'D-Prism investigators', with all national coordinators named in the authorship annex for inclusion as authors on Medline. The steering committee will form the writing committee and will be named on the indexed citation, along with national coordinators who achieve more than 20 responses from their country.

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Appendix A – identified guidelines for CAP

Guideline	Year of issue
American Thoracic Society/Infectious Diseases Society of America[1]	2019 (update of 2007 guidance)
British Thoracic Society[2]	2009 – reviewed in 2014 following guidance from NICE[3] (see also ref 8 from HAP guidelines)
Canadian Infectious Disease Society and the Canadian Thoracic Society[4]	2000
Japanese Respiratory Society[5]	2006
SBPT, Brazilian Thoracic Association[6]	2018
Infectious Disease Society of Taiwan/ Taiwan Society of Pulmonary and Critical Care Medicine[7] (covers CAP, HAP and VAP)	2019
Portuguese Respiratory Society guidelines for the management of community-acquired pneumonia in immunocompetent adults[8]	2003
Spanish Society of Chest Diseases and Thoracic Surgery (SEPAR)[9]	2010
Chinese Thoracic Society, Chinese Medical Association[10]	2016
Swedish Society of infectious diseases[11]	2017
European Respiratory Society/European Society for Clinical Microbiology and Infectious Diseases[12]	2011
Dutch Association of Chest Physicians[13]	2012

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Appendix B identified guidelines for HAP (including VAP)

Guideline	Year of issue
Infectious Diseases Society of America and the American Thoracic Society[1]	2016
British Society for Antimicrobial Chemotherapy[2]	2008
AMMI Canada[3]	2008
European Respiratory Society (ERS), European Society of Intensive Care Medicine (ESICM), European Society of Clinical Microbiology and Infectious Diseases (ESCMID) and Asociación Latinoamericana del Tórax (ALAT)[4]	2017
Japanese Respiratory Society[5]	2009
Infectious Disease Society of Taiwan/ Taiwan Society of Pulmonary and Critical Care Medicine[6] (covers CAP, HAP and VAP)	2019
Spanish Society of Chest Diseases and Thoracic Surgery (SEPAR)[7]	2020
NICE (UK)[8]	2014
Infection Study Group of Chinese Thoracic Society, Chinese Medical Association [9]	2018

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