

Commentary

ICU admission and severity assessment in community-acquired pneumonia

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See related research by Renaud *et al.*, <http://ccforum.com/content/13/2/R54>

Abstract

The past 15 years have seen major advances in our understanding of severity assessment in community-acquired pneumonia (CAP). Prognostic tools have been promoted to guide all major management decisions in CAP, including admission to the critical care unit. Several recent studies, including the study by Renaud and colleagues, have challenged us to re-evaluate how we consider severe CAP, a concept for which there is still no universally accepted definition. Existing severity scores such as the Pneumonia Severity Index and the CURB65 score are designed to predict 30-day mortality. As a result, they are heavily weighted by age and co-morbidity. They perform less well when predicting other outcomes such as requirement for ICU admission and are of limited use in the critical care environment. This commentary discusses recent attempts to develop useful severity criteria to guide the use of ICU resources in patients with severe CAP.

The past 15 years have seen major advances in our understanding of severity assessment in community-acquired pneumonia (CAP). Prognostic tools have been promoted to guide all major management decisions in CAP, including admission to the critical care unit.

Several recent studies, including the study by Renaud and colleagues [1], have challenged us to re-evaluate how we consider severe CAP, a concept for which there is still no universally accepted definition.

Since the development of the Pneumonia Severity Index in 1997 [2], severe CAP has been considered in terms of a patient's risk of 30-day mortality – determined by a combination of age, co-morbidities and physiological parameters measured on admission. The two most widely used scores, the Pneumonia Severity Index and the CURB65 score [3], were developed to predict 30-day mortality.

It is recognised that the majority of pneumonia mortality occurs in older people, however, and that many patients who die are treated palliatively [4]. Nearly 50% of all deaths in patients with pneumonia and more than one-quarter of deaths within 30 days are related to co-morbidities rather than being directly pneumonia related [5].

These scores therefore have important limitations arising from the use of 30-day mortality as an outcome. The scores may underestimate severity in young people [6] and they perform less well when considering outcomes such as intensive care unit (ICU) admission or requirement for mechanical ventilation or vasopressor support [7-9]. As few as 20% of patients in the highest Pneumonia Severity Index class (class V) require ICU admission, illustrating the system's limited value for the critical care community [9].

There is a growing consensus that ICU admission and, more specifically, mechanical ventilation or vasopressor support are more useful outcomes than 30-day mortality to define severe CAP and to identify the most acute ill patients [7,10-12]. The requirement for mechanical ventilation or vasopressor support is preferred to simply using ICU admission, as evidence suggests that ICU admission rates and criteria vary widely across different healthcare systems. This helps to explain why we see ICU admission rates of 17% in Spain [13] compared with 8.7% in the UK or 4% in Hong Kong [14].

What scoring system should we use to identify patients requiring ICU admission? The revised British Thoracic Society CAP guidelines are due to be published in 2009 and will recommend using the CURB65 criteria to determine ICU admission. The Infectious Disease Society of America–American Thoracic Society guidelines recommend the revised

CAP = community-acquired pneumonia; CURB65 = Confusion, Urea >7 mmol/l, Respiratory rate ≥30/min, Blood pressure <90 mmHg systolic and/or diastolic blood pressure ≤60 mmHg, and age ≥65 years; ICU = intensive care unit; SMART-COP = Systolic blood pressure, Multibar chest radiograph involvement, Albumin, Respiratory rate, Tachycardia, Confusion, Oxygenation and arterial pH.

American Thoracic Society criteria, which comprise two major criteria (the requirement for mechanical ventilation and vasopressor support) or three minor criteria (comprising respiratory rate, PaO₂/FiO₂ ratio, multilobar infiltrates, confusion, uraemia, leucopenia, thrombocytopenia, hypothermia and hypotension requiring aggressive fluid resuscitation) [15].

Alongside these criteria, Renaud and colleagues [1], Charles and colleagues [11] and Espana and colleagues [12] have all independently described scoring systems designed to predict ICU admission in large databases. It is reassuring that the high-risk features identified in each of these studies are similar, with acidosis, systolic blood pressure, respiratory rate, uraemia, confusion, hypoxaemia and multilobar infiltrates featuring in each of the derived scores. The abundance of severity criteria, however, reveals the lack of consensus over which patients should be initially managed in the ICU.

The majority of admissions to the ICU occur within the first 24 hours. Delayed transfer to the ICU is associated with increased mortality, and therefore early recognition of these patients is important. The Risk of Early Admission to Intensive Care Unit Score has been shown to predict patients with delayed admission to the ICU. This group probably consists of patients in whom severity was underestimated on admission, of patients with treatment failure and of patients with unstable co-morbidities and nosocomial superinfection. Further studies in this group are required.

All of the new scores are complex, making them difficult to implement in clinical practice. Evidence suggests that current severity criteria, such as the CURB65 score, are under-utilised. It may therefore be impractical to expect staff to use the CURB65 score to decide on the site of care, then use SMART-COP or the American Thoracic Society criteria to decide whether a patient requires ICU care, and then use the Risk of Early Admission to Intensive Care Unit Score to assess their risk of requiring ICU subsequently. A more practical approach to severity assessment is needed.

A perfect scoring system may not exist, but it should ideally predict both 30-day mortality and the requirement for mechanical ventilation or vasopressor support. The scoring system should be simple, composed of the fewest possible factors, and easy to remember in a busy emergency department. The system should function equally well in older patients and young patients, and should be based on physiological derangement and organ dysfunction rather than on age or co-morbidities. In addition, scoring systems need to classify patients into distinct management groups.

The hope is that future studies can identify physiological scoring systems or biomarkers that can achieve these goals and provide an effective adjunct to clinical judgement in the early management of CAP.

Competing interests

The author declares that they have no competing interests.

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