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EDITORIAL

Assessment of pneumonia severity: a European perspective

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Where to treat a patient with community-acquired pneumonia (CAP) is probably the most important decision in the management of this condition. This is true in terms of patient outcomes and, definitely, in terms of costs. Therefore, all current European and American guidelines agree that the assessment of severity is the starting point in the management algorithm [1–5]. If the assessment is so crucial, what are the criteria physicians can rely on?

In 1997, FINE *et al.* [6] introduced the pneumonia severity index (PSI). The PSI consists of 20 variables reflecting age, sex, residence, comorbidity and acute pneumonia-associated morbidity. These variables were derived from and validated in >50,000 patients, the largest database ever studied in the history of pneumonia research. The original role of the PSI was to identify those patients at a low risk of mortality who, therefore, could safely be treated as outpatients. Three risk classes were identified with a very low-risk 30-day mortality of 1–3%, a fourth with an increased risk of ~8%, and a fifth with a high risk of ~30%. The PSI was subsequently confirmed to make valid predictions of mortality by several authors, although in some reports mortality rates were somewhat lower in the highest risk group [7–9]. Finally, the PSI was also shown to predict long-term outcomes of CAP [10]. A major limitation of the PSI is the unbalanced impact of age on the score, resulting in a potential underestimation of severe pneumonia, particularly in younger otherwise healthy individuals [9]. Nevertheless, the PSI is currently recommended as a tool of severity assessment in the Infectious Diseases Society of America guidelines [2, 3].

In a previous landmark study by the British Thoracic Society, four variables reflecting acute pneumonia-associated morbidity were shown to be predictive of death from pneumonia: the presence of confusion (C) and blood urea nitrogen (U), respiratory rate (R), and blood pressure (B) at defined thresholds [11]. In an attempt to define severe CAP, these four variables, as part of three rules, were evaluated for their ability to predict death from pneumonia. Negative predictive values ranged 97–99%, whereas positive predictive values remained unsatisfactory (19–36%). These rules and their slight modifications could be validated in several independent populations [12–14]. A major breakthrough was achieved only after the transformation of these rules into a risk score, which resulted from adding one point for each of these parameters (CURB or CURB for those aged >65 yrs (CURB-65)) by LIM and coworkers [15, 16]. These scores allowed for predictions very similar to those made by the PSI, *e.g.* in a subsequent study, the absence of any CURB criterion was associated with a 30-day mortality of 1%, the presence of one or two with 8%, and the presence of three or four with 30% [9].

The data presented were derived and validated in hospitalised patients. However, severity assessment of CAP requires a triaging tool that is applicable in outpatients as well. This is particularly important in view of the fact that, in Europe, 15–51% of patients with CAP are hospitalised, possibly imposing considerably high loads of unnecessary costs [17, 18]. New data from three large prospective trials are now available. In this issue of the *European Respiratory Journal*, CAPELASTEGUI *et al.* [19] present a comparative validation of the CURB-65, CRB-65 (which omits the blood urea measurement) and PSI scores in a population of 1,776 patients including 676 outpatients. The 30-day mortality increased with increasing score, and predictions of 30-day mortality were equivalent for all scores as assessed by receiver-operating characteristics analysis (PSI: 0.89 (95% confidence interval (CI) 0.86–0.91); CURB-65: 0.87 (95% CI 0.84–0.89); CRB-65: (95% CI 0.84–0.89)). This is in contrast to a recent study by AUJESKY *et al.* [20] comprising 3,181 patients and including 1,094 outpatients, showing a minor but significant advantage for the PSI score in predicting 30-day mortality using area under the curve (AUC) analysis (PSI: 0.81 (95% CI 0.78–0.84); CURB: 0.73 (95% CI 0.68–0.76); CURB-65: 0.76 (95% CI 0.73–80)). However, this population predominantly included less severely ill patients (only 6% PSIV as compared with 18% in the present study), thereby limiting the comparability of both populations studied.

The CURB-65 score has a major advantage in its simplicity. However, with blood urea nitrogen, it includes a variable that is not readily available in general practice and not even in some hospitals. This variable appears as a foreign body in a score otherwise consisting of simple clinical criteria. Therefore, one of the most remarkable findings of the study by CAPELASTEGUI *et al.* [19] is the equivalence of predictions made by the CURB and the CRB-65 score, the latter simply replacing blood urea nitrogen by the presence of age >65 yrs. This fits well into findings from the data generated by the German competence network for the study of community-acquired

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pneumonia (CAPNETZ; unpublished data, T.T. Bauer, Medizinische Klinik III, Bergmannsheil Klinikum der Ruhr-Universität, Bochum, Germany). In a population of 1,312 patients, which included 205 outpatients, CURB and CRB-65 had an equivalent predictive power for 14-day mortality (AUC 0.79 (95% CI 0.73–0.85) and 0.79 (95% CI 0.73–0.84), respectively). Taken together, there is growing evidence that CURB, CURB-65 and CRB-65 all allow for similar predictions of death from CAP as compared to the PSI, with the CRB-65 representing the only score that is also easily applicable in outpatients.

Overall, the CRB-65 and CURB-65 scores are an impressive example of the value of a simple clinical approach not requiring sophisticated biochemical, immunological or genetic data in the risk stratification of patients with an acute potentially life-threatening condition. Let us pause and consider for a moment that complex processes of inflammation resulting in ventilation–perfusion mismatches and sometimes severe sepsis or septic shock, which determine patient outcomes, can be mirrored by simple criteria such as age, respiratory rate, blood pressure and mental state. Barefoot medicine still has its role, and it is able to make valid clinical estimations at extraordinarily low expense.

It is advocated that the CRB-65 or CURB-65 scores should currently be the preferred tool in severity assessment of CAP. These scores are undefeated in their simplicity and applicability in the ambulatory setting. The present authors remain fundamentally sceptical about any attempts to recommend the use of the PSI outside the hospital, and even in emergency departments and hospitals not primarily dedicated to the care for patients with acute pulmonary diseases. Moreover, outpatients with suspected apparently mild pneumonia do not regularly need chest radiography, laboratory tests and blood gas analysis, nor would such a recommendation be followed in any country. Simplicity has revealed convincing advantages for clinical practice. The PSI score may remain useful in specialised hospital settings and clinical studies.

Nevertheless, there still remains the question of how to appropriately use these scores in clinical practice. First, physicians should be reminded that any decisions about treatment settings must not rely exclusively on predictions of mortality. CAPELASTEGUI *et al.* [19] have nicely identified several additional factors associated with the need for hospitalisation not necessarily related to mortality but requiring special attention, which should be assessed in all but the lowest risk classes, thereby extending previous experiences [8]. These factors comprise comorbidities, severe hypoxaemia or hypercapnia, the extent of radiographic infiltrates, and pleural effusions. Nonmedical factors, such as those which are social, also have to be taken into account. Thus, risk scores are an aid to clinical decision making when considering the extent of additional investigation needed and hospitalisation; however, they cannot replace sound clinical judgment. In particular, insurance companies must not be allowed to refuse compensation when a patient with a low risk score has been hospitalised. In order to convincingly prevent such deleterious malpractice, physicians should document the severity score together with a brief comment why they feel that this particular patient should be hospitalised despite a low risk score. In case of any doubt, a short hospitalisation for additional investigation and to rule out early deterioration is to be preferred to a policy of rule-dictated ambulatory management associated with irresponsible risks. Secondly, a limitation of all scores is the limited predictive power for intensive care unit (ICU) admission. Although increasing ICU admission rates can be shown with increasing scores, the association is probably not strong enough to allow for individual predictions and decisions. Although far from being perfect, the modified American Thoracic Society score is currently the best tool in this regard, and should be used as an aid for clinical decisions by hospital physicians [1, 9].

Where do we go from here? One of the current authors recently cared for a hospitalised patient aged >65 yrs with a CRB-65 score of 1 and a small lower lobe infiltrate. The patient was hospitalised without an obvious reason. He was adequately treated but deteriorated within 48 h, with acute respiratory failure requiring mechanical ventilation. Despite intensive care, he died after an additional 48 h. This is a perfect example of the remaining blind spots in currently available severity assessment rules. Why does a patient with low to moderate risk deteriorate early and develop severe pneumonia?

In conclusion, future research must now focus on this subgroup of patients that may be at a particularly high risk of adverse outcomes due to underestimation of the initial pneumonia severity assessment.

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