Community acquired pneumonia

Assessment of illness severity in community acquired pneumonia: a useful new prediction tool?

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The clinical heterogeneity of CAP means that no severity scoring system will ever be able consistently to separate all patients into correct management subgroups, but the recently developed CURB-65 prediction tool appears to be an advance.

Illness severity might usefully guide a number of management decisions in the care pathway of a patient with community acquired pneumonia (CAP). Whether to refer to hospital by the primary care physician, whether to admit by the hospital junior doctor, what investigations to perform, what antibiotic(s) to give, and whether to admit to the intensive care unit (ICU) are just some examples. This approach is captured to a varying extent in a number of the published management guidelines for CAP.[1–5] While a clinical prediction tool to assess severity might therefore be helpful, there is no agreement on what constitutes the best approach to this. Additional caveats are that such a tool would need to be better than current practice, would need to accurately do what it sets out to do (that is, predict outcome), would need to be simple to use in a variety of settings, would need to have been shown to alter outcomes, and would need to actually be usable in clinical practice.

That current practice is inadequate is suggested by a number of studies. The mortality rate of 5–10% of adults admitted to hospital is well recognised—some of these deaths might be preventable. Routine clinical judgement was found to underestimate illness severity in one study[6] and another found illness severity assessment to be the most common failing in the management of young adults dying from CAP.[7] Severity assessment before ICU admission has been found to be suboptimal for a wide variety of conditions,[8] and the variation in hospital[9–13] and ICU[14] admission rates for CAP is probably at least in part due to inaccurate severity assessment.

Approaches to severity assessment for CAP are slowly evolving. Early studies used prediction tools developed for other conditions such as the simplified acute physiology score (SAPS), APACHE, and appropriateness evaluation protocol (AEP), but these were found to be impractical or less accurate than CAP specific tools. Subsequent studies have used three main approaches to the development of CAP specific tools, often directed towards single management decisions. The "British Thoracic Society (BTS) rule"[15] sought to separate a severely ill group and was based on three (subsequently modified to four[6]) criteria available shortly after hospital admission. The American Thoracic Society (ATS) proposed the assessment of nine[16] (subsequently modified to five[17]) criteria for use in the identification of patients for whom admission to the ICU was to be considered. The Pneumonia Severity Index (PSI), based on 20 criteria, was developed to identify less severely ill patients who might safely be managed at home.[18]

In this issue of *Thorax* Lim *et al*[19] describe the CURB-65 severity prediction tool. They have used prospectively collected CAP databases that include a total of 1068 hospitalised adult patients from three primary care based healthcare systems to identify the most important prognostic factors associated with 30 day mortality. Based on the modified "BTS rule", a CURB (**C**onfusion, blood **U**rea >7 mmol/l, **R**espiratory rate ⩾30/min, and low **B**lood pressure) severity score was calculated. Age ⩾65 remained independently associated with outcome and was added to create the six level CURB-65 score which was tested in a derivation cohort. A similar five level score (CRB-65), omitting blood urea and therefore applicable outside hospital, was also developed and tested. Both scores correlated with mortality, allowing the identification of patients at low, intermediate, and high risk of death.

Does this add to what we already know? The "BTS rule" has only been tested in small cohorts of patients and is poorly predictive in elderly patients. The modified "BTS rule" performs better but is limited to the separation of patients into only two categories—severely ill and not so severely ill. The "ATS score" depends on variables only available in hospital and has been primarily assessed against ICU admission as an end point. Neither score is useful for guiding all of the management decisions listed above and neither has been implemented prospectively in a study to change management. The new scores need only four (CRB65) or five (CURB-65) variables, based largely on clinical assessment, and facilitate the separation of patients into three management groups with mortalities ranging from 0% to 33% in the derivation cohort. The authors suggest that such grouping may inform the clinical decision as to whether to treat at home or admit to hospital, and whether to manage as severe or non-severe pneumonia. They are simple to use, can be used in a variety of settings, and allow good discrimination in the guidance of management decisions. Use of the same language across management boundaries from the primary care physician through the general medical physician to the intensive care physician is an additional potential benefit. The PSI also separates patients into five categories but it depends on many variables, some of which are only available in hospital, and the outcomes in categories I–III are similar. A recent study concluded that neither the BTS score, the ATS score, nor the PSI was adequately robust in severity prediction to be optimum for clinical practice.[14] However, this was based largely on the soft and variable end point of ICU admission .

The CURB-65 score now needs to be validated in other patient cohorts and tested prospectively to see if outcomes can be improved. There is some evidence that a severity based approach can reduce primarily cost related outcomes (such as length of hospital stay) which may be of qualitative value to the patient.[20–23] However, other studies have not found reductions in length of stay[24] or the potential to treat more at home.[25 26] Only one study has suggested a reduction in mortality.[27] Such studies are difficult to design and conduct, but the CAPITAL study shows what might be done.[21] In this site randomised study 10 hospitals using conventional practice were compared with nine others where a critical care pathway, including severity assessment with the PSI, was used. A reduction in the admission of low severity patients, the number of bed-days per patient, and the number of days of intravenous antibiotics was seen in the study hospitals. However, there was no difference in quality of life, complications, readmission, or mortality. This study design may be limited by secular changes in management practices in control hospitals. Such changes produced comparable improvement in control and study

hospitals in trials of care pathways for various surgical procedures.[28] The evidence that severity scoring tools can improve outcomes is largely based on North American healthcare systems which may or may not be translatable to other, especially primary care based, healthcare systems.

If the CURB-65 can be further validated and shown to alter outcomes, the final hurdle to be surmounted is its applicability to everyday practice as opposed to research studies. In this regard its simplicity and use of readily available factors hold promise. The readiness of local UK hospital guidelines to follow the BTS guidelines in using severity based treatment algorithms is also hopeful.[29] However, local audits suggest a gap between these and current practice.[30] While disease specific score systems might be more accurate, they may not be the most practical. It must not be forgotten that CAP is but one of many pulmonary and often non-pulmonary acute conditions that primary care physicians and junior hospital doctors have to deal with. How many disease specific scores can they cope with? Assessing illness severity usually translates into measurement of basic physiological parameters, regardless of the causative condition. CAP is no exception. While possibly less accurate, a simple generic score system based on such parameters might achieve wider clinical applicability if it was shown to have reasonable operating characteristics compared with the above scores. Such an early warning score (EWS) has been developed and shows some promise in acute medical admissions.[31] It would be interesting to assess the performance of the EWS against CURB-65. Although in the future one can foresee the time when entry of the diagnosis of CAP into the electronic patient record might automatically generate a CURB-65 or other severity score, while we continue with paper records this may be more difficult.

The best assessment tool for CAP and whether different assessment tools scores might be applicable in different healthcare systems remains to be determined, but CURB-65 appears to be an advance. The clinical heterogeneity of CAP means that no scoring system will ever be able consistently to separate all patients into correct management subgroups. Factors other than illness severity will always influence some management decisions. Severity scoring systems must continue to be seen as a useful adjunct to, rather than a replacement for, the art of clinical practice.

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