



Commentary

Predicting outcomes in patients with community-acquired pneumonia using weighted track & trigger early warning systems: Lessons learnt & insights for future use

Community-acquired pneumonia (CAP) remains a common and serious illness despite the availability of potent new antimicrobials and effective vaccines^{1,2}. Worldwide, among adults, pneumonia is the most common infectious cause of death and the second-leading cause of overall life years lost. As per the World Health Organization, Global Burden of Disease study¹ lower respiratory tract infections, including CAP account for 94.5 million disability-adjusted life years and 1.6 million deaths annually in adults aged over 59 yr¹. Severe CAP is associated with significant mortality (16-36%) in spite of the availability of effective antibiotic therapy^{3,4}. Extrapolating the data from a prospective population-based cohort study⁵ in adults hospitalized with pneumonia in Louisville, Kentucky, to the entire country, the authors⁵ reported that >1.5 million adults were hospitalized annually, 100,000 deaths occurred during hospitalization and approximately 1 of 3 patients hospitalized with CAP died within one year in the United States of America (USA). These data underscore the importance of meticulous initial assessment of patients with CAP to ensure the institution of appropriate level of treatment and care required.

In immunocompetent patients with CAP, clinical prediction rules, such as the confusion, elevated blood urea nitrogen, respiratory rate and blood pressure plus age ≥ 65 yr (CURB-65) score⁶ and pneumonia severity index (PSI)⁷, among others have been used in conjunction with clinical judgement to determine the need for hospitalization and the level of in-patient treatment intensity like admission into intensive care unit (ICU) and/or mortality. Published data suggest that in comparison to CURB-65, PSI identifies a larger proportion of patients who can be treated in the outpatient setting and has a higher discriminative power in predicting mortality⁸.

Several physiologically-based early warning scores (EWS), such as, modified early warning score (MEWS)⁹, standardized early warning scoring system (SEWS)¹⁰, global MEWS¹¹, VitalPACTM early warning score (ViEWS)¹² and the ViEWS-L¹³ which includes serum lactate as an additional component, were developed to address this issue. The National Early Warning Score (NEWS)¹⁴ includes six routinely recorded physiological parameters routinely namely, respiratory rate, oxygen saturation, temperature, systolic blood pressure, pulse rate, level of consciousness and a weighting score of 2 to be added for any patient requiring supplemental oxygen; and its modification NEWS-L¹⁵ includes serum lactate as an additional component, have also been evaluated for predicting adverse outcomes.

In the study by Kaya *et al*¹⁶, the performances of CURB-65, PSI, NEWS and NEWS-L were compared in patients (n=250, mean age 72.3 ± 14.3 yr; 58.4% males) diagnosed to have pneumonia in the emergency department. Receiver operating characteristic (ROC) curves were used for comparing the performance of these scores in predicting mortality, need for admission into hospital and ICU. The authors reported that NEWS-L [cut-off value >13.7 ; sensitivity 85.1%, specificity 96.4%, area under the curve (AUC) 0.96; 95% confidence intervals (CI) 0.928-0.981] was the most successful tool for predicting 30-day mortality followed by NEWS, CURB-65 and PSI, respectively. NEWS-L (cut-off value >7.7 ; sensitivity 69.1%, specificity 63.4%, AUC 0.72; 95% CI 0.659-0.774) was also observed to have the highest AUC for deciding on the need for admission to the hospital followed by NEWS, CURB-65 and PSI. For predicting the need for ICU care, NEWS and NEWS-L had the highest AUC (0.86 each) followed by CURB-65 (0.85); NEWS-L

had the highest sensitivity (90%) and CURB-65 had the highest specificity (94.7%). The authors concluded that NEWS-L score was most useful to predict mortality, need for hospitalization, ICU care¹⁶.

Evidence is available suggesting that abnormal vital signs precede critical events such as death, cardiopulmonary arrest and need for shifting to an ICU^{17,18}. These EWSs have been validated most often in ICUs in the USA, United Kingdom and Europe; seldom have these been derived/validated in countries like Turkey, where the present study¹⁶ was conducted. Therefore, there is a continuing need for evolving and validating early warning systems that are applicable to the institutional/hospital setup where these are intended to be practically used in day-to-day practice.

There are some caveats which concern the results of the present study¹⁶. It is a single-centre study, with a short follow up period (30-day mortality was reported). NEWS and NEWS-L belong to the category of weighted 'track and trigger systems'^{19,20} where points are allocated in a weighted manner to derangements in common clinically documented physiological variables from an arbitrarily agreed normal range. The sum total of the allocated points constitutes the EWS. The present study¹⁶ documented the various scores at a single time point, at the time of initial presentation. Further, a significant number (39%) of patients had chronic obstructive pulmonary disease and their supplemental oxygen requirement could have influenced the performance of NEWS and NEWS-L scores.

EWS mandate the collection and processing of accurate, reliable data which requires clinicians, nursing, paramedical staff, rapid response team with appropriate training, skills, experience and dedication. In developing countries, not all critically ill patients have access to quality critical care or monitoring²¹. Further, lack of resources required for providing critical care is a major concern as well. The present study¹⁶ provides clinically interesting information identifying patients at risk and offers potential for instituting an effective response that can change the outcomes. The observations from this study need to be validated in adequately powered studies for assessing key outcome measures across a spectrum of emergency room settings and ICUs for establishing the utility of the emerging EWS.

Conflicts of Interest: None.

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