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In Search of the Ideal Risk Score in Sepsis

To the Editor:

We read with great interest the recent article by Machado and colleagues (1) revealing low sensitivity of the quick Sequential Organ Failure Assessment (qSOFA) score ⩾2 in predicting mortality among emergency department and ward patients with suspected infection or sepsis and that using qSOFA ⩾1 and qSOFA ⩾1 together with lactate improved sensitivity. Being from a middle- to upper-income country comparable with Brazil, we performed an observational retrospective cohort study in a tertiary public university hospital in Turkey to evaluate and compare the predictive roles of qSOFA and SOFA scores, systemic inflammatory response syndrome (SIRS) criteria, and Modified Early Warning Score (MEWS) (2, 3) obtained during the 48 hours before ICU admission for hospital mortality. A total of 120 patients admitted to the medical ICU from the emergency department or wards between January 1 and May 31, 2018, with suspected infection were included. The hospital mortality rate was 33%. Sensitivity, specificity, and area under the receiver operating characteristic curve (AUROC) (95% confidence interval) of qSOFA ⩾2 were 72.7% (54.2–86.0), 47.1 (36.4–58.0), and 0.60 (0.49–0.71), respectively. The corresponding values for SOFA ⩾2 were 97.0 (82.4–99.8), 37.2 (22.7–43.1), and 0.65 (0.54–0.75), respectively; for SIRS ⩾2, they were 87.8 (70.8–96.0), 12.6 (6.7–21.9), and 0.50 (0.39–0.62), respectively; and for MEWS ⩾4, they were 84.8 (67.3–94.2), 42.5 (32.1–53.5), and 0.64 (0.53–0.74), respectively. In this study, the sensitivity of qSOFA with the standard cutoff value of 2 was the lowest among all scores; therefore, its use as a screening tool and mortality predictor might not be sufficient.

qSOFA was introduced as a mortality prediction tool on the basis of North American and European cohorts with an area under the curve of 0.81 for patients outside the ICU (4). However, in a large study in patients admitted to the ICU in Australia and New Zealand (5), in which investigators used the scores calculated within the first 24 hours of ICU admission, SOFA had the greatest prognostic accuracy (AUROC, 0.75), with qSOFA and SIRS having AUROCs of 0.61 and 0.59, respectively.

Early warning scores could also be more accurate than qSOFA scores for predicting mortality and ICU transfer. In a recent study by Churpek and colleagues (6), qSOFA was found to be less accurate than early warning scores for predicting in-hospital mortality in non-ICU patients with suspicion of infection. qSOFA score greater than or equal to 2 had a sensitivity of 68.7%, specificity of 63.5%, and AUROC of 0.69 (0.67–0.70), whereas the AUROC was 0.77 (0.76–0.79) for the National Early Warning Score and 0.73 (0.71–0.74) for MEWS.

Though the authors conducted a single-center study, together with the other studies, the accuracy of the qSOFA score as a risk score remains questionable. SOFA and early warning scores seem to be better mortality predictors. ■

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Could the Quick Sequential Organ Failure Assessment Predictive Accuracy Be Affected by Site of Infection?

To the Editor:

We read with interest the article by Machado and colleagues (1) concerning the evaluation of the quick Sequential Organ Failure Assessment (qSOFA) score as a screening tool for mortality in two cohorts in Brazil. The authors state that a qSOFA score ⩾2 has low sensitivity for predicting death in patients with suspected infection and may miss patients who ultimately die. Taking into consideration the opportunity of these two large cohorts of patients, it would be interesting to explore whether the site of infection plays any role in this observation. As we have previously argued, qSOFA score is potentially biased by its very parameters, because they are affected by different sites of infection (2). qSOFA could perform adequately or overperform in cases in which the infection site could involve score parameters (e.g., respiratory tract infections [RTIs] and respiratory rate) but not in cases in which potential parameters are not included in the qSOFA score but in which the underlying inflammatory response could still be expressed otherwise and drive poor outcomes (e.g., thrombocytopenia and hyperbilirubinemia).

For this reason, we performed a retrospective cohort study to evaluate qSOFA performance in the assessment of mortality, depending on site of infection. Patients admitted with signs of infection (RTI, urinary tract infection [UTI], gastrointestinal [GI] tract infection, hepatobiliary [HB] system infection, and primary bacteremia [PB]) in the medical ward of a tertiary university hospital between May 1, 2016, and May 1, 2018, were included in this study (ethics committee approval 96/15.04.16). Patient disease severity according to systemic inflammatory response syndrome (SIRS) and qSOFA score was calculated upon presentation; epidemiological parameters were recorded; and outcomes were followed for 28 days. Using IBM SPSS Statistics version 25 software (IBM Corp.), we performed receiver operating characteristic curve analysis to assess the performance of qSOFA scores ⩾2 in predicting survival for different sites of infection. A total of 614 patients were finally included in this study, involving RTI ($n = 132$), UTI ($n = 232$), PB ($n = 47$), GI tract infection ($n = 104$), and HB system infection ($n = 99$). The mean age of the population was 63 years, and 48% were male. Ninety-eight percent of patients with PB fulfilled the SIRS criteria for sepsis, followed by 74%, 72%, 55%, and 50% of patients with UTI, HB system infection, RTI, and GI tract infection, respectively. A qSOFA score ⩾2 was recorded in 22, 13, 12, 11, and 6% of PB cases, UTIs, RTIs, HB system infections, and GI tract infections. Mortality rates were higher for PB (34%), followed by RTI (17%), HB system infection (14%), UTI (7%), and GI tract infection (2%). Receiver operating characteristic curve analysis to assess the performance of qSOFA scores ⩾2 in predicting mortality, depending on site of infection, showed an adequate area under the curve for UTI (0.799), RTI (0.715), and GI tract infection (0.720) but fair to poor predictive value for PB (0.619) or HB system infection (0.590).

It appears that a qSOFA score ⩾2 may not behave the same at different sites of infection. This is reflected in diverse areas under the curve for different infection sites. Previous authors have tried to assess qSOFA performance in emergency departments or non-ICU settings (3), with variable results. Even though real-life validation data have raised questions regarding the performance of qSOFA in these settings, no efforts have been made to distinguish its performance on the basis of type of infection as a potential cause of misclassification. Ranzani and colleagues have previously observed overestimation of mortality and miscalibration of qSOFA score in patients with pneumonia (4), findings that could be attributed to respiratory rate being affected by the disease itself and not an underlying inflammatory response mirroring severity. Discrepancies could be attributed to the fact that the qSOFA score does not necessarily reflect an underlying inflammatory response, which could vary on the basis of the type of infection (5). After all, on the one hand, SIRS and Sepsis-3 (Third International Consensus Definitions for Sepsis and Septic Shock) criteria tend to complement each other, rather than substitute for each other. On the other hand, additional laboratory markers such as lactate could significantly improve qSOFA performance, as previously described (1, 6). Even though the qSOFA represents a valuable "queue" assessment in endless waiting lines of emergency departments, caution and further studies are pivotal to elucidate where its exact limitations lie in everyday clinical practice. ■

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