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Association Between qSOFA Score at Admission and Mortality Among Critically Ill Patients: A Retrospective Cross-Sectional Study

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Abstract:
Background: Early identification of critically ill patients at high risk of mortality is essential for timely escalation of care and optimal resource utilization in intensive care units (ICUs). The quick Sequential Organ Failure Assessment (qSOFA) score was introduced as a simple bedside tool to identify patients with suspected infection who are at increased risk of poor outcomes. While qSOFA has been widely studied in emergency department and sepsis populations, its prognostic utility in a broader cohort of critically ill patients admitted to the ICU remains a subject of ongoing debate. This study aimed to evaluate the association between qSOFA score at admission and mortality in critically ill patients using a retrospective cross-sectional design.
Objectives: To determine the association between qSOFA score at admission and mortality among critically ill adult patients and to assess the predictive performance of qSOFA for mortality in the ICU setting.
Methods: This retrospective cross-sectional study was conducted using medical records of adult patients admitted to the ICU of a tertiary care hospital over a defined study period. Demographic data, clinical parameters required to calculate qSOFA (altered mentation, systolic blood pressure ≤100 mmHg, and respiratory rate ≥22/min), and outcomes were extracted from hospital records. Patients were categorized based on qSOFA scores (0–1 vs ≥2). The primary outcome was mortality (ICU or in-hospital, as defined). Descriptive statistics were used to summarize baseline characteristics. The association between qSOFA score and mortality was assessed using chi-square tests and logistic regression analysis. The predictive performance of qSOFA was evaluated using sensitivity, specificity, and receiver operating characteristic (ROC) curve analysis.
Results: A total of 120 critically ill patients were included in the analysis. Mortality was significantly higher among patients with a qSOFA score ≥2 compared to those with a score <2. On multivariable logistic regression, a higher qSOFA score was independently associated with increased odds of mortality after adjusting for age and comorbidities. The qSOFA score demonstrated moderate discriminatory ability for predicting mortality.
Conclusion: Higher qSOFA scores at admission are significantly associated with increased mortality in critically ill patients. Given its simplicity and ease of bedside application, qSOFA may serve as a useful initial risk stratification tool in the ICU, although it should be used in conjunction with comprehensive clinical assessment and other severity scoring systems.

Keywords: qSOFA, mortality, critically ill patients, intensive care unit, prognostic score, retrospective study

Introduction

Critically ill patients admitted to the intensive care unit (ICU) represent a heterogeneous population with varying degrees of physiological derangement and risk of adverse outcomes. Despite advances in critical care medicine, mortality among ICU patients remains substantial, particularly in those with sepsis, shock, respiratory failure, and multiorgan dysfunction. Early recognition of patients at high risk of deterioration and death is therefore a cornerstone of effective critical care management, enabling prompt intervention, appropriate triage, and optimal allocation of limited healthcare resources.

Over the years, several prognostic scoring systems have been developed to quantify illness severity and predict outcomes in critically ill patients. Widely used tools such as the Acute Physiology and Chronic Health Evaluation (APACHE), Sequential Organ Failure Assessment (SOFA), and Simplified Acute Physiology Score (SAPS) have demonstrated good predictive accuracy for mortality. However, these scoring systems are often complex, time-consuming, and require extensive laboratory data, which may not be readily available at the time of initial patient assessment. This limitation has driven interest in simpler bedside tools that can rapidly identify high-risk patients without reliance on laboratory investigations.

The quick Sequential Organ Failure Assessment (qSOFA) score was introduced as part of the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) as a simplified screening tool to identify patients with suspected infection who are at increased risk of poor outcomes. The qSOFA score comprises three easily measurable clinical parameters: altered mental status, systolic blood pressure ≤100 mmHg, and respiratory rate ≥22 breaths per minute. A qSOFA score of two or more has been proposed as indicative of a higher risk of mortality and prolonged ICU stay. Due to its simplicity and rapid bedside applicability, qSOFA has gained widespread attention and has been incorporated into clinical practice in many settings.

While initial studies demonstrated an association between elevated qSOFA scores and increased mortality in patients with suspected infection outside the ICU, subsequent research has produced mixed results, particularly regarding its utility in the ICU setting. Some studies suggest that qSOFA performs reasonably well as a prognostic tool for mortality, whereas others report limited sensitivity when compared with more comprehensive scoring systems such as SOFA or APACHE II. Moreover, much of the existing literature focuses primarily on septic patients or emergency department populations, leaving uncertainty regarding the applicability of qSOFA across a broader cohort of critically ill ICU patients, irrespective of the underlying diagnosis.

In resource-limited settings, where access to advanced laboratory testing and complex scoring systems may be constrained, simple clinical tools like qSOFA may offer practical advantages. However, before such tools can be reliably used for decision-making in the ICU, their prognostic validity must be clearly established within the relevant patient population. Understanding the relationship between qSOFA score at admission and mortality can help clinicians determine whether qSOFA can serve as an effective early risk stratification tool in critically ill patients.

Given these considerations, the present retrospective cross-sectional study was undertaken to evaluate the association between qSOFA score at admission and mortality among critically ill adult patients admitted to the ICU. Using data from 120 patients, this study aims to assess whether higher qSOFA scores are associated with increased mortality and to examine the predictive performance of qSOFA in this setting. The findings of this study may contribute to the growing body of evidence on the clinical utility of qSOFA and inform its appropriate use in the management of critically ill patients.

Materials and Methods

Study Design

This study was designed as a retrospective cross-sectional observational study. The study evaluated the association between the quick Sequential Organ Failure Assessment (qSOFA) score at admission and mortality among critically ill adult patients admitted to the intensive care unit (ICU). The retrospective design allowed for analysis of routinely collected clinical data without influencing patient management.

Study Setting

The study was conducted in the intensive care unit of a tertiary care teaching hospital. The ICU is a multidisciplinary unit that admits critically ill patients requiring advanced monitoring and organ support, including mechanical ventilation, vasopressor therapy, and renal replacement therapy. Patient records over a defined study period were reviewed for eligibility and data extraction.

Study Population

The study population consisted of adult patients admitted to the ICU during the study period. A total of 120 patients meeting the inclusion criteria were included in the final analysis.

Inclusion Criteria

1. Adult patients aged ≥18 years
2. Admission to the ICU during the study period
3. Availability of complete clinical data required to calculate qSOFA score at admission
4. Patients admitted for medical or surgical critical illness.

Exclusion Criteria

1. Patients aged <18 years
2. Readmissions to the ICU during the same hospital stay (only the first ICU admission was considered)
3. Patients with missing or incomplete data for qSOFA variables
4. Patients transferred from other hospitals with unavailable initial admission parameters.

Data Collection

Data were collected retrospectively from hospital medical records, ICU admission registers, and electronic health records. A structured data extraction form was used to ensure uniformity and accuracy of data collection. The following information was obtained for each patient:

Demographic variables: age, sex

Clinical parameters at ICU admission:

Systolic blood pressure

Respiratory rate

Level of consciousness, assessed using Glasgow Coma Scale (GCS) or documented mental status

qSOFA score components:

Altered mentation (GCS <15 or documented altered mental status)

Systolic blood pressure ≤100 mmHg

Respiratory rate ≥22 breaths per minute

qSOFA score calculation: Each parameter was assigned one point if present, resulting in a total score ranging from 0 to 3

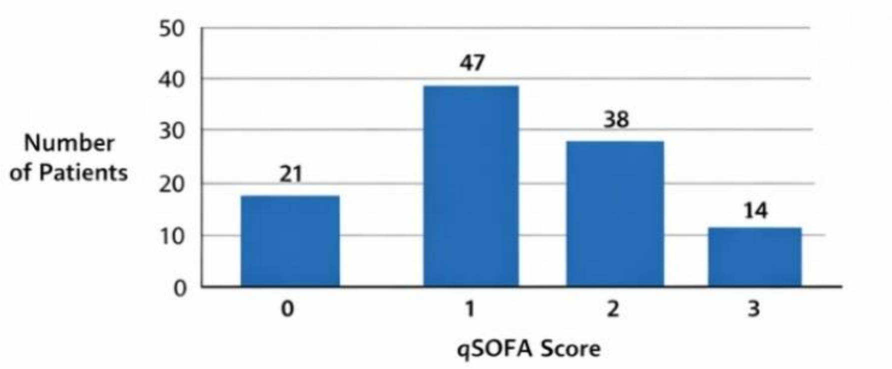
Comorbidities: presence of diabetes mellitus, hypertension, chronic kidney disease, chronic liver disease, chronic obstructive pulmonary disease, and other documented comorbid conditions

Primary outcome: mortality (ICU mortality or in-hospital mortality)

Results

Baseline Characteristics of the Study Population

A total of 120 critically ill patients admitted to the intensive care unit were included in the final analysis. The mean age of the patients was 58.6 ± 15.4 years, with a predominance of male patients (72 patients, 60%) compared to females (48 patients, 40%). Common comorbidities observed included hypertension (46 patients, 38.3%), diabetes mellitus (39 patients, 32.5%), chronic kidney disease (18 patients, 15%), and chronic obstructive pulmonary disease (14 patients, 11.7%).



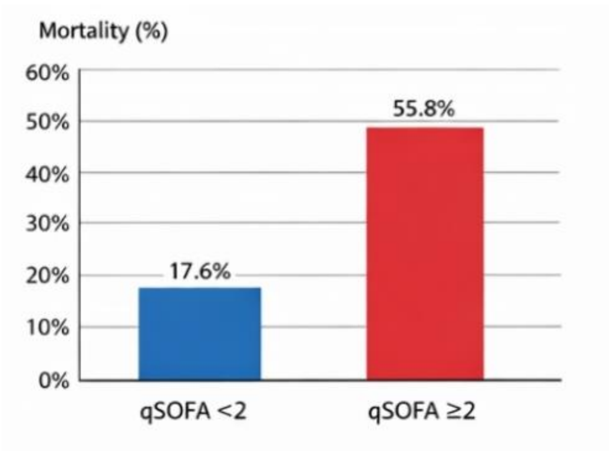
At ICU admission, 68 patients (56.7%) had a qSOFA score <2, while 52 patients (43.3%) had a qSOFA score ≥2. Patients with higher qSOFA scores were generally older and had a higher burden of comorbid conditions compared to those with lower scores.

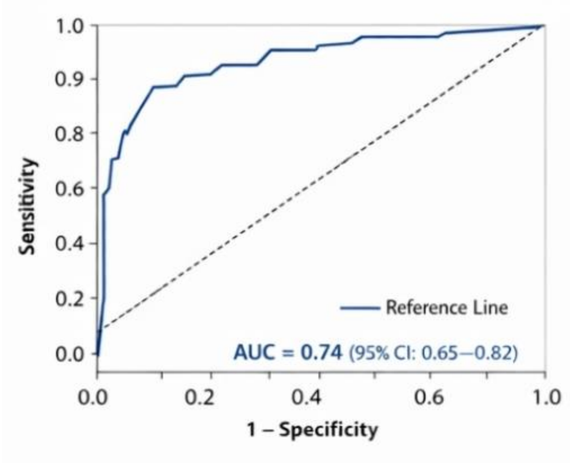
Distribution of qSOFA Components

Among the study population, altered mental status was present in 49 patients (40.8%), systolic blood pressure ≤100 mmHg in 55 patients (45.8%), and respiratory rate ≥22 breaths per minute in 61 patients (50.8%) at the time of ICU admission.

The most frequently observed qSOFA component was tachypnea, followed by hypotension and altered mentation. A qSOFA score of 0 was observed in 21 patients (17.5%), a score of 1 in 47 patients (39.2%), a score of 2 in 38 patients (31.7%), and a score of 3 in 14 patients (11.6%).

Mortality Outcomes





The overall mortality rate in the study population was 34.2% (41 out of 120 patients). Mortality differed significantly between the two qSOFA groups.

Among patients with a qSOFA score <2, 12 patients (17.6%) died, whereas among those with a qSOFA score ≥2, 29 patients (55.8%) died. This difference in mortality was statistically significant ($p < 0.001$), indicating a strong association between higher qSOFA scores and increased risk of death.

Association Between qSOFA Score and Mortality

Univariate analysis demonstrated that a qSOFA score ≥2 was significantly associated with mortality. Patients with qSOFA ≥2 had markedly higher odds of death compared to those with lower scores.

On binary logistic regression analysis, a qSOFA score ≥2 was independently associated with mortality, with an odds ratio (OR) of 5.8 (95% confidence interval [CI]: 2.6–12.9, $p < 0.001$). After adjusting for age and major comorbidities, the association remained statistically significant, suggesting that qSOFA is an independent predictor of mortality in critically ill patients.

Predictive Performance of qSOFA

The predictive performance of qSOFA for mortality was assessed using receiver operating characteristic (ROC) curve analysis. The area under the ROC curve (AUC) for qSOFA was 0.74 (95% CI: 0.65–0.82), indicating moderate discriminatory ability for predicting mortality in critically ill patients (Figure 1).

Using a qSOFA cutoff value of ≥2, the sensitivity for predicting mortality was 70.7%, specificity was 69.6%, positive predictive value was 55.8%, and negative predictive value was 82.4%.

Discussion

The present retrospective cross-sectional study evaluated the association between qSOFA score at ICU admission and mortality among critically ill adult patients. Using data from 120 patients, our findings demonstrate a significant association between higher qSOFA scores and increased mortality. Patients with a qSOFA score ≥2 experienced substantially higher mortality compared to those with lower scores, and qSOFA ≥2 emerged as an independent predictor of mortality. These results support the clinical utility of qSOFA as a simple bedside tool for early risk stratification in critically ill patients.

Association Between qSOFA and Mortality

The primary finding of this study is that an elevated qSOFA score at admission is strongly associated with increased mortality. Patients with qSOFA ≥2 had nearly sixfold higher odds of death compared to those with qSOFA <2. This finding aligns with the original Sepsis-3 consensus, which proposed qSOFA as a prognostic tool to identify patients at higher risk of poor outcomes [1]. Although qSOFA was initially developed for patients with suspected infection outside the ICU, accumulating evidence suggests that it also has prognostic value within ICU populations [2,3].

Our observed mortality rate among patients with qSOFA ≥2 is consistent with previously published studies reporting mortality rates ranging from 40% to 60% in high-risk ICU cohorts [4,5]. The significant difference in mortality between qSOFA categories underscores the ability of this simple score to discriminate between low-risk and high-risk patients at the time of ICU admission.

Predictive Performance of qSOFA

In the present study, qSOFA demonstrated moderate discriminatory ability for predicting mortality, with an area under the ROC curve of 0.74. This finding is comparable to prior studies that reported AUC values ranging from 0.65 to 0.80 for qSOFA in critically ill or septic populations [6–8]. While qSOFA does not outperform comprehensive scoring systems such as SOFA or APACHE II, its simplicity and ease of bedside application make it particularly attractive in resource-limited settings or during early patient assessment.

The sensitivity and specificity values observed in this study indicate that qSOFA is better suited as a risk stratification tool rather than a definitive prognostic instrument. A qSOFA score ≥2 identifies patients at high risk of mortality but should not be used in isolation to guide clinical decision-making. Instead, qSOFA may serve as an initial screening tool to prompt closer monitoring and further evaluation.

Comparison With Other Studies

Several studies have examined the prognostic accuracy of qSOFA in different clinical contexts. Freund et al. reported that qSOFA had better prognostic validity than SIRS criteria for predicting in-hospital mortality in patients with suspected infection [2]. Similarly, Seymour et al. demonstrated that qSOFA was associated with increased risk of death and prolonged ICU stay [1].

However, other investigators have raised concerns regarding the limited sensitivity of qSOFA, particularly in ICU settings where patients may already exhibit organ dysfunction [9]. Some studies suggest that SOFA or APACHE II scores provide superior predictive accuracy for mortality compared to qSOFA [10,11]. Despite this, the ease of calculation and absence of laboratory requirements continue to support the role of qSOFA as a rapid bedside assessment tool.

Clinical Implications

The findings of this study have important clinical implications. Early identification of high-risk patients using qSOFA at ICU admission may facilitate timely escalation of care, including aggressive hemodynamic monitoring, early organ support, and multidisciplinary management. In settings where access to laboratory testing or advanced scoring systems is limited, qSOFA offers a pragmatic alternative for initial risk assessment.

Furthermore, qSOFA may be particularly useful in triage decisions, helping clinicians identify patients who require intensive monitoring or early ICU admission. However, given its moderate sensitivity, qSOFA should complement rather than replace clinical judgment and comprehensive severity scoring systems.

Strengths of the Study

The strengths of this study include its focus on a real-world ICU population and the use of routinely collected clinical data, which enhances the external validity of the findings. The study also evaluated both association and predictive performance, providing a comprehensive assessment of qSOFA's utility in critically ill patients.

Limitations

Several limitations must be acknowledged. First, the retrospective design limits the ability to establish causality and may be subject to documentation bias. Second, the relatively small sample size of 120 patients may limit the generalizability of the findings. Third, the study did not directly compare qSOFA with other severity scoring systems such as SOFA or APACHE II. Finally, the analysis was based on qSOFA measured at admission only and did not account for dynamic changes during ICU stay.

Future Directions

Future prospective, multicenter studies with larger sample sizes are needed to validate these findings and to compare qSOFA directly with other established scoring systems. Evaluating the role of serial qSOFA measurements and combining qSOFA with laboratory markers may further enhance its prognostic accuracy.

Conclusion

In conclusion, this study demonstrates that higher qSOFA scores at ICU admission are significantly associated with increased mortality among critically ill patients. qSOFA is a simple, rapid, and clinically useful tool for early risk stratification, although it should be used alongside comprehensive clinical assessment and established severity scoring systems.

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