



NEWS2 vs qSOFA: The Battle of Bedside Scores in Sepsis Mortality Predictions.

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Abstract

Background: Sepsis is a life-threatening condition associated with high morbidity and mortality despite advances in critical care. Early identification of high-risk patients is essential for timely intervention and improved outcomes. The National Early Warning Score 2 (NEWS2) and Quick Sequential Organ Failure Assessment (qSOFA) are widely used bedside scoring systems for risk stratification; however, their comparative prognostic performance remains uncertain in many clinical settings. This study compared the ability of NEWS2 and qSOFA to predict in-hospital mortality among adult patients with sepsis. **Materials and Methods:** This prospective observational study was conducted from September 2024 to September 2025 in the Department of Emergency Medicine and Intensive Care of a tertiary care teaching hospital. A total of 150 adult patients diagnosed with sepsis according to Sepsis-3 criteria were enrolled. NEWS2 and qSOFA scores were calculated at admission using initial clinical parameters. Demographic, clinical, and laboratory data were recorded, and patients were followed until discharge or death. Receiver operating characteristic (ROC) curve analysis and multivariable logistic regression were performed to compare the prognostic accuracy of the two scoring systems. **Results:** In-hospital mortality occurred in 38 (25.3%) patients. Non-survivors had significantly higher NEWS2 (9.2 ± 2.1 vs. 5.4 ± 2.0) and qSOFA (2.42 ± 0.68 vs. 1.38 ± 0.71) scores than survivors ($p < 0.001$). NEWS2 demonstrated superior sensitivity (89.5% vs. 71.1%), diagnostic accuracy (81.3% vs. 78.0%), and discriminatory ability (AUC: 0.903 vs. 0.821) compared with qSOFA. Multivariable logistic regression identified higher NEWS2 score, qSOFA score, elevated serum lactate, increasing age, and chronic kidney disease as independent predictors of in-hospital mortality. **Conclusion:** Both NEWS2 and qSOFA were effective bedside tools for predicting mortality in sepsis; however, NEWS2 demonstrated superior prognostic performance with greater sensitivity, overall diagnostic accuracy, and discriminatory ability. Routine implementation of NEWS2 may facilitate early identification of high-risk patients and improve clinical decision-making in emergency and critical care settings.

Keywords: Sepsis; National Early Warning Score 2 (NEWS2); qSOFA; In-hospital mortality; Prognostic accuracy.



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INTRODUCTION

Sepsis is a life-threatening syndrome resulting from a dysregulated host response to infection that leads to acute organ dysfunction and remains a major cause of morbidity and mortality worldwide [1]. Despite advances in antimicrobial therapy, critical care, and supportive management, sepsis continues to account for a substantial proportion of hospital admissions and intensive care unit (ICU) deaths, particularly in low- and middle-income countries [2]. Early identification of patients at risk of clinical deterioration is crucial because timely initiation of appropriate interventions, including antibiotics, fluid resuscitation, and organ support, has been shown to improve survival [3].

Several bedside scoring systems have been developed to facilitate rapid risk stratification in patients with suspected sepsis [4]. The Quick Sequential Organ Failure Assessment (qSOFA), introduced as part of the Sepsis-3 recommendations, is a simple three-parameter score incorporating altered mental status, respiratory rate, and systolic blood pressure [5]. Owing to its ease of use, qSOFA has been widely adopted in emergency departments and resource-limited settings [6]. However, concerns have been raised regarding its relatively low sensitivity, particularly for identifying patients in the early stages of sepsis who may subsequently deteriorate despite initially low scores [6].

The National Early Warning Score 2 (NEWS2) was developed to identify patients with acute physiological deterioration by integrating seven routinely measured clinical parameters, including respiratory rate, oxygen saturation, supplemental oxygen use, systolic blood pressure, pulse rate, temperature, and level of consciousness [7]. Compared with qSOFA, NEWS2 provides a more comprehensive assessment of physiological derangement and has demonstrated promising performance in predicting adverse outcomes, including ICU admission, septic shock, and mortality [8]. Nevertheless, conflicting evidence exists regarding the comparative prognostic accuracy of NEWS2 and qSOFA across different patient populations, healthcare settings, and disease severities, highlighting the need for further validation in diverse clinical environments [9].

Accurate and reliable bedside risk stratification tools are essential for guiding clinical decision-making, optimizing resource utilization, and improving patient outcomes in sepsis. Direct comparisons of NEWS2 and qSOFA in predicting mortality remain limited in many tertiary care settings, particularly in developing countries where the burden of sepsis is high. Therefore, the present study aimed to compare the prognostic performance of NEWS2 and qSOFA in predicting in-hospital mortality among adult patients with sepsis and to determine the bedside scoring system with superior predictive accuracy.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Emergency Medicine and Intensive Care of a tertiary care teaching hospital over a period of one year, from September 2024 to September 2025. The study aimed to compare the prognostic performance of the National Early Warning Score 2 (NEWS2) and the Quick Sequential Organ Failure Assessment (qSOFA) score in predicting in-hospital mortality among adult patients with sepsis. Ethical approval was obtained from the Institutional Ethics Committee before study commencement, and written informed consent was obtained from all participants or their legally authorized representatives.

A total of 150 consecutive adult patients (≥ 18 years) diagnosed with sepsis based on the Sepsis-3 criteria were enrolled using consecutive sampling. Patients presenting with suspected or confirmed infection along with evidence of organ dysfunction were included in the study. Patients who were pregnant, had trauma-related sepsis, were referred after prolonged hospitalization elsewhere, had incomplete clinical records, or declined consent were excluded. Baseline demographic characteristics, comorbidities, source of infection, vital signs, laboratory investigations, and clinical outcomes were recorded using a predesigned case record form at the time of admission.

For each participant, the NEWS2 and qSOFA scores were calculated using the initial clinical parameters recorded at presentation before initiation of definitive treatment. NEWS2 was calculated based on respiratory rate, oxygen saturation, supplemental oxygen requirement, systolic blood pressure, pulse rate, body temperature, and level of consciousness, while qSOFA was determined using altered mentation, respiratory rate ≥ 22 breaths/min, and systolic blood pressure ≤ 100 mmHg. Additional laboratory parameters including serum lactate, serum creatinine, and total leukocyte count were recorded. Patients were followed throughout their hospital stay until discharge or death, and in-hospital mortality was considered the primary study outcome.

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 20 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean $\pm$ standard deviation (SD), whereas categorical variables were presented as frequencies and percentages. Continuous variables were compared using the independent samples t-test, and categorical variables were analyzed using the Chi-square test or Fisher's exact test, wherever appropriate. The discriminatory ability of NEWS2 and qSOFA for predicting in-hospital mortality was assessed using receiver operating characteristic (ROC) curve analysis, and the area under the curve (AUC), sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy were calculated. Multivariable binary logistic regression analysis was performed to identify independent predictors of in-hospital mortality. A p-value of <0.05 was considered statistically significant.

RESULTS

Among the 150 patients included in the study, the majority were aged 60–79 years (40.7%), followed by 40–59 years (32.0%). Males constituted 61.3% of the study population. Respiratory tract infections were the most common source of sepsis (36.0%), followed by urinary tract infections (25.3%) and abdominal infections (19.3%). Diabetes mellitus and hypertension were present in 44.0% and 47.3% of patients, respectively, while chronic kidney disease and chronic liver disease were observed in 18.7% and 9.3% of participants. These baseline demographic and clinical characteristics are summarized in Table 1.

Table 1. Baseline Characteristics of the Study Participants (N = 150)

Variable	Category	n (%)
Age (years)	18–39	22 (14.7)
	40–59	48 (32.0)
	60–79	61 (40.7)
	≥80	19 (12.7)
Gender	Male	92 (61.3)
	Female	58 (38.7)
Source of infection	Respiratory	54 (36.0)
	Urinary tract	38 (25.3)
	Abdominal	29 (19.3)
	Bloodstream	14 (9.3)
	Skin/Soft tissue	9 (6.0)
	Others	6 (4.0)
Diabetes mellitus	Yes	66 (44.0)
Hypertension	Yes	71 (47.3)
Chronic kidney disease	Yes	28 (18.7)
Chronic liver disease	Yes	14 (9.3)

The mean age of the study participants was 61.4 ± 15.8 years. At admission, patients demonstrated tachycardia (108.4 ± 18.6 beats/min), tachypnea (27.6 ± 5.4 breaths/min), and a reduced mean systolic blood pressure (102.5 ± 17.2 mmHg). The mean oxygen saturation was $92.1 \pm 5.2\%$, while the average Glasgow Coma Scale score was 13.2 ± 2.5 . The mean serum lactate, creatinine, and total leukocyte count were 3.1 ± 1.6 mmol/L, 1.82 ± 1.03 mg/dL, and $15.8 \pm 6.4 \times 10^3/\mu\text{L}$, respectively. These admission clinical characteristics are presented in Table 2.

Table 2. Clinical Characteristics at Admission

Variable	Mean $\pm$ SD / n (%)
Age (years)	61.4 ± 15.8
Temperature ($^{\circ}\text{C}$)	38.2 ± 1.1
Heart rate (beats/min)	108.4 ± 18.6
Respiratory rate (/min)	27.6 ± 5.4
Systolic BP (mmHg)	102.5 ± 17.2
Oxygen saturation (%)	92.1 ± 5.2
Glasgow Coma Scale	13.2 ± 2.5
Lactate (mmol/L)	3.1 ± 1.6
Serum Creatinine (mg/dL)	1.82 ± 1.03
Total Leukocyte Count ($\times 10^3/\mu\text{L}$)	15.8 ± 6.4

Based on NEWS2 scoring, 44.7% of patients had scores ≥ 7 , whereas 29.3% and 26.0% had scores of 5–6 and 0–4, respectively. According to qSOFA, scores of 2 and 3 were observed in 36.7% and 19.3% of patients, respectively, while 32.0% had a score of 1 and 12.0% had a score of 0. The distribution of bedside severity scores is shown in Table 3.

Table 3. Distribution of NEWS2 and qSOFA Scores

Score	Category	n (%)
NEWS2	0–4	39 (26.0)
	5–6	44 (29.3)
	≥ 7	67 (44.7)
qSOFA	0	18 (12.0)
	1	48 (32.0)
	2	55 (36.7)
	3	29 (19.3)

In-hospital mortality occurred in 38 (25.3%) patients, while 112 (74.7%) survived. Non-survivors were significantly older than survivors and had a higher prevalence of diabetes mellitus and chronic kidney disease. They also demonstrated significantly elevated serum lactate and creatinine levels compared with survivors (all $p < 0.05$), whereas gender distribution did not differ significantly between the groups. The comparison of baseline variables according to mortality status is presented in Table 4.

Table 4. Association Between Baseline Variables and In-hospital Mortality

Variable	Survivors (n=112)	Non-survivors (n=38)	p value
Age (years)	58.6 ± 15.3	69.4 ± 13.2	<0.001
Male	66 (58.9%)	26 (68.4%)	0.292
Diabetes	44 (39.3%)	22 (57.9%)	0.043
CKD	15 (13.4%)	13 (34.2%)	0.004
Lactate	2.6 ± 1.1	4.7 ± 1.8	<0.001
Creatinine	1.55 ± 0.88	2.63 ± 1.24	<0.001

Patients who did not survive had significantly higher mean NEWS2 (9.2 ± 2.1 vs. 5.4 ± 2.0) and qSOFA (2.42 ± 0.68 vs. 1.38 ± 0.71) scores than survivors. Both scoring systems showed statistically significant differences between the two groups ($p < 0.001$), indicating their association with in-hospital mortality. These findings are detailed in Table 5.

Table 5. Comparison of NEWS2 and qSOFA Scores According to Mortality

Variable	Survivors	Non-survivors	t value	p value
NEWS2 score	5.4 ± 2.0	9.2 ± 2.1	10.18	<0.001
qSOFA score	1.38 ± 0.71	2.42 ± 0.68	8.02	<0.001

Using a cut-off of ≥ 7 , NEWS2 demonstrated a sensitivity of 89.5%, specificity of 78.6%, and an overall diagnostic accuracy of 81.3% for predicting in-hospital mortality. qSOFA, using a cut-off of ≥ 2 , showed a lower sensitivity (71.1%) but comparable specificity (81.3%), with an overall accuracy of 78.0%. Overall, NEWS2 exhibited superior screening performance, particularly in terms of sensitivity and negative predictive value. The diagnostic performance of both scores is summarized in Table 6.

Table 6. Diagnostic Accuracy of NEWS2 and qSOFA for Predicting Mortality

Parameter	NEWS2	qSOFA
Cut-off	≥ 7	≥ 2
Sensitivity (%)	89.5	71.1
Specificity (%)	78.6	81.3
Positive Predictive Value (%)	58.6	56.3
Negative Predictive Value (%)	95.7	89.2
Accuracy (%)	81.3	78.0

Receiver operating characteristic analysis demonstrated excellent discrimination for NEWS2, with an area under the curve (AUC) of 0.903 (95% CI: 0.851–0.955), compared with an AUC of 0.821 (95% CI: 0.744–0.898) for qSOFA. Both scoring systems were statistically significant predictors of in-hospital mortality ($p < 0.001$), although NEWS2 showed superior overall predictive ability. The ROC analysis is presented in Table 7.

Table 7. Receiver Operating Characteristic (ROC) Analysis

Score	AUC (95% CI)	p value
NEWS2	0.903 (0.851–0.955)	<0.001
qSOFA	0.821 (0.744–0.898)	<0.001

On multivariable logistic regression analysis, higher NEWS2 score, higher qSOFA score, elevated serum lactate, increasing age, and the presence of chronic kidney disease were identified as independent predictors of in-hospital mortality. Among the bedside scoring systems, NEWS2 demonstrated a strong independent association with mortality after adjustment for other covariates. The regression analysis is summarized in Table 8.

Table 8. Binary Logistic Regression for Predictors of In-hospital Mortality

Variable	Adjusted OR	95% CI	p value
NEWS2 score	1.64	1.29–2.08	<0.001
qSOFA score	1.71	1.18–2.49	0.005
Lactate	1.48	1.17–1.86	0.001
Age	1.03	1.00–1.06	0.041
CKD	2.29	1.03–5.07	0.042

DISCUSSION

The present study compared the prognostic performance of NEWS2 and qSOFA for predicting in-hospital mortality among adult patients with sepsis. Of the 150 patients enrolled, the in-hospital mortality was 25.3%, and non-survivors were significantly older with a higher prevalence of diabetes mellitus and chronic kidney disease than survivors. Furthermore, serum lactate and creatinine levels were significantly elevated among non-survivors, highlighting the contribution of organ dysfunction to adverse outcomes in sepsis. These findings are consistent with the Sepsis-3 concept that increasing physiological derangement and organ dysfunction are strongly associated with mortality and emphasize the importance of early risk stratification using bedside scoring systems [1].

In the present study, both NEWS2 and qSOFA scores were significantly higher among non-survivors than survivors; however, NEWS2 demonstrated superior diagnostic performance. Using a cut-off value of ≥ 7 , NEWS2 achieved a sensitivity of 89.5%, specificity of 78.6%, and overall accuracy of 81.3%, whereas qSOFA (cut-off ≥ 2) showed lower sensitivity (71.1%) despite comparable specificity (81.3%). These observations are comparable to the prospective Indian study by Verma et al., who reported that NEWS2 had better sensitivity (83.2% vs. 77.1%), diagnostic efficiency (66.5% vs. 55.0%), and overall prognostic performance than qSOFA for predicting in-hospital mortality in patients with sepsis [10]. Similarly, Mellhammar et al. demonstrated that NEWS2 identified patients with sepsis-related organ dysfunction more effectively than qSOFA, mainly because NEWS2 incorporates a broader range of physiological variables that detect clinical deterioration earlier [11].

Receiver operating characteristic analysis in our study further supported the superiority of NEWS2, which demonstrated an AUC of 0.903 compared with 0.821 for qSOFA. Multivariable logistic regression also identified NEWS2 as an independent predictor of in-hospital mortality after adjustment for age, chronic kidney disease, serum lactate, and qSOFA score. These findings are in agreement with recent evidence. Likewise, a recent comparative study involving 155 patients demonstrated that NEWS2 achieved an AUC of 0.949 for predicting in-hospital mortality, outperforming qSOFA across multiple clinically relevant outcomes, including vasopressor requirement, mechanical ventilation, and prolonged ICU stay [12]. Collectively, these studies indicate that the incorporation of multiple physiological parameters in NEWS2 provides a more comprehensive assessment of disease severity than the three-variable qSOFA score.

The findings of the present study have important clinical implications. Because NEWS2 relies exclusively on routinely available bedside observations, it can be rapidly calculated without laboratory investigations and may facilitate earlier identification of high-risk patients requiring aggressive monitoring, timely antimicrobial therapy, ICU referral, and organ support. Although qSOFA remains a simple and highly specific screening tool, its lower sensitivity may fail to identify a proportion of patients with evolving sepsis. Therefore, based on the present findings and the growing body of published evidence, NEWS2 appears to be a more reliable bedside scoring system for predicting in-hospital mortality among patients with sepsis and may be preferred for early risk stratification in emergency and critical care settings.

CONCLUSION

The present study demonstrated that both NEWS2 and qSOFA are useful bedside tools for predicting in-hospital mortality among patients with sepsis; however, NEWS2 showed superior prognostic performance with higher sensitivity, better overall diagnostic accuracy, and greater discriminatory ability than qSOFA. Additionally, increasing age, chronic kidney disease, elevated serum lactate, and higher NEWS2 scores were identified as independent predictors of mortality. Given its ease of application and excellent predictive performance, NEWS2 may be considered the preferred bedside scoring system for early risk stratification, timely clinical decision-making, and identification of high-risk patients with sepsis in emergency and critical care settings.

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