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Comparison of early warning and sepsis scores for mortality prediction in patients with suspected infection admitted to medical intensive care units

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ABSTRACT

Aims: To compare the mortality prediction efficiency of the Modified Early Warning Score (MEWS), Systemic Inflammatory Response Syndrome (SIRS), Sepsis Related Organ Failure Assessment (SOFA), and Quick Sepsis Related Organ Failure Assessment (qSOFA) calculated within 48 hours before ICU admission.

Methods: A prospective, noninterventional, observational cohort study enrolled adult patients admitted to medical intensive care units (ICU) with suspected infection in a tertiary care medical center. MEWS SIRS, SOFA, and qSOFA scores were calculated at four different time points: 48, 24, and 8 hours before and at the time of the ICU admission (0. hour). The scores were analyzed for hospital mortality.

Results: A total of 120 patients were included. The median age was 68 (IQR 59.8-79) years, and 44.2% of patients were male. Of the study population, 75.8% were admitted to the medical ICU from the emergency department, while the remaining were from the medical wards. Considering the scores observed 48 hours before ICU admission, Odds Ratio (OR) of SIRS≥2 and SOFA≥2 showed a value of 7.6 (95% CI: 1.5-38.0) and 13.2 (95% CI: 2.3-74.3), respectively, while no increase in risk was observed for MEWS and the qSOFA score. Receiver operating characteristic analysis (ROC) performed with the highest scores observed at any time within 48 hours before ICU admission (ICU admission values were omitted) regarding hospital mortality yielded area under the curve (AUC) values (95% CI) of 0.80 (0.72-0.89) for SOFA, 0.66 (0.54-0.76) for MEWS, 0.63 (0.51-0.74) for qSOFA, and 0.61 (0.49-0.73) for SIRS. SOFA had the highest sensitivity of 92.6% (82.7-100.0), whereas qSOFA had the highest specificity of 63.0% (49.1-77.0) for hospital mortality.

Conclusion: SOFA score is the most sensitive scoring system to predict hospital mortality in patients admitted to the medical ICU with suspected infection compared to MEWS, SIRS, and qSOFA. Nevertheless, the sepsis and early warning scores should be combined in clinical practice whenever possible.

Keywords: Early warning score, qSOFA, critical care, sepsis, SOFA, systemic inflammatory response syndrome

The study has been derived from the Internal Medicine graduation thesis of Batuhan Başpınar, MD.

INTRODUCTION

Sepsis is a common health problem that causes high morbidity and mortality.[1,2] Increased health care expenditures are also a priority concern.[3] Therefore, it is crucial to detect sepsis early and prevent further complications. Clinical scoring systems were employed for this purpose, such as the systemic inflammatory response syndrome (SIRS), the sepsis-related organ failure assessment (SOFA), the quick sepsis-related organ failure assessment (qSOFA), and the modified early warning score (MEWS).[4-10] SIRS is the first clinical scoring system developed to predict sepsis mortality. Due to the low specificity attributed to SIRS, SOFA and qSOFA scores were introduced in clinical practice. Besides the sepsis scores, early warning scores were used to detect deteriorating patients. While National Early Warning Score (NEWS) is most widely used, MEWS is employed for early warning determination in our hospital.[6] Although last consensus guidelines suggested a combination of these scoring systems,[11] establishment of a standard in the use of scoring systems is still an issue.

Several studies have evaluated the early diagnostic value and predictive power of MEWS, SIRS, SOFA, and qSOFA scores and compared them in pairs and triads.[5-7,12-22]

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The aim of our study was to compare the mortality prediction of MEWS, SIRS, SOFA, and qSOFA scores calculated at different time periods 48 hours before ICU admission of patients with suspected infection.

METHODS

This study was approved by the Hacettepe University Scientific Researches Ethics Committee (Date: 19.12.2017, Decision No: GO17/948-11). Informed Consent was obtained from the patients or the legal guardians of the patients who could not give informed consent. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Study Population

A prospective observational cohort study was conducted in patients with suspected infection admitted to medical intensive care units of tertiary care university hospitals between January 1, 2018, and May 31, 2018. The medical ICUs consisted of a 3rd-level medical ICU with 9 beds, a 3rd-level medical oncology ICU with 6 beds, and a medical acute care unit operated as a 1st-level medical ICU with a capacity of 10 beds. Admission to the medical ICU was through the medical wards or the emergency department (ED). Patients who met the criteria for suspected infection defined below within 48 hours before admission to the ICU were recruited. Patients younger than 18 years, patients admitted directly to the ICU from another hospital, postoperative patients, patients transferred to another medical center, patients who refused to participate in the study, patients hospitalized within 28 days before ICU admission, patients receiving prophylactic antimicrobials, and patients without suspected infection were excluded from the study.

Data Collection

All patients admitted to the medical ICUs were screened for eligibility at the time of admission. Demographic data of the patients who met the enrollment criteria such as age, sex, body mass index (BMI), comorbidities, along with the length of hospital stay before ICU admission, department information where patients were admitted to the ICU were collected from printed or electronic patient file at the time of ICU admission. The Charlson Comorbidity Index (CCI), APACHE-II Scores, and early warning and sepsis scores (MEWS, SIRS, SOFA, qSOFA) were calculated during ICU admission. Early warning and sepsis scores from three different time periods before ICU admission, defined below, were calculated retrospectively from the printed and electronic patient files. Patients were followed for information on the total length of hospital stay (LOS) and the occurrence of mortality. Patient identity was not disclosed during data collection.

Definitions, Outcomes

Suspected infection is defined as suspicion of a physical examination, ordering of a culture of body fluids, radiologic examination, or empiric/preemptive antimicrobial treatment of a clinical infection.[14] Antimicrobial use is defined as oral or parenteral medications used to treat bacterial, fungal, or viral infections. MEWS the SIRS, SOFA, and qSOFA scores were calculated at four different time points: 50-46 hours (-48h), 24 hours (-24h), and 8 hours (-8h) before ICU admission and at ICU admission (0h). the 0-hour (0h) period included the first 2 hours after admission to the ICU. Accordingly, the -48-hour period included the time between the 50th and 46th hours, the -24-hour period included the time between the 26th and 22nd hours, and the -8-hour period included the time between the 10th and 6th hours. The following values were accepted as cut-off values for scoring systems: MEWS ≥3 or a parameter of MEWS ≥2, SIRS ≥2, SOFA score ≥2, qSOFA score ≥2. The primary end point of the study was in-hospital mortality.

Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) ver. 25.0 (SPSS, IBM, Armonk, New York, USA). Numbers and percentages were reported for categorical data. For normally distributed continuous variables, mean and standard deviation (SD) were used; for nonnormally distributed continuous variables, median and interquartile range were used. Pairwise comparison regarding hospital mortality was performed with the chi-square test for categorical variables, Student's T test for normally distributed continuous variables, and Mann-Whitney U test for nonnormally distributed continuous variables. A p value less than 0.05 was accepted as statistical significance. The effectiveness of the score for predicting mortality was evaluated with logistic regression to calculate odds ratios and with C-index and COX regression analyses for hazard ratios. Age, sex, BMI, and the department in which patients were admitted to the ICU were identified as confounders, and regression analyses were performed for each factor. Odds ratios and 95% confidence intervals were reported as results of logistic regression analysis, and hazard ratios were reported as results of COX regression. Receiver operating characteristic analysis (ROC) was performed to evaluate the efficacy, sensitivity, and specificity of the scores calculated in different time periods. The c-index value was reported as the result of the ROC analysis.

RESULTS

A total of 149 patients were enrolled in the study. Statistical analysis was carried out with 120 patients after excluding twenty-nine patients (Figure 1). Baseline patient characteristics and length of hospital stay are presented in Table 1. Survivor and non-survivor groups had similar age, gender, and BMI values according to hospital mortality (p>0.05). Although the length of ICU stay was the same, the median time before ICU admission and the total length of hospital stay (LOS) were longer in non-survivors. Most of the study population (n=91, 75.8%) of patients were admitted from ED, while 29 (24.2%) were from medical wards. The Charlson comorbidity index (CCI) was the same in both groups, and hypertension was the most seen comorbidity in the whole population. The mean APACHE II values were significantly higher in non-survivors (26.8, SD±8.1) than in survivors (16.2, SD±5.7, p<0.001). The highest values of MEWS, SIRS, SOFA, and qSOFA scores were significantly higher in non-survivors compared to survivors (p<0.001, p=0.007, p<0.001, and p<0.001, respectively).

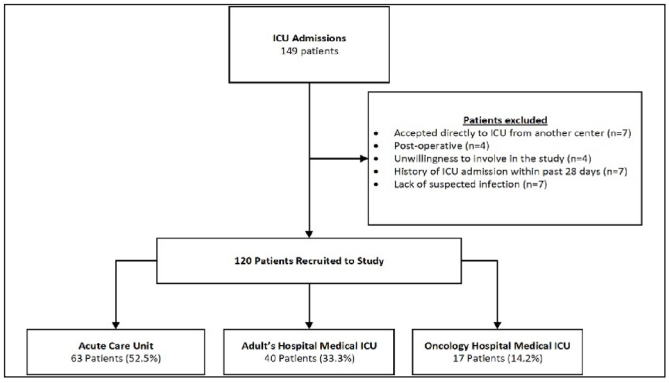

Figure 1. Flowchart of enrollment in the presented study

In-hospital mortality was observed in 33 (27.5%) patients, of which 14 (15.4%) were admitted from ED (n=91), whereas 19 (65.5%) of the patients were admitted from medical wards (n=29). The patients who admitted from other medical wards had a high mortality rate compared to ED (p<0.001). Moreover, the hospital mortality rate was higher in patients with steroid usage (83.3%), chronic liver disease (75.0%), cancer (53.1%), and non-steroidal anti-inflammatory drug usage (50.0%).

Table 1. Patient characteristics evaluated with respect to hospital mortality

	All Patients	Non-survivors	Survivors	p
	N=120	n=33	n=87	
Age, median (IQR), years	68.0 (59.8-79.0)	67.0 (61.0-78.0)	68.0 (59.0-79.0)	0.94
Male sex, No. (%)	53 (44.2)	15 (45.5)	38 (43.7)	1.00
BMI, mean (SD), kg/cm2	27.4 (6.3)	26.7 (5.9)	27.7 (6.5)	0.26
Length of stay before ICU admission, median (IQR), days	2.0 (1.0-5.0)	7.0 (2.0-18.5)	2.0 (1.0-3.0)	<0.001
Length of ICU stay, median (IQR), days	10.0 (6.0-168)	11.0 (6.5-23.5)	10.0 (6.0-14.0)	0.44
Length of hospital stay, median (IQR), days	17.0 (11.0-28.0)	25.0 (15.0-40.0)	16 (10.0-23.0)	0.003
Location prior to ICU				<0.001
Emergency	91 (75.8)	14 (42.4)	77 (88.5)	
Ward	29 (24.2)	19 (57.6)	10 (11.5)	
Charlson comorbidity index, mean (SD)	5.6 (2.8)	6.0 (3.0)	5.5 (2.8)	0.67
Comorbidity, No. (%)				
Hypertension	69 (57.5)	17 (51.5)	52 (59.8)	
COPD	47 (39.2)	5 (15.2)	42 (48.3)	
Diabetes Mellitus	42 (35.0)	9 (27.3)	33 (37.9)	
Coronary Artery Disease	38 (31.7)	5 (15.2)	33 (37.9)	
Malignancy	32 (26.7)	17 (51.5)	15 (17.2)	
Heart Failure	29 (24.2)	3 (9.1)	26 (29.9)	
CKD	24 (20.0)	3 (9.1)	21 (24.1)	
CVD	11 (9.2)	1 (3.0)	10 (11.5)	
Chronic Liver Disease	8 (6.7)	6 (18.2)	2 (2.3)	
Rheumatologic Disease	6 (5.0)	1 (3.0)	5 (5.7)	
Steroid Usage	6 (5.0)	5 (15.2)	1 (1.1)	
NSAID Usage	6 (5.0)	3 (9.1)	3 (3.4)	
APACHE II score, mean (SD)	19.1 (8.0)	26.8 (8.1)	16.2 (5.7)	<0.001
Highest score 48 hrs prior, mean (SD)				
MEWS	5.0 (2.3)	6.6 (2.5)	4.5 (1.9)	<0.001
SIRS	2.6 (0.8)	2.9 (0.8)	2.4 (0.8)	0.007
SOFA	4.8 (3.7)	8.0 (3.8)	3.6 (2.9)	<0.001
qSOFA	1.9 (0.7)	2.3 (0.6)	1.8 (0.7)	<0.001

CKD: Chronic Kidney Disease, COPD: Chronic Obstructive Pulmonary Disease, CVD: Cardiovascular Disease, ICU: Intensive Care Unit, IQR: Interquartile Range, MEWS: Modified Early Warning Score, NSAID: Non-Steroidal Anti-inflammatory Drug, No.: Number, qSOFA: Quick Sepsis-Related Organ Failure Assessment, SD: Standard Deviation, SIRS: Systemic Inflammatory Response Syndrome, SOFA: Sepsis-Related Organ Failure Assessment

Logistic regression analysis of score cut-off values observed in different time periods was performed regarding hospital mortality concerning age, sex, BMI, and unit from which patients accepted to medical ICUs (Table 2). At the -48h period, values greater than SOFA and SIRS cut-off were associated with increased mortality (OR 13.2 and 7.6, respectively). However, SOFA and qSOFA scores were associated with increased mortality at the -24h period (OR: 14.2 and 2.9 respectively), the -8h period (OR: 18.3 and 3.9 respectively), and the 0h period (OR: 10.2 and 4.8 respectively). COX regression analysis was performed with the highest score values calculated before ICU admission (ICU admission values were omitted) and given in Table 3. In the univariate and multivariate analysis, SOFA score was the only score that correlated with increased hospital mortality (OR: 1.2, p=0.01 and OR: 1.1, p=0.04, respectively). No mortality risk increment was found with MEWS, SIRS, and qSOFA scores.

Table 2. Logistic regression analysis * of MEWS, SIRS, SOFA and qSOFA score cut-off positivity observed in different time periods with respect to hospital mortality.

	Non-survivors	Survivors	OR	p
-48h, mean (SD)	n=27	n=46		
MEWS	21 (77.8)	40 (87.0)		0.61
SIRS	23 (85.2)	31 (67.4)	7.6 (1.5-38.0)	0.01
SOFA	25 (92.6)	26 (56.5)	13.2 (2.3-74.3)	0.004
qSOFA	15 (55.6)	29 (63.0)		0.19
-24h, mean (SD)	n=31	n=67		
MEWS	29 (93.5)	63 (94.0)		0.27
SIRS	25 (80.6)	50 (74.6)		0.20
SOFA	29 (93.5)	41 (61.2)	14.2 (2.5-80.6)	0.003
qSOFA	15 (48.4)	24 (35.8)	2.9 (1.0-8.4)	0.05
-8h, mean (SD)	n=33	n=84		
MEWS	30 (90.9)	74 (88.1)		0.08
SIRS	26 (78.8)	59 (70.2)		0.41
SOFA	32 (97.0)	52 (61.9)	18.3 (2.2-151.1)	0.01
qSOFA	19 (57.6)	30 (35.7)	3.9 (1.4-11.0)	0.01
0h, mean (SD)	n=33	n=87		
MEWS	33 (100.0)	85 (97.7)		NA
SIRS	30 (90.9)	60 (69.0)		0.09
SOFA	32 (97.0)	60 (69.0)	10.2 (1.3-83.5)	0.03
qSOFA	25 (75.8)	27 (31.0)	4.8 (1.8-12.8)	0.002

* Adjusted for age, sex, BMI, and admission unit. MEWS: Modified Early Warning Score, qSOFA: Quick Sepsis-Related Organ Failure Assessment, SD: Standard Deviation, SIRS: Systemic Inflammatory Response Syndrome, SOFA: Sepsis-Related Organ Failure Assessment

Table 3. COX regression analysis of highest MEWS, SIRS, SOFA and qSOFA scores calculated before ICU admission (omitting ICU admission values) with respect to hospital mortality

	HR	CI (%95)	p	HR*	CI* (%95)	p*
MEWS	1.1	0.9-1.2	0.41	1.1	0.9-1.2	0.34
SIRS	1.2	0.8-1.8	0.30	1.3	0.9-2.0	0.16
SOFA	1.2	1.0-1.3	0.01	1.1	1.0-1.3	0.04
qSOFA	1.3	0.8-2.0	0.24	1.3	0.9-2.0	0.23

*Corrected in respect of age, sex, BMI, and admission unit. CI: Confidence Interval, MEWS: Modified Early Warning Score, OR: Odds Ratio, qSOFA: Quick Sepsis-Related Organ Failure Assessment, SIRS: Systemic Inflammatory Response Syndrome, SOFA: Sepsis-Related Organ Failure Assessment

ROC analysis with the highest score values calculated before ICU admission (ICU admission values were omitted) is given in Figure 2. Observed AUROC values were 0.80 (95% CI: 0.72-0.89; p<0.001) for SOFA, 0.65 (95% CI: 0.54-0.76; p=0.01) for MEWS, 0.63 (95% CI: 0.51-0.74; p=0.04) for qSOFA and 0.61 (95% CI: 0.49-0.73; p=0.07) for SIRS.

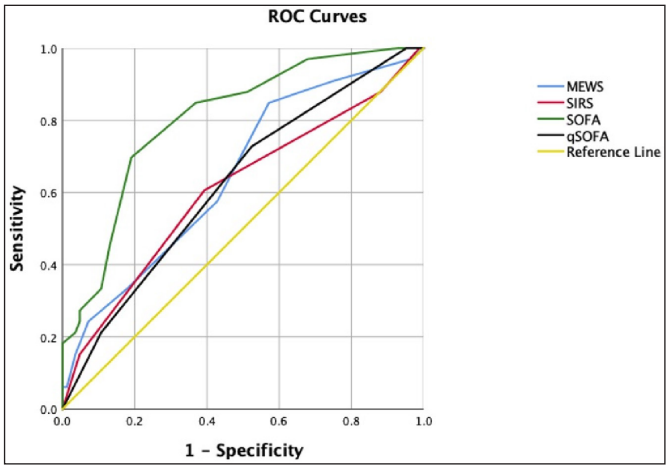

Figure 2. ROC Analysis of Highest MEWS, SIRS, SOFA and qSOFA Score Values Calculated Before ICU Admission in Respect to Hospital Mortality. Observed AUROC values are 0.80 (%95 CI: 0.72-0.89; p<0.001) for SOFA, 0.65 (%95 CI: 0.54-0.76; p=0.01) for MEWS, 0.63 (%95 CI: 0.51-0.74; p=0.04) for qSOFA and 0.61 (%95 CI: 0.49-0.73; p=0.07) for SIRS.

Sensitivity and specificity analysis of MEWS, SIRS, SOFA, and qSOFA score cut-off values are shown in Table 4. At all periods, specificity was highest in the qSOFA score. Sensitivity, positive predictive (PPV), and negative predictive values (NPV) were highest in SOFA score at -48h. At -24h, sensitivity was highest in MEWS and SOFA scores (93.5%), and NPV was highest in SOFA scores solely. Positive predictive values (PPV) were observed similarly between all four scores. -8h score characteristics were similar to -48h as SOFA had the highest sensitivity, PPV and NPV. At 0h, the MEWS score had 100% sensitivity and NPV, followed by the SOFA score (97.0% and 96.4%, respectively). Specificity and PPV were observed to be the highest in qSOFA scores at 0h.

Table 4. Sensitivity and specificity analysis of MEWS, SIRS, SOFA and qSOFA score cut-off values calculated in different time periods with respect to hospital mortality

	MEWS	SIRS	SOFA	qSOFA
- 48h, % (CI %95)				
Sensitivity	77.8 (62.1-93.5)	85.2 (71.8-98.6)	92.6 (82.7-100.0)	44.4 (25.7-63.1)
Specificity	13.0 (3.3-22.7)	32.6 (19.1-46.2)	43.5 (20.2-57.8)	63.0 (49.1-77.0)
Positive predictive value	34.4 (22.5-46.3)	36.0 (23.2-48.8)	49.0 (35.3-62.7)	41.4 (23.5-59.3)
Negative predictive value	50.0 (21.7-78.3)	79.0 (60.7-97.3)	90.9 (78.9-100.0)	65.9 (51.9-79.9)
- 24h, % (CI %95)				
Sensitivity	93.5 (84.8-100.0)	80.6 (66.7-94.5)	93.5 (84.8-100.0)	48.4 (30.8-66.0)
Specificity	6.0 (0.3-11.7)	25.4 (15.0-35.8)	38.8 (27.1-50.5)	64.2 (52.7-75.7)
Positive predictive value	31.5 (22.0-41.0)	33.3 (22.6-44.0)	41.4 (29.9-52.9)	38.5 (23.2-53.8)
Negative predictive value	66.7 (29.0-100.0)	74.0 (56.1-91.9)	92.9 (83.4-100.0)	72.9 (61.6-84.2)
- 8h, % (CI %95)				
Sensitivity	90.9 (81.1-100.0)	78.8 (64.9-92.8)	97.0 (91.2-100.0)	57.6 (40.7-74.5)
Specificity	11.9 (5.0-18.8)	29.8 (20.0-39.6)	38.1 (27.7-48.5)	64.3 (54.1-74.6)
Positive predictive value	28.9 (20.2-37.6)	30.6 (20.8-40.4)	38.1 (27.7-48.5)	38.8 (25.2-52.4)
Negative predictive value	76.9 (54.0-99.8)	78.1 (63.8-92.4)	97.0 (91.2-100.0)	79.4 (69.8-89.0)
0h, % (CI %95)				
Sensitivity	100.0	90.9 (81.1-100.0)	97.0 (91.2-100.0)	75.8 (61.2-90.4)
Specificity	2.9 (0.0-6.4)	31.0 (21.3-40.7)	31.0 (21.3-40.7)	69.0 (59.3-78.7)
Positive predictive value	28.0 (19.9-36.1)	33.3 (23.6-43.0)	34.8 (25.1-44.5)	48.1 (34.5-61.7)
Negative predictive value	100.0	90.0 (79.3-100.0)	96.4 (89.5-100.0)	88.2 (80.5-95.9)

Cut-off values for scores= MEWS total score ≥ 3 or one parameter ≥ 2, SIRS ≥ 2, SOFA ≥ 2, qSOFA ≥ 2, CI: Confidence Interval, MEWS: Modified Early Warning Score, OR: Odds Ratio, qSOFA: Quick Sepsis-Related Organ Failure Assessment, SIRS: Systemic Inflammatory Response Syndrome, SOFA: Sepsis-Related Organ Failure Assessment

DISCUSSION

In this study, MEWS, SIRS, SOFA, and qSOFA scores were compared regarding hospital mortality prediction among ED and ward patients who required ICU admission with suspected infection. It provides valuable contributions to the literature, as four frequently used early warning and sepsis scores were compared prospectively in the same cohort in the 48-hour period before ICU admission. SOFA at 48 hours prior to ICU admission was the most effective score compared to MEWS, SIRS and qSOFA, which were significantly associated with increased mortality (OR: 13.2, p=0.004) with 92.6% sensitivity. Analysis performed by omitting admission values revealed an AUROC value of 0.80 for SOFA in predicting hospital mortality (p<0.001).

SOFA score was employed to demonstrate organ dysfunction and placed in sepsis definition with Sepsis-3 criteria.[7] In our study, SOFA score had the highest sensitivity and NPV before ICU admission. Its PPV was also the highest in 48h and 24h periods compared to other scores. Thus, besides its diagnostic role, these features make SOFA score a valuable tool for predicting prognosis, especially mortality, in patients with suspected infection admitted to ICU. This superiority of SOFA score over MEWS, SIRS, and qSOFA was compatible with the literature in which AUROC values regarding hospital mortality were reported up to 0.91, 0.70, 0.72, and 0.77, respectively.[12-21,23-28] Despite the high sensitivity, SOFA score had moderate specificity in predicting mortality, which raised doubts about the accuracy of using SOFA in the definition of sepsis. Nevertheless, these concerns should be evaluated within the framework of consensus based on sepsis pathophysiology, not such analysis based on mortality.

In the presented study, qSOFA score cut-off specificity was highest, while sensitivity was lowest in mortality prediction for all periods. These findings are supported by the study conducted with 184 patients admitted to the ED with suspected infection by Garbero et al.[16] that demonstrated sensitivity and specificity values of 56.8% and 74.2% for qSOFA and 93.7% and 25.9% for SOFA. Kim et al.[18] demonstrated sensitivity and specificity values of 61.9% and 58.1% for qSOFA and 99.1% and 4.2% for SOFA among 928 patients with sepsis diagnosis. Similarly, Abdullah et al.[27] observed higher specificity values in qSOFA than SOFA (92.4% and 67.3%, respectively), whereas SOFA had higher sensitivity than qSOFA (61.4% and 19.6%, respectively). Data that is contrary to the usage of qSOFA score as a bedside screening tool to detect patients with suspected sepsis can further be exemplified.[29-32]

Moreover, in the presented study, SIRS had significantly higher sensitivity than qSOFA (85.2% and 44.4%, respectively) even 48 hours before ICU admission. This finding is similar to previous studies that reported up to 60% and 24% sensitivity for SIRS and qSOFA, respectively.[18,32-36] In this regard, it seems that qSOFA and SIRS are insufficient for screening patients with suspected infection who may have a poor prognosis, as argued by previous studies.[29,31,37] Liu et al.[29] recommended the combined use of SIRS and qSOFA to increase screening power.

When compared to MEWS, qSOFA had similar AUROC values with the highest score values observed before ICU admission within the current study (0.65 and 0.63, respectively). In the study of Khwannimit et al.[17] with 1589 patients diagnosed with sepsis, no difference was found between MEWS and qSOFA in terms of AUROC values (0.86 and 0.85, respectively), although the values were higher than our study. Likewise, similar AUROC values for MEWS and qSOFA was reported in several studies in the literature.[35,38-40] Although qSOFA was associated with increased mortality while MEWS was not in logistic regression analysis, sensitivity was higher in MEWS. Due to higher sensitivity, MEWS seems more helpful in detecting deteriorating patients with infection. However, as recent Surviving Sepsis Campaign-2021 guidelines stated, combined use of the prognostic scores could lead the clinicians to more appropriate predictions for deterioration.[11]

Limitations

Main limitation of our study is being a single center study with limited number of patients and short study course. Our patient cohort, though modest in size, was determined based on the specific criteria of our study's focus. Factors such as patient availability, consent, and stringent inclusion criteria played a significant role in shaping our recruitment process. We acknowledge the potential impact of a larger sample size on our results. However, our study offers important preliminary findings and serves as a catalyst for future research in this domain. The five-month study period was meticulously chosen based on expected incidence rates and resource availability. This timeframe was deemed optimal for achieving meaningful data collection within our logistical framework. We did not conduct a formal power analysis as the study aimed at generating hypotheses, due to the heterogeneity of our ICU patient population and the diverse nature of the scoring systems precluding an effect size to base our calculations on. All-cause mortality was accepted as an outcome rather than sepsis-related mortality. This situation limits comparability to studies conducted with sepsis-related scores. Our study population included selected patients due to limited capacity, patient refusals are possible. The definition of suspected infection in our study is broader than the other similar studies ant it may interfere with our findings since the diagnostic exclusion of infection may occur after ICU admission. Finally, not all patients had hospital admissions at least 48 hours before ICU admission. Therefore, analysis omitted the ICU admission values was performed with fewer patients than the total cohort number.

CONCLUSION

SOFA score is a good screening tool to identify patients with suspected infection who may have worse prognosis. The effectiveness of qSOFA score as a screening tool for sepsis suspicion remains controversial as a result of this study. MEWS and SIRS score can predict hospital mortality 48 hours early from ICU admission, and its abandonment with sepsis-3 criteria remains controversial. Thus, the combination of the scoring systems seems to be wise as recommended by Surviving Sepsis Campaign-2021 guidelines.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the Hacettepe University Scientific Researches Ethics Committee (Date: 19.12.2017, Decision No: GO17/948-11).

Informed Consent: All patients signed and free and informed consent form.

Referee Evaluation Process: Externally peer reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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