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ORIGINAL ARTICLE

Comparison of news and sirs score for early recognition of sepsis in medicine department

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ABSTRACT

Background: By alerting doctors and nurses to patients who are deteriorating, an early warning score system enables them to promptly address adverse events. It is not clear as to which scoring system is better in patients with sepsis[16]. Therefore, the current study aimed to compare the predictive accuracy of NEWS and SIRS in terms of early diagnosis of sepsis.

Material and Methods: It was a cross-sectional study, conducted at the General Medicine Department, LUMHS, Hyderabad/Jamshoro, from Aug/2025 till Oct/2025. A total of 105 patients who fulfilled the selection criteria were included. SIRS and NEWS were applied as screening tools for early prediction of sepsis. Sepsis was confirmed based on the Sepsis-3 definition. Findings were noted down and were subjected to statistical analysis.

Results: The median (IQR) age of the patients was 41 (12) years. Sepsis was diagnosed by Sepsis-3 criteria in 58 (55.2%) patients. According to the NEWS, 53 (50.5%) had a high risk of sepsis and according to the SIRS score, 55 (52.4%) patients had a positive SIRS score for sepsis. The sensitivity, specificity, PPV, NPV and predictive accuracy of NEWS keeping Sepsis-3 as diagnostic was 81.2%, 87.1%, 88.7%, 78.7% and 83.8%, respectively, and for SIRS score, it was 75.9%, 76.5%, 79.9%, 72.1% and 76.2%.

Conclusion: For predicting sepsis, NEWS was associated with higher sensitivity, higher specificity and predictive accuracy as compared to SIRS.

Keywords: Critical care, NEWS, Sepsis, SIRS

BACKGROUND

Sepsis is one of the most common causes of morbidity and mortality in the globe. The prognosis for sepsis may be greatly improved by an early diagnosis and rapid treatment.[1] Unfortunately, it can be challenging to diagnose the illness early and accurately. The challenge lies in identifying sepsis early enough to initiate timely intervention, especially in low-resource settings. Fleischmann and colleagues calculated an annual incidence of up to 31 million cases of sepsis with approximately 6 million fatalities using data from a systematic assessment of publications on the epidemiology of sepsis, primarily from resource-rich nations worldwide.[1] In Asia, the prevalence rate of sepsis is 22.4%.[2] Sepsis is the most common diagnosis among the several illnesses (infectious, pulmonary, cardiac, etc.) that contribute to Pakistan's 6.2% in-hospital mortality rate.[3]

The medical world has long struggled to come up with a single, widely accepted classification for this complex clinical disease. According to the third international consensus's most recent definition (Sepsis 3), sepsis is defined as organ dysfunction that poses a threat to life and is caused by the host system's dysregulated reaction to infection. Additionally, "sepsis-3" suggested using new instruments for early detection.[4] The Systemic Inflammatory Response Syndrome (SIRS) criteria were once used to identify and classify sepsis; however, more recent methods, such the "National Early Warning Score (NEWS)," are now routinely used worldwide. Numerous issues have been raised since the introduction of SIRS. First, the low specificity of the SIRS definition constituted a limitation. Second, studies conducted to validate the tool have produced indications of inadequate sensitivity beneath the suggested cut-off and, at best, subpar outcomes regarding general discrimination capacity.[5]

Furthermore, more recent instruments like "NEWS" have reported higher specificity and a higher AUROC than SIRS while maintaining the sensitivity of SIRS.

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However, the scope of these comparisons has been constrained, and they have frequently been combined with a variety of other modalities, with little emphasis on direct comparative evidence between these two.[6] Direct comparative studies between NEWS and SIRS in the early detection of sepsis are scarce, particularly in South Asian and Pakistani hospital settings.

Despite the availability of numerous diagnostic tools and modalities, the incidence and prevalence of sepsis are increasing, particularly in settings with limited resources, such as low-income and middle-income nations.[7] On the treatment front, a similar failure is also observed, with significant mortality rates despite newer therapy approaches.[8] However, the fault still rests on the diagnostic front, which is understandable given that a delayed diagnosis and thus a longer period of untreated sickness contribute to the high death rate.[9,10]

Additionally, the majority of current diagnostic tools are time-consuming and challenging, require a thorough evaluation of several organs, and frequently take up valuable time that could be used for patient treatment. Since NEWS and SIRS are two of the most popular techniques, it is critical to produce direct research-based comparative data to determine which is best for early detection. This could lower rates of morbidity and mortality and help start goal-directed therapy early. Therefore, the current study aimed to compare the predictive accuracy of NEWS and SIRS score in terms of early diagnosis of sepsis.

MATERIAL AND METHODS:

The design of the study was cross-sectional. The study was carried out for three months, from August 2025 to October 2025, at the Department of General Medicine, Liaquat University of Medical and Health Sciences, Hyderabad/ Jamshoro, following approval from the Ethical Review Board (ERC number LUMHS/REC/-1176, dated 17/10/2025). A total of 105 patients who were suspected of having sepsis were included in the study. A sample of 105 patients was calculated, by taking expected sensitivity & specificity of SIRS as 88.1% and 85% respectively[11], while prevalence of sepsis was taken as 43%[12], by keeping 95% confidence interval and a precision of 0.10 and a dropout rate of 10% using Sample Size Calculator by Wan nor Arifin. Non-probability consecutive sampling technique was used. Even though it may limit generalizability to a larger population due to potential biases, we used non-probability consecutive sampling (recruiting all eligible subjects as they become available) for its practicality, speed, and cost-effectiveness, particularly in clinical or specific contexts where accessing a full sampling frame is difficult. This allows for rich, targeted insights into niche groups or exploring feasibility.

Patients of both sexes, ages 18 to 75, who arrived at the emergency room suspected of having sepsis were included in the study. The study excluded patients who did not give consent, had missing data, were lost to follow up, and who left against the medical advice.

Sepsis was defined by the Sepsis-3 criteria as when an infection was verified and the SOFA score rose by more than two points. Sepsis was described as life-threatening organ failure brought on by a dysregulated host response to infection. Suspected sepsis referred to cases where clinical symptoms (e.g., fever, tachycardia, hypotension) and/or laboratory markers raised suspicion of infection, prompting initiation of antibiotics or further diagnostic workup, even before full diagnostic confirmation. Six physiological parameters—respiration rate, oxygen saturation, temperature, systolic blood pressure, heart rate, state of consciousness, and supplemental oxygen use—were used to calculate the NEWS; A number more than five indicated a high risk of sepsis. Standard criteria (temperature, heart rate, respiration rate, and white blood cell count) were used to determine the SIRS score; a score of >2 indicated a positive SIRS.

A total of 105 patients who fulfilled the selection criteria were enrolled in the study after taking written informed consent. Data was collected using a pre-structured questionnaire covering basic biodata, sociodemographic details, disease particulars, and findings from clinical examination. SIRS and NEWS was applied as screening tools for early prediction of sepsis. Sepsis was confirmed based on the Sepsis-3 definition, i.e., the presence of suspected or documented infection along with an increase in the Sequential Organ Failure Assessment (SOFA) score of >2 points from baseline. Findings were noted down and were subjected to statistical analysis.

Data was analyzed using Statistical Package of Social Sciences version 21.0. Normality of data was assessed using Shapiro-wilk test and quantitative data such as age, SIRS score, NEWS score was expressed as median and interquartile range (IQR) as the data was non-normal in distribution. Qualitative data (gender,

residential and socio-economic status, presenting symptoms) was expressed as number and percentage. To calculate sensitivity (Sn), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV) and predictive accuracy, a 2X2 contingency table was used.

RESULTS

There were 105 patients in all. The patients' median (IQR) age was 41.00 (12.00) years. Table-I shows that the median (IQR) NEWS score was 5.00 (6.00) while the median (IQR) SIRS score was 2.00 (2.00) (Table-I). There were 14 (13.3%) patients in the 18–30 age group, 67 (63.8%) in the 31–50 age group, and 24 (22.9%) in the 51–75 age group. There were 54 (51.4%) males and 51 (48.6%) females. Urban residence was reported by 55 (52.4%) patients and 50 (47.6%) patients had rural residence. Socioeconomic status was low in 40 (38.1%) patients, middle in 48 (45.7%) patients and 17 (16.2%) patients belonged to high socioeconomic status. In terms of comorbidity, no comorbidity was seen in 62 (59%) patients, 16 (15.2%) patients had diabetes, 9 (8.6%) patients had cardiovascular disease, 1 (1%) patient had malignancy, 4 (3.8%) patients had renal disease and 13 (12.4%) patients had hypertension. Fever was the presenting symptom in 31 (29.5%) patients, tachycardia was presenting symptom in 9 (8.6%) patients, hypotension was seen in 12 (11.4%) patients, 9 (8.6%) had hypothermia, 16 (15.2%) patients presented with tachypnea, 19 (18.1%) patients presented with altered sensorium and 9 (8.6%) patients presented with decreased urine output. The diagnosis of sepsis was confirmed by Sepsis-3 criteria in 58 (55.2%) patients. According to the NEWS score, 53 (50.5%) had a high risk of sepsis and according to the SIRS score, 55 (52.4%) patients had a positive SIRS score for sepsis (Table-II).

The sensitivity, specificity, PPV, NPV and predictive accuracy of NEWS keeping Sepsis-3 as diagnostic was 81.2%, 87.1%, 88.7%, 78.7% and 83.8%, respectively (Table-III), and for SIRS score, it was 75.9%, 76.5%, 79.9%, 72.1% and 76.2% (Table-IV).

Table-I: Demographics and baseline characteristics (n=105).

Variable	Median (IQR)
Age (in years)	4.00 (12.00)
NEWS Score	5.00 (6.00)
SIRS score	2.00 (2.00)

Table-II: Distribution of sepsis diagnosis according to NEWS and SIRS (n=105)

Variable	Frequency (percentage)
Age group:	
18 to 30 years	14 (13.3%)
31 to 50 years	67 (63.8%)
51 to 75 years	24 (22.9%)
Gender:	
Male	54 (51.4%)
Female	51 (48.6%)
Residential status:	
Urban	55 (52.4%)
Rural	50 (47.6%)
Socioeconomic status:	
Low	40 (38.1%)
Middle	48 (45.7%)
High	17 (16.2%)
Comorbidity:	
None	62 (59%)
Diabetes	16 (15.2%)
Cardiovascular disease	9 (8.6%)
Malignancy	1 (1%)
Renal disease	4 (3.8%)
Hypertension	13 (12.4%)
Presenting symptom:	
Fever	31 (29.5%)
Tachycardia	9 (8.6%)
Hypotension	12 (11.4%)

Hypothermia	9 (8.6%)
Tachypnea	16 (15.2%)
Altered sensorium	19 (18.1%)
Decreased urine output	9 (8.6%)
Confirmed diagnosis of sepsis:	
Yes	58 (55.2%)
No	47 (44.8%)
Sepsis risk according to NEWS:	
Yes	53 (50.5%)
No	52 (49.5%)
Sepsis risk according to SIRS:	
Yes	55 (52.4%)
No	50 (47.6%)

Table-III: Diagnostic accuracy parameters for NEWS (n=105)

Sepsis risk according to NEWS	Confirmed diagnosis of sepsis according to Sepsis-3 criteria	
	Yes	No
Yes	True positive (TP) 47 (44.8%)	False positive (FP) 6 (5.7%)
No	False negative (FN) 11 (10.5%)	True negative (TN) 41 (39%)

Sensitivity=TP/TP+FN x 100=81.2%
Specificity=TN/TN+FP x 100=87.1%
PPV=TP/TP+FP x 100=88.7%
NPV=TN/TN+FN x 100=78.7%
Accuracy= TP+TN/TP+FP+FN+TN =83.8%

Table-IV: Diagnostic accuracy parameters for SIRS (n=105)

Sepsis risk according to SIRS	Confirmed diagnosis of sepsis according to Sepsis-3 criteria	
	Yes	No
Yes	True positive (TP) 44 (41.9%)	False positive (FP) 11 (10.5%)
No	False negative (FN) 14 (13.3%)	True negative (TN) 36 (34.3%)

Sensitivity=TP/TP+FN x 100=75.9%
Specificity=TN/TN+FP x 100=76.5%
PPV=TP/TP+FP x 100=79.9%
NPV=TN/TN+FN x 100=72.1%
Accuracy= TP+TN/TP+FP+FN+TN =76.2%

DISCUSSION

Our study findings revealed that in patients who presented with a suspicion of sepsis, NEWS score had a predictive accuracy of 83.8%, and for SIRS score, it was 76.2%. The majority of the patients in our study were of age group 31 to 50 years, were males, had urban residence, with middle socioeconomic status. The commonest comorbid condition in the participants was diabetes and hypertension and majority of the patients presented with fever, altered sensorium and tachypnea as their chief complaints.

Sepsis is a high-risk illness with significant morbidity and death. [13] It is a syndrome brought on by an infection that causes organ failure and high death rates.[14] Septic patients must be identified and treated as soon as possible.[15,16] As a result, over time, researchers have developed a number of early warning scores that incorporate clinical factors, such as lab findings and vital signs, to produce a value that predicts clinical worsening and reflects the severity of illness.[17,18] The use of these scores as screening tools for sepsis treatment is growing.[19,20] In order to comprehend how these early warning scores help in establishing the diagnosis, the current study was carried out and assessed the predictive accuracy of two scoring systems i.e. NEWS and SIRS for the diagnosis of sepsis keeping Sepsis-3 criteria as diagnostic of sepsis.

In our study, the NEWS score was associated with higher sensitivity, specificity and predictive accuracy compared to SIRS score. The higher specificity of NEWS than SIRS, might be due to the inclusion of more physiological parameters. Thodphetch *et al.* showed that for predicting sepsis, the sensitivity of NEWS score was 96.48%, specificity was 16.95% and accuracy was 60.38% and the sensitivity of SIRS score was 90.85%, specificity was 3.39% and accuracy was 51.15%.[14]

Usman *et al.* in a study revealed that for the detection of sepsis, NEWS had sensitivity of 84.2% and specificity of 85%, whereas, SIRS had sensitivity of 86.1% and specificity of 79.1%.[11] In a study conducted in Turkey, Odunca *et al.* revealed that for the detection of sepsis, NEWS was sensitive in 58% and SIRS was sensitive in 77% patients, whereas, the specificity of NEWS was 81% and of SIRS was 35%.[5] In a study conducted at China, Qiu *et al.* revealed that for predicting sepsis, the sensitivity and specificity of NEWS score was high i.e. 71% and 85% respectively, whereas, SIRS score had high sensitivity i.e. 85% but low specificity i.e. 41%.[13] These findings are consistent with our study results that both NEWS and SIRS scores are associated with high sensitivities for predicting sepsis, but different specificities and NEWS is more specific than SIRS for ruling out sepsis. The SIRS criteria's low specificity for sepsis results from its positive results in numerous non-infectious situations (such as dehydration and trauma). When predicting sepsis, NEWS is better than SIRS in emergency room settings. According to local statistics, improving existing medical scoring systems—or even developing new ones—might be required to further increase forecast accuracy. Potential directions from current study results could include Multi-center studies in Pakistan or South Asia to validate findings, prospective cohort studies to evaluate clinical outcomes associated with NEWS and SIRS implementation, development or refinement of combined scoring tools to further improve early detection accuracy, evaluation of the cost-effectiveness and feasibility of implementing NEWS versus SIRS in emergency departments

CONCLUSION

The current study concluded that for predicting sepsis, NEWS score was associated with higher sensitivity, higher specificity and predictive accuracy as compared to SIRS. Our results proposed that for forecasting sepsis, NEWS is a suitable scoring system screening tool that may speed up triage evaluation. Future studies must be carried out on a larger sample size to validate current study findings.

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LIMITATIONS

The study had certain limitations. Because this study was conducted at a single center and had a small sample size, its findings cannot be broadly applied. Secondly, the score system computations did not consider the patients' known medical conditions, which may have an impact on the course of the disease. And also cause of sepsis, antibiotics given and source control was not assessed in the current study. Finally, only individuals who were suspected of having sepsis at the medical emergency department were included; patients who were misdiagnosed and were found to have sepsis after being admitted were excluded. The actual predictive significance of early warning scores might be more accurately represented by incorporating those patients and establishing a more precise sepsis suspicion threshold.

CONFLICT OF INTEREST

None

GRANT SUPPORT & FINANCIAL DISCLOSURE

Declared none

AUTHOR CONTRIBUTION

Gulzar Fatima: Substantial contributions to study design, acquisition of data, Manuscript drafting, reviewing it critical for important intellectual content, final approval, accountable for all aspects of publication.

Sooraj Kumar: Data collection and interpretation, critical review, final approval, accountable for all aspects of publication.

Lata: Data Collection and interpretation, critical review, final approval, accountable for all aspects of publication.

Muhammad Iqbal Shah: Critical review, final approval, accountable for all aspects of publication.

Poona Bai: Manuscript drafting, reviewing it critical for important intellectual content, final approval, accountable for all aspects of publication.

Hira Sajjad: Reviewing it critical for important intellectual content, final approval, accountable for all aspects of publication.

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