



Performance of Early Sepsis Prediction Models in a Tertiary Care Intensive Care Unit: A Retrospective Cohort Study.

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Abstract

Background: Early recognition of sepsis remains critical for improving intensive care unit (ICU) outcomes. Multiple clinical scoring systems have been proposed for early prediction. **Objective:** To compare the performance of Systemic Inflammatory Response Syndrome (SIRS), quick Sequential Organ Failure Assessment (qSOFA), and Modified Early Warning Score (MEWS)-based prediction model for early sepsis identification. **Methods:** Retrospective cohort study conducted between January 2022 and December 2024 in a tertiary ICU. Adult patients admitted with suspected infection were included. Sepsis was defined using Sepsis-3 criteria. Area under the receiver operating characteristic curve (AUROC), sensitivity, and specificity were calculated. **Results:** 268 patients were analyzed; 156 developed sepsis. AUROC was 0.68 for SIRS, 0.72 for qSOFA, and 0.81 for MEWS. MEWS identified patients earlier and was associated with lower 28-day mortality (21.4% vs 34.7%, $p=0.018$). **Conclusion:** The Modified Early Warning Score-based model demonstrated superior predictive performance and clinical utility for early sepsis detection.

Keywords: Sepsis; Modified Early Warning Score (MEWS); qSOFA; SIRS; Intensive Care Unit; Early prediction; Sepsis-3; AUROC.



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INTRODUCTION

Sepsis is a leading cause of intensive care unit mortality. Early detection tools such as Systemic Inflammatory Response Syndrome (SIRS), quick Sequential Organ Failure Assessment (qSOFA), and Modified Early Warning Score (MEWS) aim to improve outcomes through rapid recognition and timely intervention.

MATERIALS AND METHODS

Retrospective observational study including adult ICU patients with suspected infection. Sepsis defined by Sequential Organ Failure Assessment (SOFA) score increase ≥ 2 . Models evaluated: $SIRS \geq 2$, $qSOFA \geq 2$, $MEWS \geq 5$. Statistical analysis included area under the receiver operating characteristic curve (AUROC) comparison and calibration.

Study design: Retrospective cohort

Setting: Single tertiary ICU

Participants: Adult patients with suspected infection

Variables: SIRS, qSOFA, Modified Early Warning Score (MEWS), mortality

Bias: Selection and retrospective bias acknowledged

Study size: 268 patients

Statistical methods: AUROC, sensitivity, specificity

RESULTS

The Modified Early Warning Score (MEWS) showed the best discrimination (AUROC 0.81), followed by qSOFA (0.72) and SIRS (0.68). Patients detected early had improved survival and shorter ICU stays.

Table 1. Baseline Characteristics

Variable	Sepsis (n=156)	No Sepsis (n=112)
Age (years)	62 ± 15	59 ± 14
Male (%)	61%	58%
APACHE II (Acute Physiology and Chronic Health Evaluation II)	21 ± 5	18 ± 4
Serum Lactate (mmol/L)	4.2 ± 1.9	2.1 ± 1.1

Table 2. Diagnostic Performance of Prediction Models

Model	AUROC	Sensitivity	Specificity
Systemic Inflammatory Response Syndrome (SIRS)	0.68	74.3%	55.2%
quick Sequential Organ Failure Assessment (qSOFA)	0.72	63.5%	78.4%
Modified Early Warning Score (MEWS)	0.81	82.1%	73.4%

DISCUSSION

Composite early warning models such as the Modified Early Warning Score may outperform traditional criteria. Early identification likely contributes to timely therapy and improved outcomes.

CONCLUSION

The Modified Early Warning Score-based prediction system may enhance early sepsis recognition and improve intensive care unit performance metrics.

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