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Development and prospective validation of pediatric sepsis screening tool in a resource-limited setting

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Abstract:

OBJECTIVES: This study aimed to develop and prospectively validate a pragmatic two-stage bedside algorithm, integrating an age-adjusted modified Pediatric Early Warning Score (mPEWS) with the American Academy of Pediatrics (AAP) trigger tool for early recognition of sepsis and septic shock.

METHODS: This prospective study enrolled children admitted to a hospital from August 2020 to January 2022; all admissions aged 1 month–18 years were monitored. Stage-1 alerted when age-adjusted mPEWS is more than 3, plus abnormal temperature or leukocytosis/leukopenia with band form. Stage-2 applied the trigger tool by physicians; dual positivity in both stages defined a positive screening test. Diagnostic test performance was compared and calculated with Sepsis-2 (sepsis), Sepsis-3 (septic shock), Phoenix septic shock definitions, and 30-day mortality.

RESULTS: Among 3202 admissions (1765 patients; median age: 81 months; 54% male), 172 episodes (5.4%) met both stages of the new screening. Compared to the Sepsis-2 criteria, the tool achieved 60.4% sensitivity, 99.1% specificity, 84.3% positive predictive value (PPV), 96.9% negative predictive value (NPV), and area under the curve (AUC) of 0.80. For the Phoenix septic shock definition, sensitivity increased to 100% with 96.2% specificity, 30.2% PPV, 100% NPV, and AUC 0.98. Predicting 30-day mortality yielded 65.0% sensitivity, 95.1% specificity, 13.1% PPV, 99.6% NPV, and AUC 0.80. Screen-positive patients experienced markedly higher in-hospital (24.2% vs. 0.9%) and 30-day (13.1% vs. 0.4%) mortality than those screening negative ($P < 0.001$).

CONCLUSION: The combined mPEWS/APP trigger tool delivers rapid, simple with entirely clinical stratification, and excellent sensitivity for septic shock with high NPV for sepsis and early mortality. Its simplicity and minimal resource requirements make it a practical solution for improving timely sepsis recognition in resource-constrained pediatric settings.

Keywords:

Diagnostic tests, early warning score, pediatric, sepsis

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Introduction

Sepsis represents a significant cause of mortality and morbidity in children. Several studies have consistently demonstrated a rising incidence of sepsis year by year.[1,2] Conversely, sepsis-related mortality rates have significantly declined, largely attributable to the implementation of early recognition and the establishment of standardized guidelines for the management of sepsis and septic shock.[3,4] Pediatric sepsis is distinct from adult sepsis. The International Pediatric Sepsis Consensus

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Box-ED section

What is already known on the study topic?

- Sepsis remains a leading cause of morbidity and mortality, particularly in low- and middle-income countries
- The Phoenix sepsis score is not intended to be used as an early screening tool.

What is the conflict on the issue?

- A simple clinical screening tool improves early recognition of pediatric sepsis and septic shock in a resource-limited setting.

How is this study structured?

- This was a single-center, prospective cohort study that included data from approximately 1765 patients (3202 admissions).

What does this study tell us?

- A two-stage bedside algorithm combining mPEWS and the trigger tool showed high sensitivity for septic shock and excellent negative predictive value for septic shock and mortality
- This validated tool offers a simple, fully clinical, two-stage bedside tool for the timely identification of sepsis and septic shock without relying on laboratory tests.

Conference in 2005 defined pediatric sepsis as the presence of infection plus at least two systemic inflammatory response syndrome (SIRS) criteria.[5] In contrast, Sepsis-3 employed the Sequential Organ Failure Assessment (SOFA) score for mortality risk stratification. However, SOFA has primarily been validated in adult populations from upper-middle-income and high-income countries.[6,7] The pediatric SOFA (pSOFA) score, adapted for age-specific cardiovascular and renal variables, showed strong predictive value for in-hospital mortality.[8] A recent meta-analysis revealed that the pSOFA score was more accurate than qSOFA in predicting mortality, with pooled sensitivity and specificity of 0.82 and 0.62, respectively.[9] Another meta-analysis indicated pSOFA's greater predictive value over the SIRS score for mortality in pediatric patients.[10] Despite these findings, a large retrospective multicenter cohort study showed that pSOFA has high specificity but low sensitivity, limiting its utility as a screening tool in emergency department (ED) settings.[11] Additionally, the calculation of pSOFA is complex and relies on laboratory parameters, which may delay diagnosis, particularly in resource-limited settings.

The Pediatric Early Warning Score (PEWS), which assesses risk based on clinical signs and symptom changes rather than laboratory results, has shown an association with higher risks of intensive care unit (ICU) admission or mortality.[12] PEWS was initially developed and validated to identify hospitalized children at risk of cardiopulmonary arrest or requiring resuscitation. Several studies have reported good sensitivity and specificity for PEWS in these contexts.[13] In adults, modified early warning systems could be independent indicators for shock severity,[14] but a meta-analysis found these systems ineffective for predicting sepsis.[15] A recent retrospective study found that the national early warning score was more accurate than SIRS and qSOFA in detecting adults with septic shock in the ED.[16] Comparisons of seven different PEWS for predicting ICU admission in febrile children in ED showed excellent discrimination for ICU admission and sepsis-related mortality.[17] However, the generalizability of PEWS across different patient populations and healthcare settings remains uncertain, particularly in pediatric sepsis.[18] Our center had developed a modified PEWS (mPEWS) incorporating seven parameters adjusted for age: temperature, systolic blood pressure, pulse rate, respiratory rate, oxygen saturation, capillary refill time, and altered mental status. Practical nurses routinely recorded these mPEWS. The results showed that implementing this system reduced unplanned pediatric ICU admissions by 40%, highlighting the effectiveness of the rapid response system in pediatric wards at our hospital.[19]

In 2017, the American Academy of Pediatrics (AAP) developed a trigger tool for early septic shock recognition, including vital signs, physical examination, and identification of at-risk populations in the ED.[20] Prior study showed a stepwise approach combining electronic health record (EHR)-triggered alerts followed by clinician assessment can potentially shorten sepsis recognition.[21] However, no study on systematic sepsis screening in low and middle-income countries. In addition, the latest surviving sepsis campaign guideline did not mention the sepsis trigger tool in this guideline and also suggested implementing systematic screening for recognition of septic shock with early warning and rapid response system.[22] Therefore, the new screening tool was developed by combining the mPEWS and trigger tool.

Positioning in the Phoenix era: The recently proposed Phoenix pediatric sepsis criteria aim to standardize diagnosis and severity assessment using both clinical and laboratory parameters. In contrast, our two-stage screening tool is designed for early bedside recognition before laboratory confirmation, using only vital signs and focused physical examination. We therefore view this tool as complementary to the Phoenix framework for identifying children who may benefit from urgent clinician assessment and, where resources allow, subsequent Phoenix-based staging and management pathways. This study aimed to develop and validate

a new screening tool to identify pediatric sepsis and septic shock.

Methods

This prospective chart review study was conducted at a tertiary care academic center in Thailand. The registered nurse-to-patient ratio in the general pediatric ward ranged from 1:8 to 1:12. Practical nurses routinely recorded vital signs and fluid intake/output and notified registered nurse when abnormalities were detected. We included pediatric patients aged 1 month to 18 years who were admitted to the hospital from August 2020 to January 2022. This study was approved by the Institutional Review Board (IRB) of the Faculty of Medicine Ramathibodi Hospital, Mahidol University in Thailand, with the approval number COA. MURA 2020/1135. This study followed the Strengthening the Reporting of Observational studies in Epidemiology reporting checklist for a cohort study.

We developed a new screening tool by integrating the AAP trigger tool with the mPEWS. Practical nurses recorded data for all admitted pediatric patients using the mPEWS by age [Table 1]. In our hospital, a practical nurse is a vocationally trained nurse with 1 year of training who works under registered nurse supervision. Duties include vital sign monitoring, fluid balance recording, and first-stage mPEWS scoring, with prompt notification to senior staff when thresholds are exceeded. A first stage was triggered for a mPEWS score >3, accompanied by one of the following: abnormal temperature (body temperature <36 °C or >38 °C) or abnormal white blood cell count (<4,000 or >12,000, and band form >10%). Sensitivity analysis showed that mPEWS ≥3 provided the best balance between sensitivity and specificity (Youden index 0.84) [Supplementary Table 1]. Therefore, ≥3 was selected as the optimal cutoff for the first-stage screen. A positive first stage prompted physician activation and used the trigger tool checklist as a second stage. Second-stage physician trigger checklist. The physician checklist comprised 8 bedside items: (1) temperature instability, (2) age-specific systolic hypotension, (3) tachycardia out of proportion to fever/pain, (4) tachypnea with increased work of breathing, (5) capillary refill >3 s, (6) altered mental status, (7) weak pulses, and (8) mottling or cool extremities. Patients with suspected high-risk infection (e.g. immunocompromised state or indwelling device) were included. A positive second-stage screen was defined as the presence of ≥3 items or >2 items plus a high-risk infection as endorsed by the evaluating physician. Patients with positive alerts at both stages were classified as having a positive screening result, as shown in Figure 1.

Definitions

Sepsis-2 is defined according to the 2005 International Sepsis Definitions Conference.[5] Septic shock is defined as a state of persistent hypotension in sepsis patients, despite adequate volume resuscitation with fluid of more than 40–60 mL/kg.

Sepsis 3 describes life-threatening organ dysfunction caused by a dysregulated host response to infection, and septic shock by Sepsis-3 definition is sepsis patients with hypotension requiring vasopressors and serum lactate above 2 mmol/L despite adequate volume resuscitation.[6]

The Phoenix septic shock definition is sepsis with >1 point in the cardiovascular system, which includes severe hypotension for age, a venous or arterial blood lactate value of more than 5 mmol/L or a need for vasoactive medication.[23]

Statistical analyses

Data were analyzed using SPSS version 20.0 (IBM Corporation, Armonk, New York, USA). We presented data as mean ± standard deviations or median with interquartile ranges (IQRs), as appropriate. Categorical variables were compared using the Chi-square or Fisher's exact test, while continuous variables were compared using the Student's *t*-test or Mann–Whitney *U*-test, depending on the distribution normality. The sample size was estimated based on an expected sensitivity of 80%, a sepsis prevalence of 5%, and a 95% confidence interval (CI) with ± 10% precision (α =0.05). This required 62 sepsis cases, corresponding to a total of 1240 participants, which was increased by 10% to 1365 to allow for incomplete data. All admitted pediatric patients

Table 1: The modified pediatric early warning signs for children aged 1 month to 1 year (first stage)

Physiological parameters	RR (/min)	SpO_2 (%)	Temperature (°C)	SBP (mm/Hg)	PR (/min)	CRT (s)	Altered mental status
Score							
3	<30	<80			<80		Unresponsive
2		80–84		<60			Lethargic
1		85–94	<36	60–69	80–99		
0	30–40	>95	36–38.5	70–79	100–160	<2	Active/awake
1			>38.5	80–99	161–179	>2	Irritable
2	41–50			100–110	180–190		
3	>50			>110	>190		

RR: Respiratory rate, SpO_2: Oxygen saturation, SBP: Systolic blood pressure, PR: Pulse rate, CRT: Capillary refill time

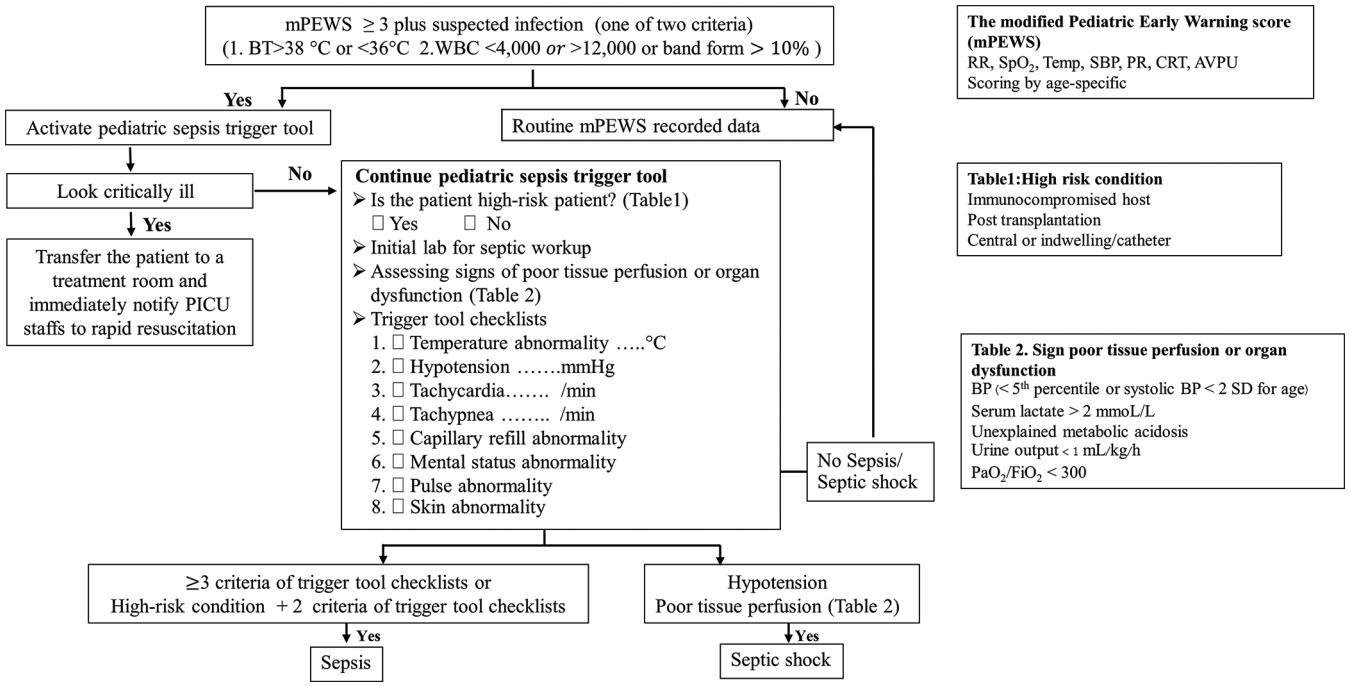

Figure 1: The screening tool (first and second stage)

during the study period were consecutively included, and the final sample size of 3202 admissions exceeded the calculated requirement. The diagnostic performance of the test was assessed by calculating sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). The CIs for these estimates were determined using the Clopper-Pearson method. Receiver operating characteristic (ROC) curves were generated, and the area under the curve (AUC) was calculated to evaluate the overall diagnostic accuracy of the test. Optimal cut-off values were determined by maximizing the Youden index with an AUROC of 0.5 indicating no discrimination, 0.5–0.7 indicating poor discrimination, 0.7–0.8 considered acceptable, 0.8–0.9 regarded as excellent, and >0.9 deemed outstanding. For comparison of the diagnostic test results with the gold standard, Cohen's kappa coefficient was calculated to assess the agreement beyond chance. A κ = 0–0.20 was considered slight agreement, 0.21–0.40 fair agreement, 0.41–0.60 moderate agreement, 0.61–0.80 substantial agreement, and 0.81–1.00 almost perfect diagnostic agreement.[24] $P < 0.05$ was considered statistically significant.

Results

During the study, 1765 patients were admitted to the hospital, accounting for 3202 admission episodes. Of these, 379 episodes triggered the first stage. A total of 172 episodes (5.37%) from 99 patients activated both the first and second stages, indicating a positive screening tool [Figure 2]. The demographic and clinical characteristics are summarized in Table 2. The median age was 81 months, and 954 patients (54%) were male. The most common comorbidities were gastrointestinal, respiratory, and hematology, respectively. Hemocultures were positive for 64 patients (3.6%), and any site infection for 401 patients (22.7%). The overall 30-day mortality was 1.13%, representing 20 out of 1765 patients. The 30-day mortality rates for patients identified by the Sepsis-2 definition, the positive screening tool, the Phoenix septic shock, and the Sepsis-3 definition were 9.15% (14 of 153 patients), 13.1% (13 of 99 patients), 25.6% (10 of 39 patients), and 28.6% (12 of 42 patients), respectively.

The median 1st h of fluid resuscitation volume was 40 mL/kg (IQR 38.7–45) in the Sepsis-2 group, 40 mL/kg (IQR 40–50) in the Sepsis-3, and 40 mL/kg (IQR 40–50) in the Phoenix septic shock group. Corresponding median initial lactate levels were 1.8 mmol/L (IQR 1.2–2.4), 3.2 mmol/L (IQR 1.4–3.9), and 4.7 mmol/L (IQR 1.4–4.5), respectively. Both fluid resuscitation volume and initial lactate levels were significantly higher in the Phoenix septic shock group and Sepsis-3 compared with the Sepsis-2 ($P < 0.05$).

The diagnostic test performance (sensitivity, specificity, PPV, NPV, and prevalence) of the screening tool across each reference definition (Sepsis-2, Sepsis-3, and Phoenix septic shock criteria) and an additional exploratory prognostic performance (30-day mortality) were presented in Table 3. The agreement between the screening tool and the Sepsis-3 definition and Phoenix septic shock was moderate (κ =0.52 and κ =0.53,

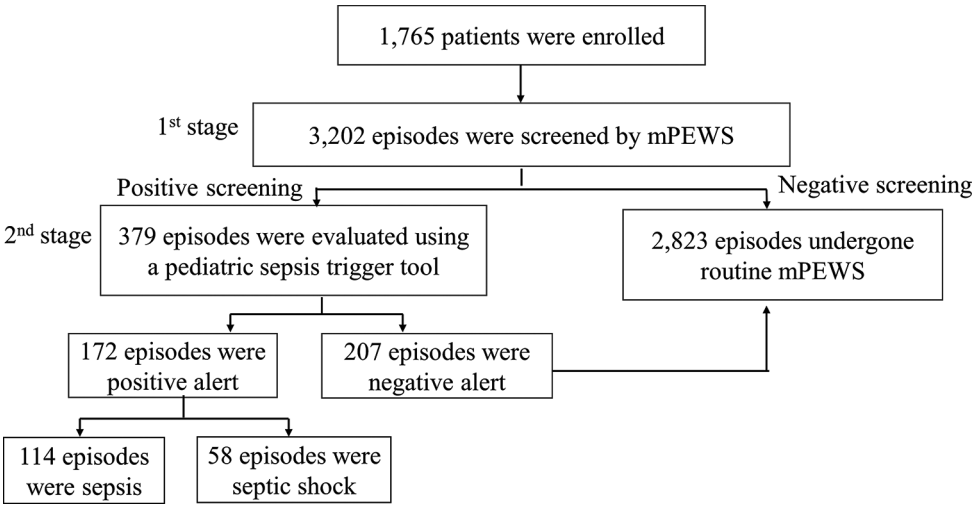

Figure 2: Flow chart of the new screening tool

Table 2: Demographic data and outcomes of included patients

Variables	Negative screening tool (*n*=1666)	Positive screening tool (*n*=99)	*P*
Gender, male (%)	906 (54.4)	48 (48.5)	0.256
Age (month)	68 (24–130)	80 (24–142)	0.381
Comorbidities, *n* (%)			
Healthy	222 (13.3)	6 (6.1)	0.006*
Respiratory	206 (12.4)	20 (20.2)	
Hematology	198 (11.9)	23 (23.2)	
Gastrointestinal	284 (17.0)	4 (4.0)	
Neurology	176 (10.6)	6 (6.1)	
Oncology	123 (7.4)	8 (8.1)	
Cardiovascular	124 (7.4)	5 (5.0)	
Others	333 (20.0)	27 (27.3)	
Source of infection, *n* (%)			
Blood	29 (1.7)	35 (35.4)	<0.001*
Lungs	207 (12.4)	27 (27.3)	
UTI	59 (3.5)	7 (7.1)	
Abdomen	66 (4.0)	3 (3.0)	
Other	25 (1.5)	7 (7.0)	
None	1280 (76.8)	20 (20.2)	
mPEW score	1 (1–2)	5 (3–6)	<0.001*
Hospital stays (day)	2 (1–5)	7 (3–20)	<0.001*

*P<0.05. UTI: Urinary tract infection, mPEW: Modified pediatric early warning

$P < 0.001$), while agreement with the Sepsis-2 definition was substantial ($\kappa = 0.65$, $P < 0.001$). The screening tool had higher sensitivity, specificity, and NPV of over 90% with the Sepsis-3 and Phoenix septic shock definition. Assessing the test's predictive capability for 30-day mortality, we found a sensitivity of 65%, specificity of 95.1%, PPV of 13.1%, and NPV of 99.6% with ROC AUC of 0.8. The false positive rate was 4.9%, and the false negative rate was 35%. The survival curve showed the comparative mortality risk between nonsepsis patients, those identified with sepsis by the new screening tool, and septic shock patients is presented in Figure 3. The Kaplan–Meier analysis showed significantly lower survival among children with positive screening results compared with those screening negative. Screen-positive patients had a higher 30-day mortality rate.

Discussion

This study addresses a critical gap in pediatric sepsis by developing and validating a screening tool for limited-resource settings. To our knowledge, this is the first in-hospital pediatric sepsis screening tool published and evaluated in the Asian population. Our results demonstrated that the sepsis screening tool, which combines a mPEWS with a sepsis trigger tool, exhibited high sensitivity (91.4%) and specificity (96.2%) in identifying septic shock as per Sepsis-3 criteria. These performance metrics corresponded to a 25-fold increase in in-hospital mortality (24.2% vs. 0.9%) and a 33-fold increase in 30-day mortality (13.1% vs. 0.4%) among screen-positive patients, highlighting the tool's effectiveness in identifying patients who require urgent escalation of care. Previous studies showed the varying performance of early warning scores and other sepsis screening tools across different healthcare settings and patient populations.[25] Our tool is designed for ease of use, relying on readily observable clinical signs rather than extensive laboratory testing.

PEWS has repeatedly shown association with clinical deterioration, ICU transfer, and mortality in hospitalized children, and has performed favorably compared with SIRS and qSOFA in pediatric cohorts. In our setting, we implemented an age-adjusted mPEWS that retains the core PEWS domains (vital signs, mental status, and perfusion) while using age-specific thresholds for heart rate and systolic blood pressure. This modification, previously implemented at our hospital, enables nurse-led, ward-level surveillance without laboratory

Table 3: Diagnostic performance of the screening tool compared with Sepsis-2, Sepsis-3, Phoenix septic shock, and exploratory 30-day mortality outcome

	Sensitivity, % (95% CI)	Specificity, % (95% CI)	PPV, % (95% CI)	NPV, % (95% CI)	ROC AUC	Prevalence (%)
Sepsis-2	60.4 (53.9–66.6)	99.1 (98.7–99.4)	84.3 (78.0–89.4)	96.9 (96.2–97.5)	0.80 (0.77–0.83)	8.7
Sepsis-3	91.4 (81.0–97.1)	96.2 (95.0–96.9)	30.8 (24.0–38.3)	99.8 (99.6–99.9)	0.94 (0.90–0.97)	2.4
Phoenix septic shock	100 (93.1–100)	96.2 (95.5–96.8)	30.2 (26.7–34.1)	100 (99.8–100)	0.98 (0.97–0.99)	2.2
30-day mortality	65.0 (40.8–84.6)	95.1 (93.9–96.0)	13.1 (7.2–21.4)	99.6 (99.1–99.8)	0.80 (0.69–0.91)	1.13

PPV: Positive predictive value, NPV: Negative predictive value, ROC AUC: Receiver Operating characteristic area under the curve, CI: Confidence interval

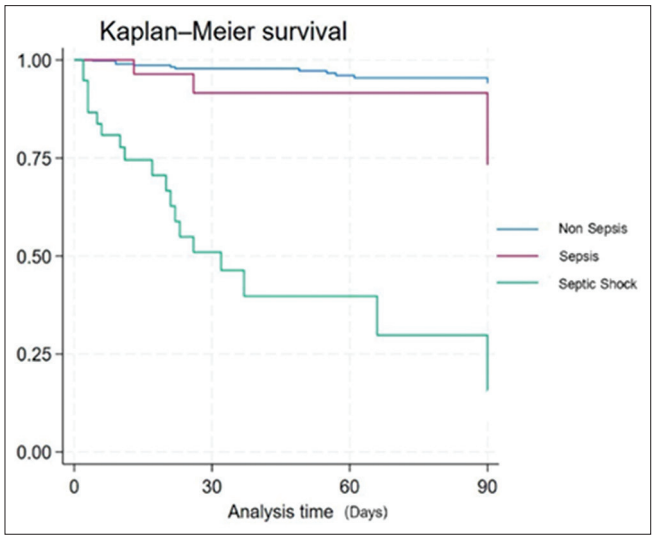

Figure 3: The survival curve of the screening tool versus the 30-day mortality

dependencies. In this study, mPEWS served as the first-stage screen in a two-stage sepsis algorithm. We selected the mPEWS because its fully clinical components allow frequent bedside assessment by ward nurses with minimal training. To enhance specificity and reduce false alarms common to PEWS alone, we required dual positivity – defined as mPEWS ≥3 combined with a positive physician trigger checklist. This stepwise design preserved sensitivity for septic shock while improving reliability through clinical confirmation before escalation. Our results compare favorably to laboratory-based scores. A recent meta-analysis reported a pooled sensitivity of pSOFA of approximately 82%, with comparable specificity. However, it requires serum chemistries and blood gases that may be delayed or unavailable in many low- and middle-income hospitals.[10] Moreover, a large US ED cohort found that pSOFA ≥2 identified fewer than half of the children who ultimately died, despite demonstrating high specificity.[11] Our screening test used only vital signs and a structured checklist. It detected septic shock more sensitively than pSOFA and did not require urgent lab tests.

Traditional PEWS alone have shown good sensitivity but modest specificity for critical deterioration in multicenter validation studies.[26,27] Raising the mPEWS threshold >3 and requiring a confirmatory trigger checklist preserved sensitivity for shock while increasing specificity over 95%. This balance mitigates the high false-alarm burden that limits stand-alone PEWS in routine ward monitoring.

When benchmarked against Sepsis-2 criteria, which are not directly associated with organ dysfunction and mortality, our screening tool demonstrated high specificity (99.1%), high PPV (84.3%), and high NPV (96.9%). However, it showed low sensitivity (60.4%), indicating a higher rate of false negatives (95 out of 240 episodes). According to the Sepsis-2 definition, sepsis is diagnosed when a patient has at least two SIRS criteria along with evidence of infection, either confirmed by positive culture or based on clinical signs suggestive of infection. Our screening found that among the 240 episodes meeting Sepsis-2 criteria, only 157 had proven infections based on positive blood cultures, pathogen identification, or positive imaging findings. This implies that 83 out of 240 episodes classified as sepsis under Sepsis-2 criteria did not have a true infection. Therefore, the diagnosis based on the sepsis screening defined by Sepsis-2 criteria may lead to overdiagnosis, potentially resulting in alarm fatigue and poorer patient outcomes.

Our screening tool exhibited both high sensitivity and specificity when compared to Sepsis-3 and Phoenix septic shock criteria in the subgroup of pediatric patients with septic shock. This performance suggested that the tool was effective in identifying severe manifestations of sepsis, consistent with the Sepsis-3 and Phoenix septic shock criteria's emphasis on organ dysfunction and septic shock as key diagnostic features.[6] However, the relatively low PPV reflected a lower prevalence of septic shock in our population. In evaluating the tool's predictive performance for 30-day mortality, the high specificity (95.1%) and excellent NPV (99.6%) suggested strong reliability in ruling out mortality risk, which was crucial for avoiding unnecessary interventions and efficiently allocating medical resources. However, the sensitivity was moderate (65%), indicating that one-third of patients who died were not flagged as high risk. In addition, the low PPV (13.1%) further reflected a high rate of false positives, likely a consequence of the low overall mortality rate in our cohort. These findings suggested this tool was more effective for excluding mortality risk than confirming it, making

it suitable as a triage aid rather than a definitive prognostic tool. False-positive cases most often involved transient tachycardia associated with fever or isolated leukocytosis without subsequent organ dysfunction; these children typically improved with antipyretics and fluid therapy alone. False-negative cases occurred when vital signs were recorded during transient stability or when progression to shock developed after the initial assessment. Reinforcing repeated mPEWS assessments and escalation for clinician concern may help reduce such missed detections.

Within the Phoenix framework, our algorithm may function as the frontline trigger for timely clinician evaluation and initiation of sepsis management bundles, particularly in settings with delayed laboratory availability. This positioning preserves Phoenix's strengths in diagnosis and severity grading, while addressing a critical gap in early recognition in resource-limited pediatric wards.

Limitations

This study has several limitations. First, it was conducted at a single pediatric center, which may limit its generalizability. The tool's performance may vary across healthcare settings. In primary-level wards with limited physician coverage, the second-stage screening may be supported through teleconsultation, whereas tertiary centers may integrate positive screens directly with Phoenix-guided management. Despite these contextual differences, reliance on bedside clinical signs supports broad applicability. Local recalibration of the mPEWS threshold after implementation is advisable to maintain optimal accuracy. Future studies should consider a multicenter design to enhance external validity. Second, the PEWS cutoffs used in this study were based on institutional practice rather than established evidence, and different PEWS thresholds may yield different outcomes. Finally, although our tool aimed to improve early recognition and timely identification of sepsis, this study could not determine whether improved outcomes, such as reduced mortality, were directly attributable to enhanced recognition or adherence to guideline-based treatment protocols.

Conclusion

Our study introduces a new pediatric sepsis screening tool with demonstrated high sensitivity and specificity. Its implementation has the potential to advance early diagnosis and treatment of sepsis, thereby improving outcomes in resource-limited healthcare settings.

Author contribution

Artprom N and Anantasit N conceptualized and designed the study. Artprom N data curation and formal analysis. Anantasit N Supervision. Artprom N and Anantasit N drafted and wrote the initial manuscript. Artprom N, Vaewpanich J, Puttiteerachot P, Uppala R, and Anantasit N critically revised the manuscript for important intellectual content. All authors read and approved the final version of the manuscript.

Conflicts of interest

None Declared.

Ethics approval

We obtained ethical approval from the Ethical Approval from Institutional Review Board. The IRB numbers were COA. MURA2020/1135 (Committee on Human Rights Related to Research Involving Human Subjects, Faculty of Medicine Ramathibodi Hospital, Mahidol University) date of approval 16 January 2020.

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Supplementary Table 1: Diagnostic performance of various modified pediatric early warning thresholds for predicting septic shock

mPEWS cutoff	Sensitivity (%)	Specificity (%)	AUC	Youden Index
>2	100	51.69	0.758	0.52
>3	100	83.65	0.918	0.84
>4	67.24	92.37	0.798	0.59

AUC: Area under the curve, mPEW: Modified pediatric early warning