Using a Sepsis Screening Tool in Triage in the Pediatric Emergency Department

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Background and Significance

- The clinical **definition of pediatric sepsis** is "two or more systemic inflammatory response syndrome criteria, confirmed or suspected invasive infection, and cardiovascular dysfunction, acute respiratory distress syndrome, or two or more organ dysfunction." [1]
- There are 72,000 pediatric hospitalizations per year with a **25% mortality rate.**[1]
- Early recognition of pediatric sepsis and prompt treatment of the condition is essential for best outcomes.[2]
- **Challenges to recognition** include reliance on nurse and provider judgement,[1] having no set standards for pediatric sepsis screening,[3] and more subtle signs and symptoms of early stages of sepsis in children as compared to adults.[2]

Purpose/PICOT

In pediatric patients being seen in the emergency department, does the use of an electronic sepsis screening tool by nurses in triage improve the early detection of sepsis in the emergency department compared to conducting the triage assessment without a sepsis screening tool?

Methods

- **Database**: PubMed
- **Keywords**: "pediatric sepsis screening tool," "pediatric sepsis screening emergency department"
- **Inclusion Criteria**: published within the last 7 years (2015-2022), setting must be in the ED, screening tool criteria must use data readily available at triage in the ED
- **Number of articles reviewed**: 23 articles
- **Results**: 5 articles met the inclusion criteria and were used in the literature review

Evidence Summary

Components of a Pediatric Sepsis Screening Tool:

- Age-based vital signs [4,5,6,7,8]
- Mental status exam[4,5,6,7]
- Capillary refill time[4,5,6,7]
- Respiratory assessment[6,7]
- Integumentary assessment[6,7]
- Clinician judgment[4,6,7]
- Presence of high-risk conditions[4,6]
- Lab values including white blood cell, platelet, INR, ALT, and serum creatinine levels[5]

Author (Year)	Type of Study	Sample Size	Results	Level of Evidence[9]	Quality Rating[10]
Balamuth et al. (2017)[4]	Cohort study	n=182,509	This sepsis screening tool was found to have an 82% sensitivity and 99.1% specificity. When clinician judgment was added, the sensitivity increased to 99.4%. PPV was 25.4%, and NPV was 100%. The tool increased the sepsis recognition rate from 83% to 96%.	4	B
Eisenberg et al. (2019)[5]	Cohort study	n=29,010	Sensitivity for a sepsis alert being triggered within 12-48hrs of onset of sepsis was 72%. The specificity of this sepsis screening tool was 91.8%. PPV was 8.1%, and NPV was 99.7%. The tool recognized 72% of sepsis patients prior to onset.	4	B
Gomes et al. (2021)[6]	Cohort study	n=19,912	Sensitivity of the screening tool was 86.7%. Specificity of tool was 87.0% and increased to 99.6% with clinician judgment. PPV was 46.4%, and NPV was 99.9%.	4	B
Lloyd et al. (2018)[7]	Cohort study	n=29	100% of septic patients who were recognized with a manual sepsis screening tool were also recognized with the automated one. The automated tool identified these patients, on average, 68 minutes earlier than the manual one	4	C
Scott et al. (2015)[8]	Cohort study	^0N	This vital sign only screening tool did not predict the onset of sepsis in ED patients which would require critical care. 81.6% of patients that were flagged were able to be discharged home from the ED.	4	B

Notes. PPV=positive predictive value. NPV= negative predictive value.

Summary and Conclusion

- Four of the five articles concluded that a pediatric sepsis screening tool can improve recognition of pediatric sepsis and decrease time to treatment in septic patients.[4,5,6,7]
- All five studies were cohort studies, but it is ethically challenging to produce higher levels on evidence doing a real-time study in the ED.
- Overall, the use of a pediatric sepsis screening tool has shown promising results in the early identification of pediatric sepsis in the ED, but more research is needed before a practice change should be made.
- Further research should focus in refining a sepsis screening tool for pediatrics. Once refined, the tool should also be validated in a wide variety of ED settings.

Implications for Nursing Practice and the CNL Role

Implications for Nursing Practice

- Further research should be conducted using age-based vital signs, mental status exam, focused respiratory exam, capillary refill time, presence of sepsis risk factors, and clinician judgment to refine a pediatric sepsis screening tool.
- Validate research findings in real-time and a wide variety of ED settings from community hospitals to trauma centers.

Implications for the CNL Role

- The CNL conducts research to improve patient outcomes and implement evidence-based practice to improve quality of care.[11]
- CNL can use their role as a researcher to help refine this tool as it has strong potential to improve patient outcomes.
- The CNL should stay up to date on best practices regarding pediatric sepsis screening and treatment in the ED and implement best practice in the clinical setting.

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References