

**Table 3: Evidence for Having a Protocol to Identify and Treat Children with Sepsis Syndrome in the Emergency Department**

| Type of Evidence           | Key Findings  | Level of Evidence (USPSTF Ranking*) | Citations   |
|----------------------------|---|-------------------------------------|---|
| <b>Clinical guidelines</b> | <p>Recommendation: Performance improvement efforts in severe sepsis should be used to improve patient outcomes (ungraded recommendation). Rationale: The goal of a severe sepsis improvement program is better patient outcomes resulting from increased compliance with sepsis quality indicators. Sepsis management requires a multidisciplinary team and multispecialty collaboration to maximize the patient's chance for success. Evaluation of process change requires consistent education, protocol development and implementation, data collection, measurement of indicators, and feedback to facilitate continuous performance improvement. Protocol implementation associated with education and performance feedback has been shown to change clinician behavior and is associated with improved outcomes and cost effectiveness in severe sepsis.</p> | III                                 | Dellinger RP, Levy MM, Rhodes A, et al. Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock. <i>Crit Care Med</i> 2013; 41(2): 580-637.                  |
| <b>Clinical overview</b>   | <p>Protocol development and performance assessment are key aspects of an institutional improvement initiative and are vital to the success of the Surviving Sepsis Campaign (SSC). Because rapid and appropriate treatment is likely to improve outcomes, early recognition of severe sepsis and septic shock is important. Patient risk assessment based on epidemiologic considerations, screening tool results, and scoring systems can be helpful in determining whether a patient has severe sepsis or septic shock and what intervention is appropriate. Once a diagnosis is established, tasks in the SSC and the Institute for Healthcare Improvement (IHI) sepsis resuscitation bundle should be performed as quickly as possible within 6 hours.</p>  | III                                 | Rivers EP, Ahrens T. Improving outcomes for severe sepsis and septic shock: Tools for early identification of at-risk patients and treatment protocol implementation. <i>Crit Care Clin</i> 2008; S1-S47. |

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|--------------------------------|---|-------------------------------------|--|
| <b>Clinical research study</b> | <p>Researchers implemented an ED protocol intended to facilitate recognition of septic shock and adherence to national treatment guidelines. To improve sepsis recognition, a computerized triage system alerted clinicians to children with abnormal vital signs; toxic-appearing children or children at high risk for invasive infection were placed in a resuscitation room. To facilitate timely delivery of interventions, additional nursing, respiratory therapy, and pharmacy personnel were recruited. Fluids were administered via syringe delivery; standardized laboratory studies and antibiotics were ordered and prioritized. Frequent vital sign measurements and interventions were documented on a graphical flow sheet to interpret physiologic responses to therapy. Compared with children treated before the protocol, time from triage to first bolus decreased from a median of 56 to 22 minutes and triage to first antibiotics decreased from a median of 130 to 38 minutes. [p. e758]</p> |                                     | <p>Cruz AT, Perry AM, Williams EA, et al. Implementation of goal-directed therapy for children with suspected sepsis in the emergency department. <i>Pediatrics</i> 2011; 127(3); e758-766</p> |
| <b>Clinical research study</b> | <p>The authors hypothesized that a septic shock protocol and care guideline would expedite identification of septic shock, increase compliance with recommended therapies, and improve outcomes. Following implementation of the protocol, gains in care included more complete recording of triage vital signs, timely fluid resuscitation and antibiotic administration, and serum lactate determination. Median length of stay also decreased over the course of the study from 181 to 140 hours.</p> <p>The protocol emphasized recognition during ED triage, which requires excellent observation skills, knowledge of age-appropriate vital signs, and a complete assessment of vital signs and physical findings indicative of shock [p. e1590]</p>  |                                     | <p>Larsen GY, Mecham N, Greenberg R. An emergency department septic shock protocol and care guideline for children initiated at triage. <i>Pediatrics</i> 2011; 127(6):e1585-e1592</p>         |

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|---|--|-------------------------------------|--|
| <b>Prospective interventional study</b> | <p>This study sought to determine the effectiveness of implementing early goal-directed therapy (EGDT) as a routine protocol in the ED for early treatment of severe sepsis and septic shock.</p> <p>Implementation of an EGDT algorithm resulted in a 9% absolute and 33% relative reduction in mortality, suggesting a number needed to treat (1/absolute mortality reduction) of approximately 11 persons. This mortality benefit was found among a group of patients with at least equal hemodynamic instability based on systolic blood pressure and sequential organ failure scores measured at enrollment.</p>  |                                     | <p>Jones AE, Focht A, Horton JM, Kline JA. Prospective external validation of the clinical effectiveness of an emergency department-based early goal-directed therapy protocol for severe sepsis and septic shock. <i>Chest</i> 2007; 132(2):425-432.</p>  |
| <b>Clinical research study</b>          | <p>Non-use of goals-and-treatment protocols is one of the most important barriers to adequate treatment for children with severe sepsis and septic shock. Other barriers included lack of adequate vascular access, lack of early recognition, and a shortage of health care providers.</p> <p>Lack of clinical protocols and treatment goals can limit changes in physician behavior. In this study, physicians were aware of the ACCM/PALS guidelines, but nurses were less so. In addition, many nurses did not know why patients were receiving time- and fluid-sensitive treatment, which the researchers felt might explain the failure to attain at least 40 mL/kg dose of fluid infusion in the first hour of shock treatment. The authors recommended a focus on nurse education, emphasizing the critical role of good vascular access and teamwork.</p> | III                                 | <p>Oliveira CF, Nogueira de Sá FR, Oliveira DSF, et al. Time- and fluid-sensitive resuscitation for hemodynamic support of children in septic shock: Barriers to the implementation of the American College of Critical Care Medicine/Pediatric Advanced Life Support Guidelines in a pediatric intensive care unit in a developing world. <i>Pediatr Emerg Care</i> 2008; 24(12):810-815.</p> |

*Note: USPSTF criteria for assessing evidence at the individual study level are as follows: I) Properly powered and conducted randomized controlled trial (RCT); well-conducted systematic review or meta-analysis of homogeneous RCTs. II) Well-designed cohort or case-control analytic study. III) Opinions of respected authorities, based on clinical experience; descriptive studies or case reports; reports of expert committees.*