Use of In-Situ Simulation to Evaluate and Modify Organizational Infrastructure and Processes Prior to Implementation of a Pediatric Sepsis Recognition Tool in a Community Hospital

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Background

Sepsis is a leading cause of death in hospitalized children, and almost 5,000 children die each year from sepsis. Early recognition and treatment greatly reduces morbidity and mortality. The Multidisciplinary Cone Health Pediatric Sepsis Taskforce developed tools to help with early identification and treatment for children presenting to the Pediatric Emergency Department (ED) with the goal of improving patient outcomes. Processes needed to be evaluated and modified prior to implementation with live patients. Simulation is useful in testing quality improvement processes and system changes prior to implementation. Using simulation within the hospital’s working infrastructure (in-situ) can identify potential safety hazards or delays without jeopardizing patient care.

Objectives

- Improve system processes to decrease the time to identify children at high risk for sepsis through the use of simulation.
- Time to huddle with ED physician
- Time to order set activation
- Improve system processes to decrease time to providing definitive treatment for septic children through the use of simulation.
- Overall time to stabilization (intubation) in the ED
- Length of stay in ED

Methods

- The Cone Health Pediatric Sepsis Taskforce identified specific metrics of a “code sepsis” to determine timeliness of team response.
- Recognition and treatment tools were evaluated using PDSA cycles, Lean methodology and in-situ high-fidelity simulation.
- Quality Department performed time studies to identify delays that could impact timely treatment.
- In addition to the code sepsis team responders and QI specialists, representatives from IT, pharmacy and leadership were also present at the simulation to further understand real-time issues.
- Simulation 1 occurred prior to tool implementation.
- Process delays and barriers were addressed prior to simulation 2, which occurred 5 months after implementation.
- Time study metrics were compared between Sim 1 and Sim 2.

Discussion

Recognition and treatment of sepsis in the pediatric population is often delayed, since signs of sepsis such as tachycardia and fever are present with many common pediatric illnesses. Using in-situ simulation to evaluate recognition tools, order sets, and systems prior to implementation improves processes and ensures patient safety.

As a result of the time study data and participant feedback, barriers including delays and inconsistencies in the notification system, unclear computer prompts, and missing equipment were identified. A multidisciplinary team of physicians and nurses from the emergency department, inpatient pediatric department and Pediatric Intensive Care Unit, pharmacists, Information Technology Specialists, and educators engaged in an outcome-driven, patient-centered discussion to address the identified barriers.

Comparison SIM 1 to SIM 2

<table>
<thead>
<tr>
<th>Metric</th>
<th>SIM 1</th>
<th>SIM 2</th>
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</thead>
<tbody>
<tr>
<td>Minutes</td>
<td>50</td>
<td>45</td>
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<tr>
<td>Time to “patient” arrival to the triage area</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Time to order set activation</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Time to stabilize (intubate) the “patient”</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Total simulation time</td>
<td>45</td>
<td>40</td>
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</tbody>
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Outcomes

- Time to “patient” arrival to the triage area to completion of the huddle with the ED physician decreased by 5 minutes and 46 seconds (49% improvement).
- Time to order set activation (recognition of sepsis) decreased by 6 minutes and 23 seconds (38% improvement).
- Time to stabilize (intubate) the “patient” decreased by 14 minutes 5 seconds (45 % improvement).
- The total simulation time (ED length of stay) including recognition and definitive treatment decreased by 14 minutes and 50 seconds (31% improvement).

Next Steps

As a result of this work, nursing team members created a sepsis workflow document to ensure all caregivers follow a systematic approach to implement key interventions in a timely manner. Following in-situ simulation, a similar workflow document is in development for use in the adult inpatient population. Simulation is scheduled to take place later this year to evaluate identification of potential sepsis in the pre-hospital setting and emergency medical services communication and hand-off to the ED care team.

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Resources


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