Three-tiered Approach to Reduce Adult Sepsis Mortality and Morbidity through Early Identification and Initial Resuscitation of Adults in the ED

Sinai Hospital of Baltimore

Program/Project Description.
1. Improve outcomes associated with sepsis - Mortality and ALOS
2. Improve compliance with the established indicators
   a. Serum lactate
   b. Blood cultures before administering IV antibiotics.
   c. IV antibiotics within 4 hours of presentation
   d. Fluid bolus.

Process.
Monthly Review of all Patients (100% review) admitted from the ED with coded diagnosis of Sepsis, Severe Sepsis, and Septic Shock to determine compliance rate for the four indicators.

Solution.
"Take Care of Basics”
1. Organizational Change allowing only RNs to insert Foley Catheters (10/09)
2. Changed the Central Line Bundle Compliance written form to an Online Form (5/10).
3. Central Line Bundle monitoring results will be reported to the Clinical Departments (7/10).

"Standardize”
1. Adding the Option for Serum Lactate to the ED Fever Order Set (Approved 5/10).
2. Finalized decision to not have POC lactate available in the ED (5/10).

"Reminders”
1. Implemented computurized lactate “alert” for MDs when three SIRS criteria present (10/09).
2. Appointed two additional ED nurses as “Sepsis Champions” (10/09).

"Develop Contingency Plans”
1. Purchased ultrasound for the ED to be used with Central Line Placement (4/10)

"Design Reliability into the System”
1. Changed the critical result of serum lactate (requiring a call to the ED) from 4.7 to 4 (3/10).
2. Began reporting the use of the ED Early Goal-directed Order Set with data to the ED (11/09).

Measurable Outcomes.

<table>
<thead>
<tr>
<th>Mortality Rate</th>
<th>Data CY 08</th>
<th>Jan-Aug CY 09</th>
<th>Sept 09-Apr 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality Rate</td>
<td>13.9%</td>
<td>15.9%</td>
<td>13.4%</td>
</tr>
<tr>
<td>ALOS</td>
<td>7.61</td>
<td>7.49</td>
<td>8.22*</td>
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</tbody>
</table>
Sustainability.
Monitoring is still ongoing.

Words of Wisdom when considering Implementing Sepsis Improvement based on the IHI Sepsis Bundle

1. Have a clearly established Early Goal-directed Therapy implementation strategy: ED-centric, mobile ICU team; or ICU-centric and align order sets accordingly.

2. Create (if not already in place) a multidisciplinary team with staff from the ED and ICU to review compliance with order sets and evaluate care.

3. If documentation is computerized, work with IS to create a real-time report that includes SIR criteria data, laboratory studies ordered, lab results, and medications and intravenous fluid ordered and time given.

Role of Collaboration and Leadership.
Implementation of the solutions required the cooperation of Information Services, the Emergency Department Medical and Nursing Leadership, the ED APN, the ED Clinical IS Coordinator, the Respiratory Care Department, the Laboratory, the Sepsis Workgroup including Pharmacy and the Medical leadership of the ICU, the Case Management Systems Administrator, and the Performance Improvement/Risk Management Department.

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SEPSIS PROCESS IMPROVEMENT PROJECT

To reduce morbidity and mortality due to sepsis through early identification and initial resuscitation of adults presenting to the ED with Sepsis, SIRS, Severe Sepsis and/or Septic Shock. The Aims of the Project were (a) screening at triage, (b) early serum lactate, (c) blood cultures before antibiotics, (d) initial fluid resuscitation. The data collection phase began September 1, 2009 and ended April 30, 2010 with report submission from October 2009 until May 2010.

Sinai’s Three-tiered Approach

1. Improve outcomes associated with sepsis - Mortality and ALOS

2. Improve compliance with the Collaborative indicators - Serum lactate, Blood cultures before administering IV antibiotics, IV antibiotics within 4 hours of presentation, and Fluid bolus.

3. Implement elements within the Change Concepts of “Take Care of Basics”; “Standardize”; “Reminders”; “Develop Contingency Plans”; and “Design Reliability into the System.”
Sepsis Definitions

SIRS Screening Criteria
- Heart Rate >90
- Respiratory Rate >20, pa CO2 <32 mmHg
- Temperature >38 C or < 36 C
- WBC > 12,000 or < 4,000 or > 10% Bands

Sepsis Screening Criteria
- 2 or more of the SIRS screening criteria and a suspected infectious etiology

Severe Sepsis Screening Criteria
- Sepsis criteria as above associated with organ dysfunction, hypotension, and hypoperfusion, for example change in mental status. It is part of the continuum of a biologic inflammatory response to infection that evolves toward septic shock.

Septic Shock
- Severe sepsis with hypotension refractory to treatment.
Behind the Data

Participation in the collaborative required the cooperation of Information Services, the Emergency Department Medical and Nursing Leadership, the ED APN, the ED Clinical IS Coordinator, the Respiratory Care Department, the Laboratory, the Sepsis Workgroup including Pharmacy and the Medical leadership of the ICU, the Case Management Systems Administrator, and the Performance Improvement/Risk Management Department.

Mortality and ALOS Results

<table>
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<tr>
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<tbody>
<tr>
<td>Mortality Rate</td>
<td>13.9%</td>
<td>15.9%</td>
<td>13.4%</td>
</tr>
<tr>
<td>Change Concept</td>
<td>12 (25)</td>
<td></td>
<td>17 (25)</td>
</tr>
<tr>
<td>Self-Assessment Score</td>
<td></td>
<td></td>
<td></td>
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<td>ALOS</td>
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THE TEAM TACKLED ELEMENTS IN EACH OF THE CHANGE CONCEPTS

"Take Care of Basics"
1. Organizational change allowing only RNs to insert Foley catheters (10/09).
2. Changed the Central Line Bundle Compliance written form to an online form (5/10).
3. Central line bundle monitoring results will be reported to clinical departments (7/10).

"Standardize"
1. Adding the option for serum lactate to the ED Fever Order Set (Approved 5/10).
2. ED POC lactate availability in discussion by Respiratory Care and Lab (4/10).

"Reminders"
1. Implemented computerized lactate alert for MDs when three SIRS present (10/09).
2. Appointed two additional ED nurses as "Sepsis Champions" (10/09).

"Develop Contingency Plans"
1. Purchase additional ultrasounds for CL placement for immediate availability.
   
   **Barrier:** An organizational initiative that required a full Needs Analysis and additional staff training. Began 11/09, purchase order 5/10; remains ongoing.
   
   **Resolution:** Scheduled progress updates at Performance Management Comm.

"Design Reliability into System"
1. Changed critical result of serum lactate (requiring call to ED) from 4.7 to 4.0 (11/09),
2. Began monitoring and reporting the use of the ED EGDT order sets (11/09).
WORDS OF WISDOM FOR IMPLEMENTING EARLY IDENTIFICATION AND INITIATION OF THERAPY FOR SEVERE SEPSIS IN THE ED

1. Have a clearly established Early Goal-directed Therapy implementation strategy: ED-centric, mobile ICU team; or ICU-centric and align order sets accordingly.

2. Create (if not already in place) a multidisciplinary team with staff from the ED and ICU to review compliance with order sets and evaluate care.

3. If documentation is computerized, work with IS to create real-time report that includes SIR criteria data, laboratory studies ordered, lab results, and medications and intravenous fluid ordered and time given.