Sepsis: Developing and Implementing a Housewide Sepsis Program – Understanding the Four Tiers

Pat Posa, RN, BSN, MSA, FAAN
Quality Excellence Leader
St. Joseph Mercy Hospital
Agenda

• Define Sepsis
• Standardize Sepsis Treatment
• Enhance Sepsis Screening
• Identify Barriers
• Establish Processes
• Utilize Tools
• Develop a Protocol
• Measure and Improve

https://www.youtube.com/watch?v=12Qbnn6XfH0
Background

Severe sepsis is a significant healthcare challenge:

- Major cause of morbidity and mortality worldwide
  - Leading cause of death in noncoronary ICU (U.S.)
  - 10th leading cause of death overall (U.S.)

- More than 750,000 cases of severe sepsis in the U.S. annually

- Sepsis occurs in just 10% of U.S. hospital patients, but it contributes to as many as half of all hospital deaths

- In pediatric: half of cases with healthcare factors and half with community-acquired

- Most expensive condition treated in hospitals in 2013, $23.7 billion or 6.2% aggregate cost

- In the U.S., more than 500 patients die of severe sepsis daily


Novosad SA, et al. MMWR, 2016;65(33):864-869
Background (cont.)

CDC vital signs:

- 80% of sepsis begins outside of the hospital
- 7 out of 10 patients with sepsis had recently used health services or had a chronic diagnosis requiring frequent care
- 4 types of infections most often connected to sepsis:
  - Lung
  - Skin
  - Urinary Tract
  - Gut
- Healthcare professionals:
  - Think sepsis and act fast
Background (cont.)

Sepsis is the #1 cause of inpatient deaths:

2014 Acute Care Discharges
11% of Pts Have Sepsis DX

- Simple Sepsis
- Severe Sepsis
- Septic Shock
- Acute Care Patients without Sepsis DX

122,517, 89%
7,557, 5%
4,505, 3%
3,466, 3%

2014 Acute Care Deaths
48% of Pts have Sepsis DX

- Simple Sepsis
- Severe Sepsis
- Septic Shock
- Acute Care Patients without Sepsis DX

245, 7%
506, 13%
1,988, 52%
1,072, 28%
Background (cont.)

Sepsis’ impact on mortality in hospitals:

Table 1. Inpatients With Sepsis Diagnoses in the Kaiser Permanente Northern California Cohort and the Healthcare Cost and Utilization Project Nationwide Inpatient Sample

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 21 Hospitals) (14,206 Deaths/432,828 Admissions)</td>
<td>(n = 1051 Hospitals) (143,312 Deaths/6,555,621 Admissions)</td>
</tr>
<tr>
<td>Hospitalizations</td>
<td>Explicit (11.4) [11.3-11.5] 55,008 (11.4)</td>
<td>Explicit (4.3) [4.3-4.3] 280,663 (4.3)</td>
</tr>
<tr>
<td></td>
<td>Explicit POA (10.5) [10.4-10.5] 50,520 (10.5)</td>
<td>Explicit POA (4.3) [4.3-4.3] 717,718 (10.9)</td>
</tr>
<tr>
<td></td>
<td>Implicit (16.7) [16.6-16.8] 80,678 (16.7)</td>
<td>Implicit (10.0) [9.8-10.2] 73,933 (15.3)</td>
</tr>
<tr>
<td></td>
<td>Implicit POA (15.3) [15.2-15.4] 73,933 (15.3)</td>
<td>Implicit POA (10.0) [9.8-10.2] 73,933 (15.3)</td>
</tr>
<tr>
<td>Hospital mortality</td>
<td>Explicit (11.4) [11.1-11.7] 62,722 (11.4)</td>
<td>Explicit (17.7) [17.6-17.8] 49,664 (17.7)</td>
</tr>
<tr>
<td></td>
<td>Explicit POA (10.4) [10.1-10.6] 52,388 (10.4)</td>
<td>Explicit POA (17.7) [17.6-17.8] 74,451 (10.4)</td>
</tr>
<tr>
<td></td>
<td>Implicit (9.8) [9.6-10.0] 79,411 (9.8)</td>
<td>Implicit (10.0) [9.8-10.2] 73,933 (10.0)</td>
</tr>
<tr>
<td></td>
<td>Implicit POA (10.0) [9.8-10.2] 73,933 (10.0)</td>
<td>Implicit POA (10.0) [9.8-10.2] 73,933 (10.0)</td>
</tr>
<tr>
<td>% (95% CI) of all hospital deaths among patients with sepsis</td>
<td>44.2 (43.3-45.0)</td>
<td>34.7 (34.4-34.9)</td>
</tr>
<tr>
<td></td>
<td>36.9 (36.1-37.7)</td>
<td>52.0 (51.7-52.2)</td>
</tr>
<tr>
<td></td>
<td>55.9 (55.1-56.7)</td>
<td>52.0 (51.7-52.2)</td>
</tr>
<tr>
<td></td>
<td>52.0 (51.2-52.8)</td>
<td>52.0 (51.7-52.2)</td>
</tr>
</tbody>
</table>

1 out of 2–3 deaths are related to sepsis, most present on admission.

In KPNC 2012 subset, patients meeting criteria for EGDT comprised 32.6% of sepsis deaths and patients with sepsis, normal BP and lactate < 4 comprised 55.9% of sepsis deaths.
Background (cont.)

2017 Surviving Sepsis Guidelines Best Practice Statement:

“Sepsis (severe sepsis) and septic shock are medical emergencies, and we recommend that treatment and resuscitation begin immediately.”
Background (cont.)

Core measure:

• Sepsis management is a core measure that began being reported to CMS on October 1st, 2015.

• Compliance is all or none:
  – All measures on the 3- and 6-hour bundles need to be met in the appropriate timeframe to be compliant.
Background (cont.)

Understanding distinctions:

• Infection

• Sepsis: Infection plus 2 or more SIRS

• Severe Sepsis: Infection plus 2 or more SIRS plus new organ dysfunction

• Septic Shock: Severe sepsis with a lactic acid $\geq 4$ mmol/L OR continued hypotension (systolic BP < 90 or 40 mmHg decrease from their baseline) after initial fluid bolus (30 ml/kg)
Standardizing Treatment

3-Hour Sepsis Bundle of Care:

• To be completed within 3 hours of time of presentation:
  1. Measure lactate level.
  2. Obtain blood cultures prior to administration of antibiotics.
  3. Administer broad-spectrum antibiotics.
  4. Administer 30 ml/kg crystalloid for hypotension or lactate ≥ 4 mmol/L.

“Time of Presentation” is defined as the time of earliest chart annotation consistent with all elements of severe sepsis or septic shock ascertained through chart review.
Standardizing Treatment (cont.)

6-Hour Sepsis Bundle of Care:

• To be completed within 6 hours of time of presentation
  5. Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65 mmHg.
  6. In event of persistent hypotension after initial fluid administration (MAP < 65 mmHg) or if initial lactate was ≥ 4 mmol/L, reassess volume status and tissue perfusion and document findings according to Table 1.
  7. Re-measure lactate if initial lactate was elevated.
Standardizing Treatment *(cont.*)

Document reassessment of volume status and tissue perfusion with:

• Either:
  – Repeat focused exam (after initial fluid resuscitation) by licensed independent practitioner including vital signs, cardiopulmonary, capillary refill, pulse, and skin findings.

• Or 2 of the following:
  – Measure CVP
  – Measure ScvO\textsubscript{2}
  – Bedside cardiovascular ultrasound
  – Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge
## SURVIVING SEPSIS CAMPAIGN RECOMMENDATION HIGHLIGHTS

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEPSIS DEFINITION</strong></td>
<td>Systemic manifestation of infection + suspected infection</td>
<td>Life threatening organ dysfunction caused by dysregulated response to infection</td>
</tr>
<tr>
<td></td>
<td>Severe sepsis: sepsis + organ dysfunction</td>
<td>No severe sepsis category</td>
</tr>
<tr>
<td><strong>INITIAL RESUSCITATION</strong></td>
<td>at least 30 cc/kg in first 3 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crystalloid fluid (no recommendations on 0.9% NaCl vs balanced solution)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Albumin if patients require “substantial” fluids (weak)</td>
<td></td>
</tr>
<tr>
<td>Protocolized care including</td>
<td>CVP</td>
<td>Use dynamic resuscitation markers (passive leg raise)</td>
</tr>
<tr>
<td></td>
<td>ScVO2</td>
<td>Target MAP of 65mmHg</td>
</tr>
<tr>
<td></td>
<td>Normalize lactate</td>
<td>Reassess hemodynamic status to guide resuscitation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normalize lactate</td>
</tr>
<tr>
<td><strong>VASOPRESSORS</strong></td>
<td>target MAP of 65 mmHg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Norepinephrine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Epinephrine if not at target MAP OR vasopressin to reduce norepinephrine requirement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Avoid dopamine in most patients</td>
<td></td>
</tr>
<tr>
<td><strong>STEROIDS</strong></td>
<td>Only indicated for patients with septic shock refractory to adequate fluids and vasopressors</td>
<td></td>
</tr>
<tr>
<td><strong>ANTIBIOTICS</strong></td>
<td>One or more antibiotics active against presumed pathogen</td>
<td>Initial broad spectrum antibiotics (ex: vancomycin + piperacillin-tazobactam)</td>
</tr>
<tr>
<td></td>
<td>Combination therapy (double coverage) for neutropenic patients and pseudomonas</td>
<td>Against combined therapy (i.e. do not double cover pseudomonas)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>May use procalcitonin to guide de-escalation</td>
</tr>
<tr>
<td><strong>SOURCE CONTROL</strong></td>
<td>Achieve within 12 hours, if feasible</td>
<td>Achieve as soon as medically and logically feasible</td>
</tr>
<tr>
<td><strong>VENTILATOR</strong></td>
<td>6 cc/kg tidal volume</td>
<td></td>
</tr>
<tr>
<td></td>
<td>prone patients with severe ARDS (P/F &lt;150 in 2017 guideliens)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>no recommendation</td>
<td>Against high frequency oscillatory ventilation (HFOV)</td>
</tr>
<tr>
<td>weak recommendation for noninvasive ventilation in select patients with sepsis induced ARDS</td>
<td>Unable to make recommendation on noninvasive ventilation</td>
<td></td>
</tr>
</tbody>
</table>
Standardizing Treatment (cont.)

Understanding Sepsis-3:

• Sepsis is a “life-threatening organ dysfunction caused by a dysregulated host response to infection.”
  – Sepsis-3 does away with:
    • SIRS criteria (sepsis is pro- and anti-inflammatory)
    • Severe sepsis (sepsis = the old severe sepsis)
    • Antiquated concepts: sepsis syndrome; septicemia
    • Sepsis-3 codifies the quantification of organ dysfunction through the SOFA score
      - SOFA: Sequential Organ Failure Assessment

• Septic Shock
  – Vasopressor-dependent hypotension + lactate > 2

Sepsis-3 includes clinical criteria to predict life-threatening disease.

Singer et al, JAMA 2016. PMID: 26903338
Standardizing Treatment (cont.)

Incompatibility with current proven QI efforts:

- The definitions are mortality predictors, not screening definitions for early identification.
- CMS definitions and core measures have NOT changed.
- ICD-10 has NOT changed.
- No pathway to implement at our current institutions.
  - How would a transition happen?
  - Big bang go-live?
Sepsis Practice Collaborative Model
4-Tier Process for Program Implementation

Organizational Consensus That Severe Sepsis Must Be Managed Early and Aggressively

Early Screening with Tools and Triggers

Implementation of the Sepsis Bundles

Measuring Success CQI

Rapid Improvement

Hand Washing

 VAE (VAP) Bundle  CAUTI  BSI

Infection Prevention

Documentation Improvement ~ Accurate Coding

1 Continuous Quality Improvement

Adapted from: Sepsis Solutions International
Standardizing Treatment (cont.)

Tier I: Organization consensus, support milestones and checklist

1. Define sepsis program goal and align with organizational goals.

2. Identify executive sponsor.

3. Collect baseline data.
   - An essential step

4. Develop sepsis team.
   - Ensuring the appropriate individuals are on the team
   - Scheduling at minimum a monthly meeting for at least 6 months

5. Identify nursing and physician champions in the ED and ICU and ensure champions attend team meetings.
   - Create a sepsis coordinator position to oversee the program

6. Begin to define an action plan and timeline for program development and implementation.
Standardizing Treatment \((cont.)\)

- **Must** have nurse and physician champions from the ED and ICU.
  - Need at least 1 physician at all meetings

- **Must** be linked in the organization’s quality or operational structure.

- **Must** meet at least 1 to 2 times per month.

- Team members must be well-educated on the evidence and armed with tools and knowledge to change behavior at the bedside.
  - **Does the team need more education?**

- **Must** have a bedside nurse on the team to provide a reality check and best knowledge of barriers.

Create a sepsis coordinator position to oversee program.

Consider developing nurse champions on each patient care unit and shift.
Standardizing Treatment (cont.)

Sepsis Practice Collaborative Model
4-Tier Process for Program Implementation

- Organizational Consensus That Severe Sepsis Must Be Managed Early and Aggressively
- Early Screening with Tools and Triggers
- Implementation of the Sepsis Bundles
- Measuring Success CQI

Rapid Improvement

Infection Prevention

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VAE (VAP) Bundle
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Documentation Improvement ~ Accurate Coding

1Continuous Quality Improvement
Adapted from: Sepsis Solutions International
Enhancing Sepsis Screening

Tier II: Screening, Surviving Sepsis Campaign Guidelines for Screening

• 2016: We recommend that hospitals and health systems have a performance improvement program for sepsis, including sepsis screening for acutely ill, high-risk patients (BPS).

• 2012: We recommend routine screening of potentially infected seriously ill patients for severe sepsis to increase the early identification of sepsis and allow implementation of early sepsis therapy (1C).
Enhancing Sepsis Screening (cont.)

Redefining what a “septic shock” patient looks like:

<table>
<thead>
<tr>
<th>Before</th>
<th>Now</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supine in bed</td>
<td>Sitting up in bed</td>
</tr>
<tr>
<td>Ventilator</td>
<td>Nasal cannula</td>
</tr>
<tr>
<td>Fluids wide open</td>
<td>IV boluses</td>
</tr>
<tr>
<td>Increasing vasopressors</td>
<td>Weaning vasopressors</td>
</tr>
<tr>
<td>Minimally responsive</td>
<td>Awake</td>
</tr>
</tbody>
</table>

“ Doesn’t look sick enough to be in the ICU or to have a central line”
Must correct this misperception
Enhancing Sepsis Screening (cont.)

Severe Sepsis: Defining a Disease Continuum

Infection  SIRS  Sepsis  Severe Sepsis

Adult Criteria
A clinical response arising from a nonspecific insult, including ≥ 2 of the following:

Temperature: > 38°C or < 36°C
Heart Rate: > 90 beats/min
Respiration: > 20/min
WBC Count: > 12,000/mm³, or < 4,000/mm³, or > 10% immature neutrophils

SIRS
With a presumed or confirmed infectious process

Sepsis
With at least one sign of organ dysfunction, hypoperfusion, or hypotension

Examples:
- Cardiovascular (refractory hypotension)
- Renal
- Respiratory
- Hepatic
- Hematologic
- CNS
- Unexplained metabolic acidosis

Shock

SIRS = Systemic Inflammatory Response Syndrome
Enhancing Sepsis Screening (cont.)

Tier II: Screening for severe sepsis milestones and developing a checklist

- Develop screening process for ED, rapid response team, ICU, and housewide
- Develop audit process to evaluate compliance and effectiveness
- Ensure screening process has clear “next steps” defined for nursing staff
Enhancing Sepsis Screening *(cont.)*

Screening is also taking place in other locations:

- In the field
  - U.S. and the U.K.
- In skilled nursing facilities
- In dialysis units before placement on dialysis
- Home care
Enhancing Sepsis Screening (cont.)

Having a screening process in place is necessary for a number of reasons:

**Time is tissue**
- Similar to trauma, AMI, or stroke, the speed and appropriateness of therapy administered in the initial hours after severe sepsis develops are likely to influence outcomes.

**To screen effectively, it must be part of the nurses’ daily routines.**
- For example, part of admission and shift assessment.

**Must define a process for what to do with the results of the screen.**

If you do not screen, you will miss patients that may have benefited from the interventions.

Schorr C, et al Journal of Hospital Medicine, 2016;11:S32-S39
### Enhancing Sepsis Screening (cont.)

Difference between paper or electronic screening methods:

<table>
<thead>
<tr>
<th>Method</th>
<th>Benefits</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| Paper Form                      | • Nurses critically think as they screen the patient  
• Easy and quick to develop  
• No cost                                      | • Screening is intermittent  
• Paper can be misplaced  
• Static—no ability to automate an alert                                                |
| EMR Form                        | • Nurses critically think as they screen the patient  
• Can automate alerts for positive screens                                                  | • Screening is intermittent  
• Length of programming time  
• Cost                                                                                       |
| EMR—real time, continual screening | • 24-hour screening  
• Can automate alerts for positive screens                                                  | • Nurse does not screen patient—potential loss of screening knowledge and critical thinking  
• Computer not reliably able to identify patients who have infection  
• Computer unable to discern if SIRS is valid or organ dysfunction is new                 |
| EMR—real time and scheduled     | • Form fires and pre-populates for nurse to screen upon admission and each shift—nurse critically thinks  
• 24-hour screening  
• Manual screen completed when EMR alert fires—nurse discerns/validates appropriateness/correctness of alert | • Screening form needs to be developed in EMR—programming time and costs                                                                     |
Enhancing Sepsis Screening (cont.)

Patient Care Unit Severe Sepsis Screening Tool:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temperature greater than or equal to 103°F or less than or equal to 96°F</td>
</tr>
<tr>
<td>2</td>
<td>Heart Rate greater than 100 beats per minute</td>
</tr>
<tr>
<td>3</td>
<td>Respiratory Rate greater than 20 breaths per minute</td>
</tr>
<tr>
<td>4</td>
<td>WBC greater than or equal to 12,000/mm³ or less than or equal to 4,000/mm³ or greater than 10,000/mm³</td>
</tr>
<tr>
<td>5</td>
<td>Blood glucose greater than 140 mg/dL in non-diabetic patient</td>
</tr>
<tr>
<td>6</td>
<td>Negative screen for severe sepsis (Please initial)</td>
</tr>
</tbody>
</table>

If check box of all above - Negatives screen for severe sepsis (Please initial) - sepsis infection - question NO 1 in flowchart.

If check box of all above + Positive screen for severe sepsis (Please initial) - sepsis infection - question YES 1 in flowchart.

Sepsis Units Severe Sepsis Screening Tool:

Severe Sepsis = Infection + SIRS + Organ Dysfunction

<table>
<thead>
<tr>
<th>Stage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Organ Dysfunction (change from baseline)</td>
</tr>
<tr>
<td>2</td>
<td>SIRS criteria</td>
</tr>
<tr>
<td>3</td>
<td>Organ failure (two or more of the following within 3 days of severe infection)</td>
</tr>
<tr>
<td>4</td>
<td>Cardiopulmonary: SBE less than 90 mmHg or 40% decrease less than baseline OR MAP less than 65 mmHg</td>
</tr>
<tr>
<td>5</td>
<td>Renal: serum creatinine level greater than 2 mg/dL or increase greater than 0.5 mg/dL from baseline</td>
</tr>
<tr>
<td>6</td>
<td>Cerebral: altered consciousness unrelated to primary neuro pathology</td>
</tr>
<tr>
<td>7</td>
<td>Gastro Intestinal: less than 100,000 WBC greater than 1.5</td>
</tr>
<tr>
<td>8</td>
<td>Hematologic: platelets less than 100,000, WBC greater than 1.5</td>
</tr>
</tbody>
</table>

If check box of all above - Negatives screen for severe sepsis (Please initial) - sepsis infection - question NO 1 in flowchart.

If check box of all above + Positive screen for severe sepsis (Please initial) - sepsis infection - question YES 1 in flowchart.

Sepsis Risk for Hypovolemia

<table>
<thead>
<tr>
<th>Stage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clinical signs of severe sepsis plus one of the following criteria</td>
</tr>
<tr>
<td>2</td>
<td>Hypotension: systolic blood pressure less than 90 mmHg or less than 70% of baseline</td>
</tr>
<tr>
<td>3</td>
<td>Lactate level greater than or equal to 4 mg/dL</td>
</tr>
</tbody>
</table>

If check box of all above - sepsis infection - question NO 1 in flowchart.

If check box of all above + Positive screen for severe sepsis (Please initial) - sepsis infection - question YES 1 in flowchart.
Enhancing Sepsis Screening (cont.)

Sepsis Bundles of Care:

**General Care Severe Sepsis Bundle**
- For patients with 2 or more SIRS + known/suspected infection + initial lactic acid 2-2.9 w/o additional organ dysfunction
  - Blood cultures x 2
  - Antibiotics win 1 hr of screening positive for sepsis. Ensure antibiotic is ordered STAT (call Rx and notify of STAT order)
  - Vital signs: every 1 hr x 4, then every 4 hr x 2, then once per shift
  - Lactic acid every 4 hr x 24 hr
  - I & O every 2 hr (if no void win 4 hr, bladder scan- if greater than 200 mL, perform intermittent straight cath), call MD if less than 0.5 mL/kg/hr
  - Maintain/monitor for:
    - SBP greater than 90 mmHg
    - Urine output greater than 0.5 mL/kg/hr
    - Decrease in lactic acid x 3 results or normalization x2 within 12 hours
  - If unable to maintain these parameters or if pt has additional organ dysfunction, call MD for possible transfer to ICU
  - Continue sepsis screen every shift and pm change in patient condition
  - Complete 0 to 1 hour interventions, below

**Intermediate Care Severe Sepsis Bundle**
- For patients with 2 or more SIRS + known/suspected infection + initial lactic acid 3-3.9 or had hypotension that responded to fluid bolus
  - Blood cultures x 2
  - Antibiotics win 1 hr of screening positive for sepsis. Ensure antibiotic is ordered STAT (call Rx and notify of STAT order)
  - Vital signs: every 30 min x 4, then every 1hr x 2, then every 2hr x 4, then every 4 hr
  - Lactic acid every 4 hr x 24 hr
  - I & O every 2 hr (if no void win 4 hr, bladder scan- if greater than 200 mL, perform intermittent straight cath), call MD if less than 0.5 mL/kg/hr
  - Continue to administer fluid boluses per physician order to achieve/maintain the following goals:
    - SBP greater than 90 mmHg
    - Urine output greater than 0.5 mL/kg/hr
    - Decrease in lactic acid x 3 results or normalization x2 within 12 hours
  - If unable to achieve these parameters or if pt has increase in lactic acid of 0.5 or more, increase in O2 requirements, mental status change, or additional organ dysfunction, call MD for possible transfer to ICU
  - Complete 0 to 1 hour interventions, below

---

**Date/Time:**

If hypotensive, volume resuscitate: initial 30 mL/kg as fast as possible, then additional boluses as needed per order

- Time 30 mL/kg fluid bolus infused
- Broad spectrum antibiotic start after obtaining blood culture
- Time antibiotic hung
- Initial labs: serum lactate, additional labs as ordered by physician

**Yes No**
- Serum lactate drawn
- Blood Cultures x 2

**Time 1:**
- Other cultures:
- Establish IV access (2 large bore IVs)

**Signature:**

**Date/Time:**

---

**Date/Time:**

If hypotensive, volume resuscitate: initial 30 mL/kg as fast as possible, then additional boluses as needed per order

- Time 30 mL/kg fluid bolus infused
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**Yes No**
- Serum lactate drawn
- Blood Cultures x 2

**Time 1:**
- Other cultures:
- Establish IV access (2 large bore IVs)

**Signature:**

**Date/Time:**

---
Enhancing Sepsis Screening (cont.)

Other screening tool examples:

STOP Severe Sepsis SBAR
[Communication tool with MD when patient screens positive for sepsis]

Situation: 
_________ has screened positive for sepsis at 
(patient name) 
(time)

Background:
1. __________ has the following positive criteria for SIRS 
(patient name) 
(state only those that apply)
   a. Temperature > 100.6 (38°C) or < 96.8°F (36)
   b. BP < 90mmHg or > 40 mmHg from baseline
   c. HR > 90/min
   d. Respiratory rate > 20/min
   e. Change in mental status, ALOC

2. I suspect infection
   The most recent WBC is 
   (Consider infection if WBC > 12,000 or < 4,000)

Assessment:
1. Vital signs are: Temp______, BP:______, HR:______, RR:______
2. SAO2 is______, compared to______(last reading)
3. Mental status is now ______
4. Urine output is ______ ml per hour or ______ over the last 8 hours
5. The most recent creatinine is______; Creatinine on admission was ______

Recommendation:
1. I need you to evaluate the patient to confirm if they have severe sepsis
2. In addition to a stat Lactate, what other labs would you like me to order?
3. Should I start an IV and give fluid bolus? (If patient hypotensive)
Enhancing Sepsis Screening (cont.)

Make screening for severe sepsis process-dependent:

• Weave into fabric of current practice

• Bedside nurse should do the screening
  – Every shift and PRN with changes in patient’s conditions

• Define expectation to screen during shift assessment and PRN with changes in patient’s conditions

• Screen for severe sepsis with every rapid response or medical response team call

• Identify strategies for initiation of therapy once patient with positive screen for severe sepsis is identified
Enhancing Sepsis Screening (cont.)

To Save Lives.....

Early identification

Early antibiotics

Early (aggressive) fluid resuscitation
Identifying Barriers

Moving forward:

- Clearly define next steps for patients with positive screen for severe sepsis
  - Alert RRT/Med Team
  - Notify physician
  - Begin 3-hour bundle:
    - Lactate
    - Blood Cultures
    - Antibiotics
    - Fluid

<table>
<thead>
<tr>
<th>SBAR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Situation:</strong></td>
</tr>
<tr>
<td>Screened Positive for Severe Sepsis</td>
</tr>
<tr>
<td><strong>Background:</strong></td>
</tr>
<tr>
<td>1. Positive Systemic Response to Infection</td>
</tr>
<tr>
<td>2. Known or suspected infection</td>
</tr>
<tr>
<td>3. Organ dysfunction: share which organs</td>
</tr>
<tr>
<td><strong>Assessment:</strong></td>
</tr>
<tr>
<td>Share any other clinical changes?</td>
</tr>
<tr>
<td><strong>Recommendations:</strong></td>
</tr>
<tr>
<td>1. I need you to come and evaluate the patient to confirm if they have severe sepsis.</td>
</tr>
<tr>
<td>2. It is recommended that I get an ABG, lactate, blood cultures, and a CBC (if &gt; 12 hrs since last one). Can I proceed and get these?</td>
</tr>
<tr>
<td>3. Any other labs you would like me to obtain? Do you want to order antibiotics?</td>
</tr>
<tr>
<td>4. If patient is hypotensive: Can I start an IV and give a bolus of NS—30 ml/kg?</td>
</tr>
<tr>
<td><strong>Date/time of call:</strong> ________________</td>
</tr>
<tr>
<td><strong>RRT called:</strong> Yes  No</td>
</tr>
</tbody>
</table>
Identifying Barriers \textit{(cont.)}

Barriers and strategies for sepsis screening:

- **Barriers**
  - Time for nurses to do it
    - Perception vs. reality
  - Screening is not specific only for severe sepsis
  - Positive screen is not a diagnosis of severe sepsis

- **Strategies**
  - Must assign responsibility and enforce accountability
  - Perform audits to measure compliance and identify problems
  - Round on unit and ask nurses how it is going
    - Discuss issues
Identifying Barriers (cont.)

Tier III: Milestones and Checklist

• Understand current process for caring for septic shock patients
  – “Go and See” work
  – Baseline data

• Order sets

• Common barriers/issues
  – Identified gaps from “Go and See” work

• Educational plan

• Implementation plan
  – Unit champions
  – Prospective rounding
  – Independent checks
Identifying Barriers (cont.)

1. List the process steps below each box
2. For each process step, include job title of persons performing the step
3. For each queue, quantify the delay time (D/T)
4. Then total each to get L/T for the overall process

% bundle use:
Labs:
Meds:
IVs:
Monitoring:
CVP:
MAP:
ScvO₂:
Dynamic assess
Echo

If bundle is not used, describe these resuscitation components
Which components of the bundle did you find gaps in performance during “Go and See” and from baseline data collection?
Identifying Barriers (cont.)

Common barriers and issues:

• Lactate

• Antibiotics

• Fluid boluses

• Reassessment for volume status and perfusion

• Consistency in bundle application
Establishing Processes

Lactate measurement:

- Lab vs. POC
- Venous vs. arterial
- Turnaround time
- Repeat lactate if initial measurement is greater than 2
Establishing Processes (cont.)

- **Appropriate initial antibiotics**
  - Guide for providers recommending the appropriate antibiotic based on whether hospital- or community-acquired source and your hospital’s antibiogram

- **Turnaround time: from indication to hanging**
  - ED vs. ICU vs. floor

- **Understand your current process and where the gaps are**

- **Make antibiotics rapidly available**

- **Factors that showed delayed administration**
  - Higher APACHE
  - Older
  - Presence of comorbidities
  - HLOS before hypotension
  - Diagnosis of pneumonia
  - Admin to academic hospitals
  - Transfer to medical wards

Establishing Processes (cont.)

Fluid boluses:

• Speed of administration:
  – Gravity or pressure bag
  – Not by infusion pump

• Other patient demographics to consider:
  – Dialysis patients
  – Patients with CHF or low EF

Fluid bolus is given rapidly, IV wide open, pressure bag if necessary; goal is 500 ml every 15–30 minutes
Establishing Processes (cont.)

Barriers:

• Fear of heart failure
  – “I will flood the patient”

• 1 liter of normal saline adds 275 ml to the patient’s plasma volume

• Not based in evidence

• Rivers et al. study
  – % ventilated patients

<table>
<thead>
<tr>
<th>Hours after start of Therapy</th>
<th>0-6</th>
<th>7-72</th>
<th>0-72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Therapy</td>
<td>53.8%</td>
<td>16.8%</td>
<td>70.6%</td>
</tr>
<tr>
<td>Early Goal Directed Therapy</td>
<td>53%</td>
<td>2.6%</td>
<td>55.6%</td>
</tr>
<tr>
<td>P Value</td>
<td>&lt;.001</td>
<td>0.02</td>
<td></td>
</tr>
</tbody>
</table>

Chronic coexisting conditions-CHF:
Control 30.2%
EGDT  36.7%
Establishing Processes (cont.)

Impact of early fluid and amount:

- Prospective, observational cohort of all ED severe sepsis or septic shock patients during 13 months
- 90,000 average ED visits
- 1,866 subjects; 53.6% were men, 72.5% were white, mean age was 72 years (SD 16.6 years)
- Mean initial lactate level was 2.8 mmol/L
- 86% received intravenous antibiotics within 180 minutes
- 64% had intravenous fluid initiated within 30 minutes
Establishing Processes (cont.)

Results:

• Lower mortality in 30 minutes group
  – 159 (13.3%) vs. 123 (18.3%)

• Lower median hospital length of stay
  – 6 days vs. 7 days

• Adjustment for age, lactate, hypotension, acute organ dysfunction, and Emergency Severity Index score, intravenous fluid within 30 minutes was associated with lower mortality

• Higher mortality with later fluid administration
  – 13.3% (30 minutes) vs. 16.0% (31 to 60 minutes) vs. 16.9% (61 to 180 minutes) vs. 19.7% (>180 minutes)

Establishing Processes (cont.)

• Vascular volume is lost into interstitial space due to a diffused capillary leaking from cytokine release.

• Both venous and arteriolar tone is reduced and blood volume occupies a larger intravascular space than normal.

• Many patients also have GI and skin losses.

• Only 40% of NS stays intravascular, the rest goes into the interstitial space.

• An initial BP response is not an indication to not give full bolus.

- Large trial before and after bundle implementation for patients with intermediate lactate values greater than 2 and less than 4

- Reduced hospital mortality in the bundle implementation group was observed in the patient with CHF and kidney disease compared with patients without

- Received more fluid with the bundle approach

Establishing Processes (cont.)

Sepsis-induced hypotension or lactate ≥ 4 mmol/L
(Based on SSC bundle and CMS threshold)

- **No high flow oxygen and No ESRD on dialysis or CHF**
  - Rapid infusion of 30 ml/kg Crystallloid*

- **Pneumonia or ALI with high flow oxygen requirements**
  - Not intubated/mechanically ventilated
  - Intubated/mechanically ventilated
    - **ESRD on hemodialysis or CHF**
      - Total of 30 ml/kg crystalloid*
        - with frequent reassessment of oxygenation
    - **Consider intubation/mechanical ventilation to facilitate 30 ml/kg crystalloid**
      - If yes
        - Rapid infusion of 30 ml/kg crystalloid*
      - If no
        - Total of 30 ml/kg with frequent reassessment of oxygenation

*Administer 30 ml/kg crystalloid within first 3 hours

**Considerations post 30ml/kg crystalloid infusion**

1. Continue to balance fluid resuscitation and vasopressor dose with attention to maintain tissue perfusion and minimize interstitial edema
2. Implement some combination of the list below to aid in further resuscitation choices that may include additional fluid or inotrope therapy
   - blood pressure/heart rate response,
   - urine output,
   - cardiothoracic ultrasound,
   - CVP, ScvO2,
   - pulse pressure variation
   - lactate clearance/normalization or
   - dynamic measurement such as response of flow to fluid bolus or passive leg raising
3. Consider albumin fluid resuscitation, when large volumes of crystalloid are required to maintain intravascular volume.
Utilizing Tools

Tools to assist with consistent application of the evidence:

- Identify tools to assist bedside staff to implement bundles
  - Algorithm, pathway, checklist, pocket cards, green folder, etc.

- Create protocols
  - For positive screen
    - Lactate, blood cultures, and fluids
  - When patients need ICU-level care

- Multidisciplinary rounds
- Handoffs
- Real-time review and feedback
Utilizing Tools (cont.)

### Adult Sepsis Criteria

<table>
<thead>
<tr>
<th>SIRS</th>
<th>Temp: &gt;100.9 or &lt; 96.8 HR &gt;100 RR &gt;20 WBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>Known or suspected infection PLUS 2 or more SIRS criteria</td>
</tr>
<tr>
<td>Severe Sepsis</td>
<td>CV: SBP &lt; 90 mmHg or 40 mmHg drop from baseline Resp: increase in O2 requirement Renal: u/o &lt; 0.5 ml/kg/hr; creat&gt;2 Hepatic: bilirubin &gt; 2 Metabolic: lactic acid &gt; 2 Hem: platelets &lt; 100,000</td>
</tr>
<tr>
<td>Severe Sepsis PLUS</td>
<td>New Organ Failure</td>
</tr>
<tr>
<td>Septic Shock</td>
<td>SBP &lt; 90mmHg or 40mmHg less than baseline after 30ml/kg of fluid AND/OR lactic acid ≤ 4mmol/L</td>
</tr>
</tbody>
</table>

### Sepsis Bundles

TO BE COMPLETED WITHIN 3 HOURS OF TIME OF PRESENTATION:
1. Measure lactate level.
2. Obtain blood cultures prior to antibiotics.
3. Administer broad-spectrum antibiotics.
4. Administer 30 ml crystalloid for hypotension or lactate ≥ 4 mmol/L.

TO BE COMPLETED WITHIN 6 HOURS:
5. Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation to maintain MAP ≥ 65 mmHg).
6. In the event of persistent hypotension after initial fluid administration (MAP < 65 mmHg) or if initial lactate was ≥ 4 mmol/L, reassess volume status and tissue perfusion.
7. Re-measure lactate if initial lactate > 2.

DOCUMENT REASSESSMENT OF VOLUME STATUS AND TISSUE PERFUSION:

Either:

Repeat focused exam (after initial fluid resuscitation) including vital signs, cardiopulmonary, capillary refill, pulse, and skin findings.

Or two of the following:

- Measure CVP
- Measure ScvO₂
- Bedside cardiovascular ultrasound
- Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge
Utilizing Tools *(cont.)*

**TO BE COMPLETED WITHIN 3 HOURS:**
1. Measure lactate level.
2. Obtain blood cultures prior to administration of antibiotics.
3. Administer broad spectrum antibiotics.
4. Administer 30 ml/kg crystalloid for hypotension or lactate ≥4 mmol/L.

*“Time of presentation” is defined as the time of triage in the emergency department or, if presenting from another care venue, from the earliest chart annotation consistent with all elements of severe sepsis or septic shock ascertained through chart review.*

**TO BE COMPLETED WITHIN 6 HOURS:**
5. Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥65 mm Hg.
6. In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was ≥4 mmol/L, reassess volume status and tissue perfusion and document findings according to Table 1.
7. Re-measure lactate if initial lactate elevated.

### TABLE 1
**DOCUMENT REASSESSMENT OF VOLUME STATUS AND TISSUE PERFUSION WITH:**

**EITHER:**
- Repeat focused exam (after initial fluid resuscitation) including vital signs, cardiopulmonary, capillary refill, pulse, and skin findings.

**OR TWO OF THE FOLLOWING:**
- Measure CVP.
- Measure ScvO₂.
- Perform bedside cardiovascular ultrasound.
- Perform dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge.
Utilizing Tools (cont.)
Utilizing Tools (cont.)

Sepsis checklist:
Developing a Protocol

Based on the Surviving Sepsis Guidelines:

• Obtain lactate following presence of 2 SIRS and suspected infection

• When patients are screened positive for severe sepsis:
  – Nurse protocol to draw labs and give fluid bolus
  – Protocol completed by RRT/Medical Response Team or all nurses

• Gain medical staff approval
Developing a Protocol (cont.)

Severe sepsis placement algorithm:

Screened Positive for Severe Sepsis

For lactic acid less than 2.9
Initiate General Care Severe Sepsis Bundle on back and complete interventions

SEPSIS INDUCED HYPOPERFUSION?
(Clinical picture of severe sepsis plus one or both of the following criteria)
1. Hypotension AFTER initial fluid bolus (30 ml/kg)
   OR
2. Require vasopressor
   OR
3. Initial lactic acid greater than or equal to 4 mEq/L with any BP

YES
Activate CODE SEPSIS
Initiate transfer to ICU

Meanwhile, continue crystalloid resuscitation of 250-1000ml boluses if hypotensive after the initial bolus — per physician order

NO
For lactic acid 3-3.9 or initial hypotension that responded to the 30 ml/kg fluid bolus, initiate transfer to IMC

Initiate Intermediate Care Severe Sepsis Bundle on back and complete interventions.
Developing a Protocol (cont.)

Defining Code Sepsis:

• Notify through paging the ICUs about septic shock patient

• RRT come to the bedside

• Urgently assess a patient with severe sepsis

• Assist the primary physician in achieving the goals of care
  – Fluid resuscitation
  – Expediting antibiotic delivery
  – Movement to a higher level of care as indicated
Developing a Protocol (cont.)

Code Sepsis exclusions:

- Comfort care only

- Patient who does not wish to have care escalated

- No evidence of suspected or actual infection
Developing a Protocol (cont.)

Role of ICU team in a Code Sepsis:

• After each team member has received report from ED or floor, implement a Code Sepsis pre-admission huddle.
  – Include the bedside nurse, resident, attending, and charge nurse if possible.

• Purpose of huddle:
  – Ensure all team members have same knowledge of the patient.
  – Know what treatment has been already provided.
  – Establish and agree on time zero for severe sepsis and septic shock.
  – Identify the priority interventions to be provided when patient arrives.
    • Written on the whiteboard
Developing a Protocol (cont.)

Redundancy: multidisciplinary rounds

Interdisciplinary Rounds – ABCDEF Bundle & Nursing Objectives

1. **Assess Pain:** What is the current score? What is the pain goal and current scale?
2. **Breathing:** Both SAT and SBT
   - Were they coordinated? Pass or Fail?
3. **Choice of Sedation:** Name of medication, route and dosage
4. **Delirium:** What is the CAM-ICU result?
   - If +, possible causes & interventions?
5. **Exercise:** Mobility Level?
   - What level is pt progressing to?
   - PT/OT consult?
6. **Family:** Patient/Family questions? Goals for the day?
   - Who will update pt/family? When?
7. **Severe Sepsis** screen result? + or –
   - On the bundle? What goals have not been met?
8. **Vasopressor Infusions**
9. **Skin:** Pressure Ulcer? POA?
   - Current description of PU
10. **Foley:** Can it be removed?
    - Renew Order
11. **Lines / Tubes:**
    - Other Tubes?
    - Vascular Access?
12. **Patient Diet / Tube Feeding / Bowel Regimen:** Nutrition concerns?
13. **Restraints:** Type? Time of Order Expiration?
14. Time of scheduled procedures today? Expected labs / tests
15. **Other:** Nursing concerns
Developing a Protocol \textit{(cont.)}

Tier III: Develop and implement the education plan

- **Content:**
  - Present to physicians, nurses, and RTs
  - Significance of problem
  - Sepsis continuum
  - Pathophysiology of severe sepsis
  - Prevention and management
    - Share the evidence
    - Case studies for staff to practice with bedside tools

- **Methods:**
  - Self-learning modules
  - Classroom and/or small groups of staff on unit
  - Web-based

- **Ongoing:**
  - Build into orientation
  - Monthly for residents
  - Every 6 months for all staff
  - 1-on-1 during rounds
Developing a Protocol (cont.)

Tier III: Develop implementation plan

• Identify who will oversee the implementation and the expectations of that person
  – Sepsis nurse or program coordinator

• Define ICU/ED resources for staff that they can call at any time for questions and assistance

• Create rounding schedule and process
  – Should begin as daily in the ICU and ED
  – Keep master list of all patients who go on the bundles
  – Do real-time interventions to ensure patients get the evidence-based practices
  – Define follow-up process for review and evaluate missed opportunities
Measuring and Improving

Sepsis Practice Collaborative Model
4-Tier Process for Program Implementation

1. Continuous Quality Improvement

- Organizational Consensus That Severe Sepsis Must Be Managed Early and Aggressively
- Implementation of the Sepsis Bundles
- Early Screening with Tools and Triggers
- Measuring Success CQI

- Hand Washing
- VAE (VAP) Bundle
- CAUTI
- BSI

Infection Prevention

Documentation Improvement ~ Accurate Coding

Adapted from: Sepsis Solutions International
Measuring and Improving (cont.)

Tier IV: Measurement milestones and checklist

• Define outcome and process data elements that will be collected

• Develop and implement a data collection process

• Revise and update goals and action plan as needed

• Execute implementation plan

• Continuous improvement
Measuring and Improving (cont.)

Data collection:

• Patient log
  – Define how to find all patients that receive the bundles
  – Real-time data collection is optimal
    • Used as a checklist to ensure patient receives all appropriate interventions

• Outcome
  – Mortality
    • ICU and hospital
  – Hospital length of stay
  – Cost per case
    • Total and indirect

• Process
  – Core measures
  – Data elements that measure implementation of 3-hour and 6-hour bundle
Measuring and Improving *(cont.)*

How data is collected impacts use:

<table>
<thead>
<tr>
<th>Data Utilization</th>
<th>Prospective</th>
<th>Concurrent</th>
<th>Retrospective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipatory review of patient record can impact current care</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Data abstracted in real time or within 24 hours</td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Serves as a prompt to execute bundle or the next phase of the bundle</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Recommended for new improvement teams</td>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Recommended for advanced improvement teams or those that have demonstrated success with process measures</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

Surviving Sepsis Campaign, Society of Critical Care Medicine, website accessed 1/26/2017
Measuring and Improving (cont.)

Common challenges can be insufficient feedback, data, and accountability:

• Strategies to overcome these challenges

  – Core sepsis team
    • Monthly multidisciplinary sepsis team meeting with consistent attendance
      - Nursing and physician champions
      - Lab, pharmacy, and radiology as needed
    • Accountable executive who understands the role, holds the team accountable, and assists with problem-solving and removing barriers
    • Timely feedback to the team who provides care to the sepsis patients
      - Achieved through data
Measuring and Improving (cont.)

Common challenges can be insufficient feedback, data, and accountability:

• Other strategies
  – Set goals and expectations for the sepsis program
  – Use examples of hospital patients in case studies for education of staff
    • Good outcomes and bad outcomes
  – Review data at:
    • Sepsis team meeting
    • Quality meeting
    • Patient safety meeting
    • Unit-based meetings
    • Medical staff/department meetings
    • Board meetings
  – Provider-specific data on compliance with bundle elements and patient outcomes, compared to the goal
  – Individual case feedback based on case reviews
Feedback to individual providers:

### Severe Sepsis/Shock Feedback Report - MICU

The purpose of this report is to give feedback on the below listed patient recently treated for Severe Sepsis/Shock, and to emphasize the current quality improvement initiative related to Sepsis. We value your input and clinical expertise on opportunities that might help us improve on any of these measures.

Notably, all the elements within the sepsis improvement checklist below are specifically related to mortality of our Severe Sepsis and Sepsis Shock patients. Thank you for your dedication and care for these patients. If you have any questions, please contact Dr. [Name].

**Patient Name:** [Name]
**ICU Arrival Date & Time:** [Date]

#### Severe Sepsis

**Sepsis/Shock Time (Close Zero):** [Time]

**Sepsis/Shock Initiation:** [Date]

**Sepsis/Septic Shock Clinical Pathway:** [Pathway]

**Septic Quality Indicators**

<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Recall</th>
<th>Goal Met</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 Hour Measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactate Acid</td>
<td>Down within 3h of Severe Sepsis (Lact Acid 3h)</td>
<td>[Value]</td>
<td></td>
</tr>
<tr>
<td>Blood Culture before Administration</td>
<td>Down before ASC (Blood-WBC Frenzy)</td>
<td>[Value]</td>
<td></td>
</tr>
<tr>
<td>Broad Spectrum Antibiotic</td>
<td>Hang IV of 3h from Sepsis (Lact Acid 3h)</td>
<td>[Value]</td>
<td></td>
</tr>
<tr>
<td>DDAVP Fluid No.</td>
<td>As Per A 3h from Sepsis (Lact Acid 3h)</td>
<td>[Value]</td>
<td></td>
</tr>
<tr>
<td>Central Line placed</td>
<td>Placed within 2h of Vasoactive Start</td>
<td>[Value]</td>
<td></td>
</tr>
<tr>
<td><strong>6 Hour Measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vasopressors Started for SBP &lt; 90 or MAP &lt; 60</td>
<td>Started 1h of Persistent Hypotension After Fluid Bolus</td>
<td>[Value]</td>
<td></td>
</tr>
<tr>
<td>CBV Measurement</td>
<td>CBV Measurement 3h after Vasopressor Start</td>
<td>[Value]</td>
<td></td>
</tr>
<tr>
<td>Repeat Fluid Order</td>
<td>Order Fluid within 3h of Vasopressor Start</td>
<td>[Value]</td>
<td></td>
</tr>
<tr>
<td>Repeat Lactate Acid</td>
<td>[Value]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Consensus:**

[Decision Resources, Inc. All Rights Reserved.]
Measuring and Improving (cont.)

Next steps after compiling data are to identify gaps in the application of evidence:

- Set performance targets
  - For example, achieving 90% compliance with obtaining lactates within 3 hours

- Prioritize area to work on first
  - Focus on screening and the 3-hour bundle
    - Then move to the 6-hour bundle

- Understand the “why” for gaps
  - “Go and see”
    - Walk the process, talk with frontline staff
  - Cause and effect
    - Fishbone

- Define action plan
  - IHI Model for Improvement
  - PCDA
    - Tests of change
Measuring and Improving (cont.)

Sepsis Practice Collaborative Model
4-Tier Process for Program Implementation

- Organizational Consensus That Severe Sepsis Must Be Managed Early and Aggressively
- Early Screening with Tools and Triggers
- Implementation of the Sepsis Bundles
- Measuring Success

Hand Washing

- VAE (VAP) Bundle
- CAUTI
- BSI

Infection Prevention

- Documentation Improvement ~ Accurate Coding

Adapted from: Sepsis Solutions International

1 Continuous Quality Improvement
Measuring and Improving *(cont.)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Responsibility</th>
<th>Due Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assemble team</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Identify executive sponsor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Educate team on evidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Project charter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Baseline data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Define screening tool and process for ED, ICU, Floor, RRT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Define screening audit process</td>
<td></td>
<td></td>
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<tr>
<td>8. Develop triggers/processes to alert staff when time to move from 3 hours to shock bundle</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9. Develop and implement an educational plan for all staff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Develop an implementation plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Data measurement and feedback</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lessons Learned

Keys to success:

- Team in place with key stakeholders overseeing implementation
- Project coordinator with lead clinical staff on each unit
- Sepsis resource/coordinator rounds frequently on units
- Strong physician leadership on team
- Reminders to staff through use of bedside sepsis tools/checklist
- Empowerment of nursing staff to prevent errors
Keys to success:

• Administrative support to help manage barriers

• Review data monthly to identify opportunities for improvement
  – Real-time follow-up whenever possible

• Provider-specific feedback or report cards related to performance

• Support from a collaborative

• Education, data, coaching, education
Conclusion by The Academy

• The Academy extends thanks to our presenter as well as our attendees – and welcomes any questions, comments, or feedback regarding this presentation.

  – At this time, we would like to begin our Q&A session
NOTE TO ATTENDEES

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