Sepsis Gap Analysis Results and Next Steps at your Facility

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SEPSIS ALLIANCE
Suspect Sepsis. Save Lives.

SEPSIS COORDINATOR NETWORK
Resources and Guidance for Improved Outcomes

Founding Sponsor

Network Sponsors

ACCELERATE DIAGNOSTICS
Edwards
La Jolla Pharmaceutical
About Sepsis Alliance

- Founded in 2007
- Nation’s leading sepsis organization
- Working in all 50 states
- Sepsis.org – 2.5 million visits a year
- Focus on:
  - Public awareness
  - Provider education
  - Survivor support
  - Advocacy
  - Partnership

Dr. Carl Flatley
Help spread the word:

Social Media, Infographics, Flyers
Host an Event: Everything you need to host your own event
Patient Toolkit: Get all the information and tools needed to be sepsis smart
Public Service Announcements: Share the stories of sepsis survivors and their loved ones
Sepsis Information Guides: 50 sepsis guides
Spanish resources available
It’s About TIME™, a national initiative

When it comes to sepsis, remember **IT’S ABOUT TIME**. Watch for:

**T** Damn high or low body temperature

**I** Infection signs or symptoms

**M** Mental decline or confusion

**E** Extremely sick or ill

Sepsis Gap Analysis Results and Next Steps at Your Facility

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Sepsis Solutions International LLC
Disclosures

Angela Craig

• Nurse Consultant with Edwards Lifesciences.
• Speaker Bureau: ELS
• Baxter KOL Team

Pat Posa

• Consultant-Michigan Hospital Association Keystone Center
• Consultant-HRET Hospital Improvement Innovation Network (HIIN)
Overview-Objectives

At the end of the webinar you should be able to:

1. Describe common gaps when evaluating current state of sepsis care in a facility

2. Discuss current gaps between the evidence and your hospital’s sepsis program

3. Prioritize and plan your next actions to improve your sepsis program
Infection Prevention

VAE (VAP) Bundle
Organizational Consensus that Severe Sepsis Must be Managed Early and Aggressively
Implementation of the Sepsis Bundles
Early Screening with Tools and Triggers
Measuring Success CQI¹
Rapid Improvement

Hand Washing

VAE (VAP) Bundle
CAUTI
CLABSI
Non-vent HAP

Infection Prevention

Documentation Improvement ~ Accurate Coding

Adapted from: Sepsis Solutions International

¹Continuous Quality Improvement
# Gap Analysis: TIER 1

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>YES</th>
<th>NO</th>
<th>NA</th>
<th>Action Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizational Commitment/ Team</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician and nursing leadership participate in action planning for sepsis initiatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multidisciplinary team in place and monthly meetings (providers, nursing, quality, care management, etc) from various care areas, ED, ICU, Med Surg, Perinatal, pediatrics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Executive sponsor receives regular data reports and provides feedback</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sepsis Team is part of reports to Critical care or quality structure in hospital</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing sepsis is aligned with hospital’s quality, safety or organizational goals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline data collection completed for process and outcome data</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dedicated Sepsis resource/ Sepsis Coordinator</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dedicated Sepsis Resource in place (in comments identify title)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTE allocation/ time commitment to sepsis role</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site/ sites supported</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other responsibilities in the role</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What Gaps did you find in TIER 1?

What would you say your biggest gap is in Tier 1?
A. The right team is not in place
B. You lack executive sponsorship that is engaged
C. Sepsis is no aligned with your organizations goals
D. You do not have a sepsis coordinator that can give the time to this initiative because of their other roles
Role of Executive Sponsor

- Review project plans
- Review results from first team meeting
- Identify anticipated barriers that senior leader can help address
- Enlist support and help AND ASK for a sponsor to be assigned to the project
Challenges with Physician Buy In

- Cook book medicine
- “I know I can treat them better” or “I have been treating this patient my whole career”
- “I don’t have enough time”
Strategies to Address Buy In

- Use hospital sepsis mortality data and nationally data to show it makes up the majority of deaths
- Strong informal leaders connect individually
- Identify who’s opinion they would respect and provide discussion or feedback
- Individual physician data on patients treated including bundle compliance
- Quick turn around time on data to change behavior
Role of the Sepsis Coordinator

- Facilitates implementation/evaluation of the Sepsis program including all systems necessary for the multidisciplinary approach throughout the continuum of care.
- Makes regular rounds on sepsis patients to evaluate appropriateness of orders, treatment plans, nursing intervention, physician documentation and compliance with the Sepsis bundle.
- Utilizes currently available reports to identify sepsis cases and facilitates data collection process and assesses and analyzes outcomes.
- Collaborates with frontline staff to identify on-going care concerns related to sepsis care.
- Collaborates with leadership and colleagues in identifying sepsis quality of care issues.
Role of the Sepsis Coordinator

- Determines baseline compliance with physician documentation and compliance with the Sepsis bundle.
- Provides real time/detailed feedback to all clinical providers and departments and scheduled updates to the Sepsis Collaborative Team and work groups.
- Assist the rapid response team and other hospital staff, when necessary, if dealing with a patient situation.
- Conducts sepsis organizational tracers to identify quality and safety issues.
- Analyze data to identify trends and issues, also use improvement tools to assist with problem solving and action planning.
- Provides formal and informal education to medical and clinical staff.
- Maintains knowledge of current trends and developments in the sepsis management, fields of quality, and safety.
HCA added sepsis coordinators to all facilities (FTE was based upon sepsis volume)

– Severe sepsis/septic shock mortality dropped from 22% to 15%

– Bundle compliance improved to 61%

– Other key elements initiated were order sets, sepsis alerts, routine screening, sepsis champions and community outreach

Presentation at Colorado Hospital association Sepsis Program

Infection Prevention

VAE (VAP) Bundle

Organizational Consensus that Severe Sepsis Must be Managed Early and Aggressively

Early Screening with Tools and Triggers

Implementation of the Sepsis Bundles

Measuring Success CQI¹

Rapid Improvement

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Documentation Improvement ~ Accurate Coding

¹Continuous Quality Improvement
## Gap Analysis: TIER 2

<table>
<thead>
<tr>
<th>Identification/Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early alert or warning system/process in place in the ED or describe triggers for sepsis screening:</td>
</tr>
<tr>
<td>ED</td>
</tr>
<tr>
<td>ICU</td>
</tr>
<tr>
<td>INPATIENT UNITS</td>
</tr>
<tr>
<td>PERINATAL</td>
</tr>
<tr>
<td>PEDIATRICS</td>
</tr>
<tr>
<td>Is a screening process completed consistently as designed?</td>
</tr>
<tr>
<td>All ED patients are screened/assessed for sepsis in triage?</td>
</tr>
<tr>
<td>All ICU patients are screened/assessed for sepsis upon admission and every shift – describe process</td>
</tr>
<tr>
<td>All med surg patients are screened/assessed for sepsis upon admission and every shift – describe process</td>
</tr>
<tr>
<td>All OB patients are screened/assessed for sepsis upon admission and every shift – describe process</td>
</tr>
<tr>
<td>All pediatric patients are screened/assessed for sepsis upon admission and every shift – describe process</td>
</tr>
<tr>
<td>Does the process include specific actions by nurse when a positive screen is obtained?</td>
</tr>
<tr>
<td>Rapid Response Team (RRT) process in place for sepsis</td>
</tr>
<tr>
<td>If yes describe process in comments, if no describe response expectations to positive screening or sepsis identification</td>
</tr>
</tbody>
</table>
What Gaps did you find in TIER 2?

What do you think the biggest gap in Tier 2 is in your facility?

A. routine screening in all areas of hospital not consistently being done

B. Lack of a nurse driven protocol with defined next steps for patients with a positive screen for severe sepsis?

C. Lack of follow up on missed screens

D. Other (please document in the chat box)
Tier II: Screening for Severe Sepsis
Milestones and Checklist

• Develop screening process for ED, rapid response team, ICU and house wide
• Develop audit process to evaluate compliance and effectiveness
• Ensure screening process has clear “next steps” defined for nursing staff

If you don’t screen you will miss patients that may have benefited from the interventions

2. Schorr C. et al Journal of Hospital Medicine, 2016;11:S32-S39
**Patient Units Severe Sepsis Screening Tool**

**Severe Sepsis = Infection + SIRS + Organ Dysfunction**

**Directions:** The screening tool is for use in identifying patients with severe sepsis. Screen each patient upon admission, once per shift and PRN with change in condition.

**DATE:**

**TIME:**

<table>
<thead>
<tr>
<th>I. SIRS-Systemic Inflammatory Response Syndrome (two or more of the following):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature greater than or equal to 100.4°F or less than or equal to 96.8°F</td>
</tr>
<tr>
<td>Heart Rate greater than 90 beats/minute</td>
</tr>
<tr>
<td>Respiratory Rate greater than 20 breaths per minute</td>
</tr>
<tr>
<td>WBC greater than or equal to 12,000/mm3 or less than or equal to 4,000/mm3 or greater than 0.5 KU/L bands</td>
</tr>
<tr>
<td>Blood glucose greater than 140 mg/dL in non-diabetic patient</td>
</tr>
</tbody>
</table>

If check two of the above, move to II

<table>
<thead>
<tr>
<th>II. Infection (one or more of following):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected or documented infection</td>
</tr>
<tr>
<td>Antibiotic Therapy (not prophylaxis)</td>
</tr>
</tbody>
</table>

If check none of above - Negative screen for severe sepsis (Please initial) – answer infection question NO in I View. Call physician for serum lactate acid order and move to III

If check one of above – answer infection question YES in I View, call physician for serum lactate acid order and move to III

<table>
<thead>
<tr>
<th>III. Organ Dysfunction (change from baseline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(one or more of the following within 3 days of new infection)</td>
</tr>
<tr>
<td>Respiratory: SaO2 less than 90% OR increasing CI requirements</td>
</tr>
<tr>
<td>Cardiovascular: SBP less than 90mmHg OR 40mmHg less than baseline OR MAP less than 65mmHg</td>
</tr>
<tr>
<td>Renal: urine output less than 0.5mL/kg/hr; creatinine increase of greater than 0.5mg/dL from baseline</td>
</tr>
<tr>
<td>CNS: altered consciousness (unrelated to primary neuro pathology)</td>
</tr>
<tr>
<td>Glasgow Coma Score less than or equal to 12</td>
</tr>
<tr>
<td>Hematologic: platelets less than 100,000; INR greater than 1.5</td>
</tr>
<tr>
<td>Hepatic: Serum total bilirubin greater than or equal to 4mg/dL</td>
</tr>
<tr>
<td>Metabolic: Serum lactic acid greater than or equal to 2mmol/L</td>
</tr>
</tbody>
</table>

Negative screen for severe sepsis (Please initial)

If check one in section III or a severe sepsis alert fire, patient has screened positive for severe sepsis:

1. Call rapid response team
2. Call physician, physician assistant or nurse practitioner and implement urgent measures protocol.
3. Initiate or ensure IV access (2 large bore IV’s if no central access)
4. Obtain a venous blood gas (peripheral draw), serum lactate acid, CBC (if it has been greater than 12 hrs since last test), two sets of blood cultures (if greater than 24 hours since last set)
5. If patient is hypotensive: Give crystalloid (NS) fluid bolus – 30mL/kg over one hour or as fast as possible until hypotension resolved, unless known EF is less than 35% or active treatment for heart failure

---

**For Lactate Acid 3-2.9**

NO

Initiate General Care Severe Sepsis Bundle on back and complete interventions

---

For Lactate acid 3-3.9 or Initial hypotension that responded to the 30 mL/kg fluid bolus, Initiate transfer to IMC

---

YES

**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. Lactate acid greater than or equal to 4 mmol/L with any SIRS

Initiate Intermediate Care Severe Sepsis Bundle on back and complete interventions.

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

Initiate the Septic Shock Pathway and complete interventions

RN Signature, Initial Date & Time:

---

Note: The tool includes a decision tree for managing patients with sepsis, including criteria for lactate acid levels and decisions on fluid resuscitation and transfer protocols.

---

The tool is intended to guide clinical decision-making and ensure timely intervention for patients at risk for severe sepsis.
Electronic Routine Screening

Sepsis Screening Tool

The purpose of this tool is to facilitate EARLY RECOGNITION & TREATMENT OF SEPSIS
THIS TOOL DOES NOT REPLACE CLINICAL JUDGEMENT

SIRS/Organ Dysfunction/Sepsis Screening Tool Retrieval

SIRS
Temperature °Celsius 38.6 (09/20/2017 07:30)
Pulse Rate 89 (09/20/2017 07:30)

Note: Blood sugar > or = 140 is SIRS criteria for a non-diabetic patient

Retrieval Script includes;
SIRS, Organ Dysfunction and Sepsis Screening Tool

Temp <36 °C (96.8 °F) or Temp > 38.3 (101 °F)

Severe Sepsis Screen

Organ Dysfunction Screen

Lactic acid greater than 2 mMol/L within 12 hrs
Systolic blood pressure (SBP) less than 90 mmHg
Mean Blood Pressure (MAP) less than 65 mmHg
Systolic blood pressure (SBP) decrease of 40 mmHg from baseline
Acute respiratory failure. BIPAP or Mechanical Ventilation
Creatinine increase more than 0.5 mg/dL within past 72 hrs
Creatinine greater than 2 mg/dL in past 72 hrs not chronic kidney dx
Bilirubin greater than 2 mg/dL, within past 72 hrs
Platelet count less than 100,000 K/mL, within past 72 hrs
aPTT greater than 60 sec in past 72 hrs without anticoagulants
INR greater than 1.5 within past 72 hrs without anticoagulants

Positive SEVERE Sepsis Screen Occurs when one selection is chosen once one Organ Dysfunction is identified.

Automatically defaults to a Positive SEVERE Sepsis Screen.

SEVERE Sepsis Screen is activated

Negative SEVERE Sepsis Screen – occurs when criteria for positive screen is not met.

A POSITIVE Sepsis Screen Result plus 1 or more signs of Organ Dysfunction = Positive SEVERE Sepsis

Severe Sepsis Screening Result

○ Negative SEVERE Sepsis Screen  ○ Positive SEVERE Sepsis Screen
Infection Prevention
VAE (VAP) Bundle
BSI
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VAE (VAP) Bundle CAUTI BSI

Infection Prevention

Documentation Improvement ~ Accurate Coding

Sepsis Practice Collaborative Model
4 Tier Process for Program Implementation

Adapted from: Sepsis Solutions International

1Continuous Quality Improvement
<table>
<thead>
<tr>
<th>Implementing the Bundles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis order sets are in place and utilized by providers (CPOE/Paper)</td>
</tr>
<tr>
<td>Sepsis provider documentation tools are in place and utilized to meet SEP-1 requirements</td>
</tr>
<tr>
<td>Communication between physician and nurses related to diagnosis and treatment plan specific for sepsis; handoffs readily incorporate appropriate sepsis language</td>
</tr>
<tr>
<td>Appropriate utilization of central lines; adequate skill and resource to place them when clinical criteria met</td>
</tr>
<tr>
<td>Able to get lactate levels in one hour or less. Able to get antibiotics in one hour for ICU, 3 hours for ED</td>
</tr>
<tr>
<td>Process in place for reassessment of volume status and tissue perfusion for septic shock patients</td>
</tr>
<tr>
<td>Identify resistance/barriers to components of bundles and developed solutions (fluid resus, blood cultures before antibiotics, repeat lactate, etc.)</td>
</tr>
</tbody>
</table>
Identify Gaps in Application of Evidence

• Set performance targets
  – IE: 90% compliance with obtaining lactates in 3 hours
• Prioritize area to work on first
  – Focus on screening and the 3 hour bundle first then move to the 6 hour bundle
• Understand the ‘why’ there are gaps
  – “go and see”—walk the process, talk with front line staff
  – Cause and effect—Fishbone
• Define action plan—
  – Can use IHI Model for Improvement
  – PDCA—tests of change
What Gaps did you identify in TIER 3?

What is your biggest gap for Tier 3 in your facility?
A. Not reaching targeted goals for each of the processes in the 3 hour bundle
B. Not reaching targeted goals for each of the processes in the 6 hour bundle
C. Not understanding ‘why’ you are not meeting your targets
D. Administering the appropriate amount of fluid
E. Other (document in chat box)
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 30ml/kg crystalloid for hypotension or lactate ≥4mmol/L

† “time of presentation” is defined as the time of earliest chart annotation consistent with all elements severe sepsis or septic shock ascertained through chart review.
Time Zero

- Will always be when the chart annotation suggests signs and symptoms are all present.
- May be from nursing charting/screens, lab flow sheets, physician documentation, order sets, anything with a time stamp.
- Will = triage time if all signs and symptoms are present at triage.
- *It does not require MD documentation of the clock starting and relying on this alone in the ED would likely result in late clock starts.*

Sepsis coding is increasing but is accurate. More aggressive treatment seen from 2003 to 2013

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) ≥65mmHg.

6. In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was ≥4 mmol/L, re-assess 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) by licensed independent practitioner can include vital signs, cardiopulmonary, capillary refill, pulse and skin findings. Or document sepsis reassessment completed

**Or one of the following (for core measure after July, 2018)**
- Measure CVP
- Measure ScvO2
- Bedside cardiovascular ultrasound
- Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge
Challenges with the Bundles

- Timely antibiotics
- 30ml/kg fluid bolus
- Repeat lactate
- Sepsis reassessment
3723 patients at 138 hospitals in seven countries (all patients from the PROCESS, PROMIS and ARISE trials)

Prior to randomization >92% of patients were identified early, and provided the 3 hour bundle (including 2L of fluid and antibiotics-given within 70 minutes of presentation to ED)

No difference in 90 day mortality between EGDT and Usual Care groups

Authors stated: “It remains possible that general advances in the provision of care for sepsis and septic shock, to the benefit of all patients, explain part or all of the difference in findings between the trial by Rivers et al. and the more recent trials”
In 2013, New York began requiring hospitals to follow protocols for the early identification of sepsis.

April 2014 to June 30, 2016

49,331 patients at 149 hospitals

82.5% had the 3-hour bundle completed within 3 hours (median time was 1.3 hrs)

Longer time to completion of the 3-hour bundle was associated with higher risk-adjusted in-hospital mortality as well as longer time to administration of antibiotics (14% higher for both)
Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock

*2,154 septic shock patients

*Effective antimicrobial administration within the 1st hour of documented hypotension was associated with increased survival in patients with septic shock.

*Each hour of delay over the next 6 hours was associated with an average decrease in survival of 7.6% (range 3.6-9.9%)

CCM 2006 Vol. 34 No.6
Antibiotics are Key

Each elapsed hour between presentation and antibiotic administration was associated with a 9% increase in the odds of mortality with sepsis of all severity strata.

Increased Time to Initial Antimicrobial Administration Is Associated With Progression to Septic Shock in Severe Sepsis Patients

Bristol B. Whiles, BS1; Amanda S. Deis, MS1; Steven Q. Simpson, MD2

- Each hour until initial antimicrobial administration was associated with an 8% increase in progression to septic shock.
- Patients who progressed to shock had significant increase in hospital LOS (18.7 days vs 9.66 days) and mortality (30.1% vs 7%)
Antibiotics Challenges

- 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 delay administration
  - Higher APACHE, older, presence of co-morbidities, HLOS before hypotension, dx of pneumonia, admin to academic hospitals & transfer from medical wards

Fluid Boluses

- How fast should they be given?
  - Gravity or pressure bag, not by infusion pump
- What about dialysis patients?
- What about patients with CHF or low EF?

Fluid bolus is given rapidly, IV wide open, pressure bag if necessary; goal is 500ml every 15-30 minutes
Heart Failure—Going to Flood My Patient
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%

Early Fluid Resuscitation is Key

Increased Fluid Administration in the First Three Hours of Sepsis Resuscitation Is Associated With Reduced Mortality

A Retrospective Cohort Study

Sarah J. Lee, MD, MPH; Kannan Ramar, MBBS, MD; John G. Park, MD, FCCP; Ognjen Gajic, MD, FCCP; Guangxi Li, MD; and Rahul Kashyap, MBBS

CHEST OCTOBER 2014

↑ mortality with later fluid administration 13.3% (30 minutes) versus 16.0% (31 to 60 minutes) versus 16.9% (61 to 180 minutes) versus 19.7% (>180 minutes)

After adjusting for confounders, the higher proportion of total fluid received within the first 3 hrs was associated with decreased hospital mortality
Early Fluid Resuscitation is Key

Decrease in hospital mortality was observed primarily in patients with heart and/or kidney failure (p<0.04) who received at least 2 Liters fluid resuscitation for severe sepsis with lactate between 2.1-3.9

Early fluid initiation (30-120 minutes) was associated with significantly lower hospital mortality, mechanical ventilation, ICU admission, LOS and ICU days & no harm seen to the patients
Application of Fluid Resuscitation in Adult Septic Shock

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 Crystalloid*

- Pneumonia or ALI with high flow oxygen requirements
  - Not intubated/mechanically ventilated
  - Intubated/mechanically ventilated
  - 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

- ESRD on hemodialysis or CHF
  - Total of 30 ml/kg crystalloid* 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,
   - cardiotoracic 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.

ALI=acute lung injury; CHF=congestive heart failure; CMS= US Centers for Medicare and Medicaid Services; CVP=central venous pressure; ESRD=end stage renal disease; kg=kilograms; ml=milliliters; oxyhemoglobin; ScvO2=superior vena cava oxygen saturation
Repeat Lactate Strategies

- Repeat lactate can be drawn anytime after fluid bolus
- Reflex lactate for any initial lactate greater than 2
- 2\textsuperscript{nd} lactate order included when first one is ordered
Reassessment

Requirement changes in July, 2018 for CMS

- Still a requirement for physician/APP to reassess volume status and tissue perfusion, just no requirement to state how that reassessment occurred or what the outcome of the assessment was

- IE: “ perfusion reassessed; “sepsis reassessment done”

- Only need to do one out of 2 of the reassessment measurement (CVP, ScvO2, Echo, dynamic responsiveness)

Strategies to comply with documentation requirements

- Standard provider note or dot phrase

- Expect that whomever orders the 30ml/kg fluid bolus is responsible for the reassessment documentation

- Part of a sepsis checklist
Infection Prevention

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Early Screening with Tools and Triggers

Implementation of the Sepsis Bundles

Measuring Success

Continuous Quality Improvement

1 Continuous Quality Improvement

*Adapted from: Sepsis Solutions International*
## Gap Analysis: TIER 4

### Components

<table>
<thead>
<tr>
<th>Component</th>
<th>YES</th>
<th>NO</th>
<th>NA</th>
<th>Action Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define real-time method for tracking patients (i.e., severe sepsis patient log)</td>
<td></td>
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### Education

<table>
<thead>
<tr>
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<th>YES</th>
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<th>Action Steps</th>
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<tbody>
<tr>
<td>Provider Education completed – Define in status column</td>
<td></td>
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</tr>
<tr>
<td>Nursing Education completed – Define is status column</td>
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<tr>
<td>General Sepsis Education – Define in column</td>
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<td>Tools to assist bedside staff have been implemented (i.e., algorithm, clinical pathway, pocket cards, etc.)</td>
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</table>
Gap Analysis: TIER 4

What do you perceive to be the biggest challenge in Tier 4?

A. Lack of using your process and outcome data to identify opportunities for improvement?
B. Lack of feedback to the appropriate people who did not implement the protocol to reach the goals
C. Lack of analyzing your outcome data?
D. Other (document in the chat box)
What outcome and process data should be collected and reviewed?

- Understand your volume of sepsis, severe sepsis and septic shock—look at mortality, LOS, cost, readmission

- Stratify your data by:
  - POA, non-POA
  - Medical vs surgical
  - Discharge disposition
  - Sepsis severity

- Process Metrics
  - Overall SEP-1 compliance
  - 3 hour bundle compliance
  - Each individual element compliance
Feedback to Individual Providers

Severe Sepsis/Septic Shock Feedback Report - MICU

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

Performing all the elements within the recommendation bundles listed below in a timely manner can significantly reduce mortality of our Severe Sepsis and Septic Shock patients. Thank you for your dedication and care for these patients. If you have any questions, please contact Dr. [Name], MICU Sepsis Champion or Dr. [Name], ED Quality Coordinator or Emily C. Swiss, Sepsis Program Leader at [Contact Information].

<table>
<thead>
<tr>
<th>Patient Name:</th>
<th>TDN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED Arrival Date &amp; Time:</td>
<td>ED RN:</td>
</tr>
<tr>
<td>ED Physician:</td>
<td>ED Resident:</td>
</tr>
<tr>
<td>Floor Arrival Date, Time, &amp; Unit:</td>
<td>Pt Transferred From:</td>
</tr>
<tr>
<td>ICU Arrival Date &amp; Time:</td>
<td>Resident:</td>
</tr>
<tr>
<td>Nursing:</td>
<td>PRISM Score</td>
</tr>
<tr>
<td>RN:</td>
<td>Severe Sepsis:</td>
</tr>
<tr>
<td>Severe Sepsis:</td>
<td>Septic Shock Time (Time Zero)</td>
</tr>
<tr>
<td>Severe Sepsis/Septic Shock Clinical Pathway:</td>
<td>Code Sepsis Page:</td>
</tr>
<tr>
<td>Data/Time:</td>
<td>Data/Time Criteria SIRS</td>
</tr>
<tr>
<td>Date/Time Criteria Organ Dysf:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sepsis Quality Indicators</th>
<th>Date &amp; Time</th>
<th>Result</th>
<th>Goal Met (Y/N)</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hour Measures</td>
<td></td>
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<tr>
<td>Lactic Acid</td>
<td></td>
<td></td>
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<tr>
<td>Blood Cultures before Antibiotics</td>
<td>Drawn before ABX (Look 48hrs Prior)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Broad-Spectrum Antibiotics</td>
<td>Hung within 3h of Severe Sepsis (Look 24hrs Prior)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>30mL/kg Fluid Bolus</td>
<td>As Fast As Possible. Infused within 3h of Severe Sepsis. (Goal = Y/N if Hypotensive, LA ≥ 4, OR Septic Shock)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight in kg:</td>
<td>At least one BP documented</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Check BP in hour after conclusion of 30mL/kg fluid bolus</td>
<td>Placed within 2h of Vasopressor Start</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Line Placed, If Requires Vasopressors</td>
<td>Started 1hr of Persistent Hypotension After Initial Fluid Bolus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Line Placed, If Requires Vasopressors</td>
<td>CMS Requirement-Started within 6h of Septic Shock</td>
<td></td>
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<tr>
<td>Vasopressor Started for SBP &lt; 90 or MAP ≤ 65mmHg</td>
<td>Documented within 6h of Septic Shock</td>
<td></td>
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<tr>
<td>CMS Requirement- Vasopressor Started for SBP &lt; 90 or MAP ≤ 65mmHg</td>
<td>Repeat Lactic Acid</td>
<td></td>
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<td></td>
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<tr>
<td>Repeat Focused Exam by MD/AP (vS, Cardiopulm, Cap Refill, Peripheral Pulse, AND Skin Findings) OR 2 Measures (CVP, ScVO2, Bedside Cardiovascular Ultrasound, SV Optimization with Fluid Challenge/Passive Leg Raise)</td>
<td>Repeat within 6h of Septic Shock</td>
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<tr>
<td>Repeat Lactic Acid</td>
<td>Repeat within 6h of Severe Sepsis ≥ 2</td>
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</tbody>
</table>

Comments:
Determining the Gaps: Understanding Why

- Success relies on a complex set of tasks being completed in a limited amount of time
- Requires data collection and analysis to determine the bottleneck(s)
- Must analyze the workflow for patients arriving in the ED as well as those who become septic after hospitalization
- QI/PI teams are a great resource when available
- Multiple tools have proven successful
- Some examples of diagnostic tools used for analysis, and the “therapeutic” tools developed out of the analysis
Current State Mapping Exercise

- Perform a “Go See” with ED and ICU staff and draw a Current State Map for the septic patient flow
  - Include Customer & Requirements, Supplier & Inputs, major steps, technology, information flow, rework loops, delays, and data boxes with job titles

- If there is no septic patient presenting, consider:
  - Interviewing the people who would be involved in the sequence of the septic patient flow: ask them to demonstrate what they would do if they were working with a septic patient
  - Simulating a patient: choose one of the staff to “be” a septic patient and observe the simulated treatment as the patient progresses to ICU management
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

If bundle is not used, describe these resuscitation components

% pt. screened:
Total L/T to diagnosis:
% bundle use:
Labs:
Meds:
IV’s:
Monitoring:
CVP:
MAP:
ScvO2:
SV:
Echo:
# Current State Issues

<table>
<thead>
<tr>
<th>Process Box &amp; Issue</th>
<th>Top 2 reasons why</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1a</td>
</tr>
<tr>
<td></td>
<td>1b</td>
</tr>
<tr>
<td>2</td>
<td>2a</td>
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<tr>
<td></td>
<td>2b</td>
</tr>
<tr>
<td>3</td>
<td>3a</td>
</tr>
<tr>
<td></td>
<td>3b</td>
</tr>
<tr>
<td>4</td>
<td>4a</td>
</tr>
<tr>
<td></td>
<td>4b</td>
</tr>
</tbody>
</table>
Why is the initial 30ml/kg fluid bolus not being given

Themes:
1. Knowledge and comfort in using protocol
2. Accepting when physician doesn’t want to do protocol without going up chain of command
3. Fear of fluid in elderly, ESRD and CHF
4. Blame hypotension on other conditions
5. Unassertive RN staff

Initial Fluid bolus (30ml/kg) not given in 3 hrs

- Not trusting high lactate and continue to recheck
- Patient not symptomatic with low BP
- RN not sure where pt is on pathway
- SBP >90 but MAP <65—Rn doesn’t know what might be in shock
- New RN a fluid of starting fluids on someone where no fluids are running
- Doctors order small amt of fluid
- Staff knowledge deficit
- Nurse like exact orders in EMR before starting interventions—causes delays

Process/critical thinking

- Give fluid over long period of time or just increase IV rate

People/knowledge

- Physician not familiar with protocol and not consulting with senior

Lack of education on appropriate fluid needed

- Physical support especially on shift
- Lack of documentation when fluid actually given

Policy

- New interns
- Staff not aware of sepsis protocoldoesn’t require physician order
- Unassertive RN staff—at advanced beginner stage
- Not properly using screening tool
- Fear of fluid overload of renal or CHF patients (RNs and doctors)
- Lack of education on appropriate fluid needed

Environment/EMR

- Staff busy with more than one patient
- Getting orders in and charting in MAR (should treat like a code and chart later)

Communication

- Poor between residents and nursing staff
- Responses from physicians: Physician aware and don’t respond or RN just accepts

Communication breakdown RN-RN shift report

- Not sure what they received on another unit
- Takes too long for physician to come and see the patient

Lack of IV access

Material

- Need to elicit support of CNL and charge nurse/nurse coordinators

- Appropriate lab not drawn/ordered
- Appears cardiogenic not septic
- “his BP has been low before” accept low BP as normal
- Unaware of baseline BP
- Delay in identifying change in condition
- Infection not suspected—other causes pursued
- Blame hypotension on other conditions or source (i.e. sedation)
- Physician pushback
- Nurse/Doctor hesitant because being derailed
- Patient who hover or have unclear presentation
The **PDSA Cycle** for Learning and Improvement

1. **Plan**:
   - Set objective
   - Ask questions and make predictions (why)
   - Plan to carry out the cycle and data collection (who, what, where, when)

2. **Do**:
   - Carry out the plan
   - Document problems and unexpected observations
   - Collect and begin data analysis

3. **Study**:
   - Analyze the data
   - Compare data to predictions
   - Summarize what was learned

4. **Act**:
   - What changes are to be made?
   - Next cycle?
### Planning a Test of Change Worksheet Example

<table>
<thead>
<tr>
<th>SM</th>
<th>WHAT do you need to test this idea?</th>
<th>WHO will be involved in the tests?</th>
<th>HOW will you inform participants?</th>
<th>WHERE will the test occur?</th>
<th>WHEN will the test occur?</th>
<th>HOW will you know it is successful?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test routine screening on medical unit</td>
<td>Paper screening form that includes looking for infection, SIRS and organ dysfunction</td>
<td>3 staff nurses on the medical unit</td>
<td>Meet with 3 staff nurses to review the tool and process</td>
<td>9E medical unit</td>
<td>Week of June 5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Screening tool was completed correctly without any confusion and same result is obtained by staff nurse and sepsis team member</td>
</tr>
</tbody>
</table>

When will you compare what happened to your prediction? Week of June 12<sup>th</sup>

When will you decide what to do next? Try it with all the nurses on the day shift and night shift for one week

<table>
<thead>
<tr>
<th>SM</th>
<th>What did you predict will happen?</th>
<th>What happened?</th>
<th>What did you learn?</th>
<th>What are the next steps?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine sepsis screening</td>
<td>Screening form/process will be easy to follow and result in a correct screen</td>
<td>Screening process was easy and the results were correct</td>
<td>Nurses like having clear direction on the form for what to do with a positive screen for severe sepsis</td>
<td>Expand the test of change to the rest of the day shift and the night shift</td>
</tr>
</tbody>
</table>
What other challenges are you facing?
What questions do you have?
Pat Posa RN, BSN, MSA, CCRN-K, FAAN
Quality Excellence Leader
St. Joseph Mercy Hospital
Ann Arbor, MI
patposa07@gmail.com
Sepsis Solutions
International LLC

Angela Craig
APN, MS, CCNS
Clinical Nurse Specialist/ICU
Cookeville Regional Medical Center
Cookeville, TN
acraig@crmchealth.org
## Sepsis Gap Analysis and Action Steps

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>YES</th>
<th>NO</th>
<th>NA</th>
<th>Action Steps</th>
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<tbody>
<tr>
<td>Physician and nursing leadership participate in action planning for sepsis initiatives</td>
<td></td>
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<tr>
<td>Multidisciplinary team in place and monthly meetings (providers, nursing, quality, care management, etc) from various care areas, ED, ICU, Med Surg, Perinatal, peds</td>
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<tr>
<td>Executive sponsor receives regular data reports and provides feedback</td>
<td></td>
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<tr>
<td>Sepsis Team is part of/ reports to Critical care or quality structure in hospital</td>
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<tr>
<td>Managing sepsis is aligned with hospital’s quality, safety or organizational goals</td>
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<tr>
<td>Baseline data collection completed for process and outcome data</td>
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<table>
<thead>
<tr>
<th>Dedicated Sepsis resource/ Sepsis Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated Sepsis Resource in place (in comments identify title)</td>
</tr>
<tr>
<td>FTE allocation/ time commitment to sepsis role</td>
</tr>
<tr>
<td>Site/ sites supported</td>
</tr>
<tr>
<td>Other responsibilities in the role</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identification/ Screening</th>
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</thead>
<tbody>
<tr>
<td>Early alert or warning system/process in place in the ED or describe triggers for sepsis screening:</td>
</tr>
<tr>
<td>ED</td>
</tr>
<tr>
<td>ICU</td>
</tr>
<tr>
<td>INPATIENT UNITS</td>
</tr>
<tr>
<td>PERINATAL</td>
</tr>
<tr>
<td>PEDIATRICS</td>
</tr>
<tr>
<td>Is a screening process completed consistently as designed?</td>
</tr>
<tr>
<td>All ED patients are screened/ assessed for sepsis in triage?</td>
</tr>
<tr>
<td>All ICU patients are screened/ assessed for sepsis upon admission and every shift – describe process</td>
</tr>
<tr>
<td>All med surg patients are screened/ assessed for sepsis upon admission and every shift – describe process</td>
</tr>
<tr>
<td>All OB patients are screened/ assessed for</td>
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</tbody>
</table>
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<tr>
<td>Sepsis upon admission and every shift – describe process</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>All pediatric patients are screened/assessed for sepsis upon admission and every shift – describe process</td>
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<tr>
<td>Does the process include specific actions by nurse when a positive screen is obtained?</td>
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<tr>
<td>Rapid Response Team (RRT) process in place for sepsis</td>
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<tr>
<td>If yes describe process in comments, if no describe response expectations to positive screening or sepsis identification</td>
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</table>

#### Implementing the Bundles

<table>
<thead>
<tr>
<th>Requirement</th>
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</tr>
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<tbody>
<tr>
<td>Sepsis order sets are in place and utilized by providers (CPOE/Paper)</td>
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<tr>
<td>Sepsis provider documentation tools are in place and utilized to meet SEP-1 requirements</td>
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<tr>
<td>Communication between physician and nurses related to diagnosis and treatment plan specific for sepsis; handoffs readily incorporate appropriate sepsis language</td>
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<tr>
<td>Appropriate utilization of central lines; adequate skill and resource to place them when clinical criteria met</td>
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<tr>
<td>Able to get lactate levels in one hour or less Able to get antibiotics in one hour for ICU, 3 hours for ED</td>
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<td></td>
</tr>
<tr>
<td>Process in place for reassessment of volume status and tissue perfusion for septic shock patients</td>
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<tr>
<td>Identify resistance/barriers to components of bundles and developed solutions (fluid resus, blood cultures before antibiotics, repeat lactate, etc.)</td>
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<tr>
<td>Do you have the tools you need to optimize fluid based on hemodynamics?</td>
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<tr>
<td>Do you have the ability to know time to antibiotic?</td>
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#### Measurement/Continuous Improvement

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<tr>
<td>implementation of the bundles</td>
<td></td>
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<td>Provide a sample of topics for the team meeting</td>
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<td>Tools to assist bedside staff have been implemented (i.e., algorithm, clinical pathway, pocket cards, etc.)</td>
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Challenges: New Sepsis Definitions
• **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 greater than or equal to 4mmol/L OR continued hypotension (systolic BP<90 or 40mmHg decrease from their baseline) after initial fluid bolus (30ml/kg)
**Sepsis 3:**
*Singer et al, JAMA 2016. PMID: 26903338*

- **Sepsis is:** ‘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:** infection plus 2 or more SOFA (Sequential Organ Failure Assessment) points

- **Septic shock:** vasopressor-dependent hypotension + lactate >2

* Sepsis-3 includes clinical criteria to predict life-threatening disease
qSOFA: (have 2 or more of these, then evaluate for SOFA)

Respiratory Rate $\geq 22$
Altered Mental Status
Systolic BP $\leq 100$ mmHg
Challenges with New Sep-3 Definitions

- SIRS not part of the definition:
  - the most appropriate use for SIRS is that its presence prompts an immediate search for both infection, as its possible source, and organ dysfunction, as its possible companion
- Late recognition
  - “sepsis is a problem only when life-threatening organ dysfunction is already present fails to recognize the spectrum of the illness, minimizes the importance of infection to its evolution and as its principal driver and devalues systemic host response as a harbinger of the onset of organ failure”
- Doesn’t recognize ‘cryptic shock’
- People will begin to use qSOFA as a screening tool
  - qSOFA and SOFA are predictors of mortality; they are not test of early sepsis at risk to progress to organ failure
- Only their predictive ability for morality and prolonged ICU stay have been evaluated, not their utility in reducing mortality

“As the physician say of hectic fever, that in the beginning of the malady it is difficult to detect but easy to treat, but in the course of time, having been neither detected nor treated in the beginning, it becomes easy to detect but difficult to treat”

Niccolo Machiavelli, 14th Century
SCN activities support ongoing communication, education and network building among health professionals passionate about improved sepsis care. Activities include:

- Educational webinars that highlight sepsis best practices in a variety of healthcare settings
- Active discussion and peer support via an online community
- Training and education opportunities
- Resource drive to find information on a range of topics, including core measures, clinical practice guidelines, patient screening and identification tools, education resources and more

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To provide sepsis best-practice resources and guidance to sepsis coordinators and all health professionals across the country

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Scott Weiss, MD, MSCE, FAAP, FCCM
Children’s Hospital of Philadelphia

Leslie Dervan, MD, MS
Elaine Beardsley MN, ACCNS-P, CPEN
Seattle Children’s Hospital

September 18, 2018 @ 1:00 pm ET
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