Indiana Sepsis: Screening

December 10, 2019
Rebecca Hancock, PhD, RN
rh Hancock@ihaconnect.org
Our Mission

Advancing Health in Indiana
- Engage and inspire health care providers
- Create safe cultures
- Create reliable systems of care
- Prevent patient harm in Indiana

PREVENT PATIENT HARM
To create high reliability organizations who collaborate and engage in continuous improvement to achieve best in class outcomes

INCREASE PATIENT AND FAMILY ENGAGEMENT
To engage patients and families in all aspects of their care and seek their input and inclusion in advisory capacities throughout organizations

IMPROVE COMMUNITY HEALTH
To partner with communities and stakeholders to develop, plan, and coordinate initiatives that span the prevention and care continuum

LEAD A CULTURE OF SAFETY
To create an environment of mutual trust, respect, and transparency among organizations, patients, and families

A State of Mind
Painting created by Regina Holliday during the 2018 Indiana Patient Safety Summit

IHAconnect.org/Quality-Patient-Safety
Sepsis Across the Continuum

Sepsis Topical Conversations & Best Practice Sharing
Monthly IHA Office Hour
2nd Tuesday, 11a.m. -12p.m. EST

November 12: Sepsis Bundle Compliance
https://zoom.us/j/467670260
Phone +1 646 558 8656
Meeting ID: 467 670 260

December 10: Screening
https://zoom.us/j/762464469
Phone +1 646 558 8656
Meeting ID: 762 464 469

January 14: Post-Sepsis Syndrome & Readmissions
https://zoom.us/j/577595555
Phone +1 646 558 8656
Meeting ID: 577 595 555F

February 11: Prevention
https://zoom.us/j/227228146
Phone +1 646 558 8656
Meeting ID: 227 228 146

www.survivesepsis.com
2019 IHA Sepsis Toolkit & webinar recordings & podcasts

2018 Preventing Hospital Acquired Non-Vent Pneumonia – Dr. JoAnn Brooks
IHAconnect.org/Quality-Patient-Safety
## 2019 IHA Sepsis Toolkit Resources

<table>
<thead>
<tr>
<th>Resource Title</th>
<th>Author(s)</th>
<th>Views</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Might my infection become sepsis?</td>
<td>Dr. Lindsay Weaver</td>
<td>630</td>
<td>2 months ago</td>
</tr>
<tr>
<td>A Daughter’s Concerns in Care Transitions</td>
<td>Karin Kennedy</td>
<td>58</td>
<td>3 months ago</td>
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<tr>
<td>Lisa: A Widow’s Journey: Grief to Advocacy</td>
<td>Lisa Bartlett Dziali</td>
<td>145</td>
<td>3 months ago</td>
</tr>
<tr>
<td>Sepsis Treatment Successes with Joint Commission Certification</td>
<td>Rayce Barnett, MSN, RN</td>
<td>38</td>
<td>3 months ago</td>
</tr>
<tr>
<td>Recognizing Pediatric Sepsis with Dr. Brian Wagers</td>
<td>Brian Wagers RN, FAAP</td>
<td>175</td>
<td>3 months ago</td>
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<tr>
<td>Sepsis Bundle Compliance Success with Dr. Raymond</td>
<td>Raymond Lee Kiser</td>
<td>59</td>
<td>3 months ago</td>
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<tr>
<td>Sepsis Survivors’ Rehabilitation Research with Dr. Arnold</td>
<td>Babar Khan, MD, MBA</td>
<td>29</td>
<td>3 months ago</td>
</tr>
<tr>
<td>Pediatric Sepsis Treatment</td>
<td>Tyler S. Arnold, MD</td>
<td>119</td>
<td>3 months ago</td>
</tr>
<tr>
<td>Sepsis Recovery - Suzanne’s Story</td>
<td>Suzanne’s story</td>
<td>217</td>
<td>3 months ago</td>
</tr>
</tbody>
</table>

Visit [www.survivesepsis.com](http://www.survivesepsis.com) for more resources.
“I had been awake for nearly 24 hours and I craved a shower and a nap. Four hours later he called me. ‘I’m in trouble!’ he said. ‘I need you to come back.’ There was an odd sound to his voice, but I didn’t question his concerns and I flew back to the hospital.”

“At the second hospital they started antibiotics, 12 hours after she presented to the emergency room at the first hospital. She never received any of the care described in the Surviving Sepsis Guidelines. Because my mother was more than 70 years old, she was not being treated aggressively. My brother and I decided to immediately bring her home via air ambulance.”

“Why didn’t anyone at the hospital or any of his doctors tell us that he had or could have sepsis? By the time I had hunted for his diagnosis on the paperwork sent home, he probably had the beginnings of what would become sepsis. There were no checklists for us—nothing that would have ever led us to believe that this infection would kill him.”

©Rebecca Hancock
My Brother-in-Law Hadn’t Felt Well for a Couple Days
He had flu-like symptoms and the doctor diagnosed him with pneumonia. On the third day of his symptoms persisting, my sister took him to a small local emergency room. The emergency room also thought it was pneumonia, admitted him and started him on antibiotics. Within an hour, he started having difficulty breathing, and an ambulance transported him to a larger hospital. He stopped breathing on the way. By the time I arrived, only 10 minutes after the ambulance, his skin was mottled and he was totally unresponsive. I have worked in emergency medicine on ambulances and in the fire service for 43 years and, aside from traumatic events, I have never seen anything progress so quickly. He was a great guy, and I miss him a lot. He was never sick and took good care of himself. His death was tragic and unexpected. I had never heard of sepsis until I saw the coroner’s report.
Quotes from families of victims

- We can send people to another planet but we can't fix something that seems so simple....I miss her terribly Screw you sepsis.

- I know my entire family struggles every day with "what ifs" - had we only known the signs of Sepsis, this would have had a very different outcome.
Indiana sepsis volumes & mortalities - IHA Datalink

ICD-10 Sepsis Diagnosis Primary or Secondary

APR DRG 720 Septicemia Primary Diagnosis (72% of patients in 2018)
Post Op Sepsis

- Increased risk for in hospital mortality with post-op sepsis: 33.95 odds ratio
- Per discharge impact on length of stay: 10 days
- Per discharge impact on costs: $45,264

Source: IBM Watson Truven Health Analytics Fact file, 2015
Objectives

• Identify signs of sepsis using SIRS criteria
• Briefly describe pathophysiology of sepsis
• Share successes from other hospitals
• Identify next steps in sepsis vigilance for screening
Sepsis Screening DRAFT Gap Analysis

• Does your organization have a sepsis screening tool/system in the ED?
• Does your organization have a sepsis screening tool/system in inpatient departments?
• Is your sepsis screening automated within your organization's Electronic Medical Record with an early alert or warning system?
• Does your organization have a separate screening tool/system for children?
Sepsis Screening DRAFT Gap Analysis

• Does your hospital screen every adult patient during initial evaluation in the ED?
• Does your hospital utilize qSOFA to identify organ dysfunction in sepsis screening?
• Does your hospital utilize Systemic Inflammatory Response Syndrome (SIRS) criteria to screen for sepsis?
• Do you screen every adult inpatient once a shift and with acute changes in condition?
Risk factors for sepsis

- Recent UTI, pneumonia, or operative event
- Diabetes
- Immunosuppressive therapy (chemo, transplant)
- Elective surgery
- Chronic renal failure
- Alcohol abuse
- Splenectomy
- Non-modifiable factors: age (very old or young), gender (M>F), race (B>W)

(Kumar et al, 2006; Torres et al, 2004; Englert & Ross, 2015)
Most Common Sources of Sepsis

- Skin or soft tissue (7%)
- Abdominal (16%)
- Respiratory (33%)
- Urinary (44%)
- Up to 22% sources unknown (Kumar et al, 2006)

- Device (9.3%)
- Wound / soft tissue (2.9%)

Pediatric

Respiratory (57.2%)
Genitourinary (21.6%)
Device (9.3%)
Abdominal (8.4%)
Wound / soft tissue (2.9%)

All Adult

Respiratory (44%)
Genitourinary (21%)
Abdominal (21%)
Skin (6%); Wound (4%); Catheter (4%)

Older Adult

Urinary (44%)
Respiratory (33%)
Abdominal (16%)
Skin or soft tissue (7%)

(Ruth et al, 2014; Kumar et al, 2006; Levy 2010; ElSohl et al, 2008)

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RHIC Sepsis Screening

• **Jack Jaeger, MSN, RN, CCRN**
  – Director RHIC Simulation Center
  – Terre Haute, IN
Sepsis: Early Recognition Through Screening

Jack Jaeger, MSN, RN, CCRN, RHIC Director
jack.jaeger@therhic.org
812-237-8489
Rural Health Innovation Collaborative
Case Study

- 50 year old woman comes into E.R. with 3 week history of respiratory infection.
- “I’m just not getting any better.”
- Unremarkable history
# ED Notes

- Generalized weakness and malaise
- Skin warm and diaphoretic
- Awake and alert

- Shortness of breath
- Auscultation: Diminished in right lower lobe
- Coughing up yellow green sputum
- X Ray: RLL Pneumonia

## Vital Signs

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Temp</td>
<td>99.7</td>
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<tr>
<td>HR</td>
<td>105</td>
</tr>
<tr>
<td>RR</td>
<td>22</td>
</tr>
<tr>
<td>BP</td>
<td>106/58</td>
</tr>
<tr>
<td>SpO2</td>
<td>86% on Room Air</td>
</tr>
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</table>

## Labs

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>WBC</td>
<td>16.5</td>
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<tr>
<td>BANDS</td>
<td>12</td>
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<tr>
<td>HGB</td>
<td>9.9</td>
</tr>
<tr>
<td>PLT</td>
<td>234</td>
</tr>
<tr>
<td>Glucose</td>
<td>165</td>
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<tr>
<td>BUN</td>
<td>26</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.2</td>
</tr>
</tbody>
</table>
Where’d She Go?

• Patient was admitted to Med-Surg floor for observation with diagnosis of pneumonia

• **Orders:** Broad spectrum antibiotic, NS @ 75cc/hr, O2 @ 3l NC, and VS q6hrs.
Day 2

- Continued General Malaise
- Shortness of Breath and congestion
- Flushed Skin
- U/O: 20-30cc/hr

**Vital Signs**

<p>| | |</p>
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp</td>
<td>101.5</td>
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<td>HR</td>
<td>120</td>
</tr>
<tr>
<td>RR</td>
<td>28</td>
</tr>
<tr>
<td>BP</td>
<td>105/62</td>
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<tr>
<td>SpO2</td>
<td>93% on 4L NC</td>
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**Labs**

<p>| | |</p>
<table>
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<tr>
<td>WBC</td>
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<tr>
<td>BANDS</td>
<td>18</td>
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<td>HGB</td>
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<tr>
<td>PLT</td>
<td>283</td>
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<tr>
<td>Glucose</td>
<td>195</td>
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<tr>
<td>BUN</td>
<td>43</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.4</td>
</tr>
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</table>
No Sepsis Screening....

- Blood Cultures were drawn
- Given Tylenol 650mg PO
- Increased IV Fluid Rate to 100cc/hr
- Continued Observation
- Continued Antibiotic Therapy
Day 3 0730

- Pt is lethargic and responding only to repeated verbal stimuli
- Skin hot to touch. Diaphoretic
- Short, diminished breaths
- Course crackles in bases, rhonchi in upper lobes

**Vital Signs**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
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<tr>
<td>Temp</td>
<td>103.1</td>
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<tr>
<td>HR</td>
<td>128</td>
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<tr>
<td>RR</td>
<td>30</td>
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<tr>
<td>BP</td>
<td>78/40</td>
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<tr>
<td>SpO2</td>
<td>86% on 50% VM</td>
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</table>
At this moment, the patient’s average mortality rate:

Over 80%
Multi-Organ Dysfunction

• Respiratory = 20%
• Cardiovascular = 20%
• Renal = 20%
• Neurologic = 20%
• Total = 80% or greater
Over the Next Week....

- Respiratory Failure: Intubated and Mechanical Ventilation
- Eventual Tracheostomy Placement
- Renal Failure (BUN:56, CREAT: 2.9)
- Hemodialysis and Hemofiltration
- Cardiovascular Failure. Vasopressors and Inotropic Agents
- Received **NUMEROUS** Procedures, Scans, and Tests
She remained in the ICU for 15 days prior to her death.
Mortality Statistics

- Sepsis: 250,000
- Breast Cancer: 40,920
- Prostate Cancer: 29,430
- Influenza & Pneumonia: 51,537
- Motor Vehicle: 37,461
- Diabetes: 80,058
- AIDS: 4,130

An EPIDEMIC!

- Affects 1.7 million Americans per year
- 3rd leading cause of death in the US
- Occurs in just 10% of Hospital Patients, but contributes to as many as half of hospital deaths
- US Spends $24 BILLION per year to treat

- 700 People die each day from Sepsis in the US –ONE EVERY 2 MINUTES

What the CDC Tells Us

• 80% of sepsis begins outside of the hospital
• 7 out of 10 patients with sepsis had recently used health services or had chronic diagnosis requiring frequent care
• 4 types of infections most connected with Sepsis:
  • Lung
  • Urinary Tract
  • Skin
  • Gut
Early Screening is ESSENTIAL!!

- Decreased Mortality by 30% by Implementing Mandatory Sepsis Screening with Nurse-Driven Protocol for Drawing Lactates

- Decreased Mortality by 47% Across Health System By Implementing Mandatory Sepsis Screening
  - Sharp, 2015 Journal Of Health Affairs

- Adoption of an EMR-Based Screening Tool and a Sepsis Treatment Bundle Drove Down Mortality Rates Markedly Over Four Years by 65%
  - Cheney, 2019 Health Leaders
“Time-Sensitive Assessment and Treatment for a Time-Sensitive Situation”
Acute MI

• Pre-hospital 12 Lead ECG on Ambulance
• Rapid Response Call for Chest Pain
• Rapid Troponin Level
• D2B (Door To Balloon): Less than 90 Minutes from ER Doors to PCI
• Cath Lab Always Set Up for Emergent Cath
Acute Stroke

• Recognition of Symptoms (FAST)
• Rapid Response Team Alerted
• NIH Stroke Scale
• Rapid Labs: PT/PTT/INR/PLT
• From onset of stroke symptoms:
  • Rapid Response team notified immediately
  • 10 minutes or less to contact primary care physician
  • 20 minutes or less to obtain neurologist consult
  • 25 minutes or less to obtain head CT
  • 60 minutes or less to give thrombolytic for ischemic, non-hemorrhagic stroke
Golden Hour of Trauma

• From Moment of Injury to Definitive Treatment
• Assessment and Management
• Every Action Must Have Lifesaving Purpose
• Organized, Detail-Oriented, Selective, Rapid
“Except on few occasions, the patient appears to die from the body's response to infection rather than from it.”

Sir William Osler – 1904
The Evolution of Modern Medicine
Defining Sepsis

Infection

Sepsis

Severe Sepsis

Septic Shock
Possible infective processes present in sepsis

1. Pneumonia / Empyema
2. Urinary Tract
3. Acute Abdominal
4. Meningitis
5. Skin/Soft Tissue
6. Idiopathic
7. Bone/Joint
8. Wound Bed
9. Bloodstream Catheter
10. Endocarditis
11. Implantable Device
12. Perforated Viscus
## SIRS Criteria

A non-specific clinical response including >2 of the following:

- Temperature >38°C or <36°C
- Heart rate >90 beats/min
- Respiratory rate >20/min
- White blood cell count >12,000/mm³ or <4,000/mm³ or >10% immature neutrophils

As well as infection, SIRS can also be caused by trauma, burns, pancreatitis and other insults.

Diagram of the coagulation cascade with interactions involving protein C, factor VIIIa, factor Va, interleukin-6, interleukin-1, TNF-α, and fibrin.

- Endothelium
- Monocyte
- Tissue factor
- Interleukin-6
- Interleukin-1
- TNF-α
- Activated protein C
- Factor VIIIa
- Factor Va
- Inactivation
- Prevention of activation
- PAI-1
- Suppression of fibrinolysis
- Thrombin
- Fibrin
- Activated protein C
- Neutrophil
- Inhibition
- Tissue factor
- Reduction of rolling
- Fibrin clot

Pathways:
- Inflammatory Pathway
- Procoagulant Pathway
- Anti-fibrinolytic Pathway
Healthy volunteer
Sepsis Definition

Life-Threatening Organ Dysfunction Caused by a Dysregulated Host Response

- JAMA, Feb. 23, 2016: Sepsis-3, New criteria for defining sepsis

The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)

Mervyn Singer, MD, FRCP; Clifford S. Deutschman, MD, MS; Christopher Warren Seymour, MD, MSc; Manu Shankar-Hari, MSc, MD, FFICM; Djillali Annane, MD, PhD; Michael Bauer, MD; Rinaldo Bellomo, MD; Gordon R. Bernard, MD; Jean-Daniel Chiche, MD, PhD; Craig M. Coopersmith, MD; Richard S. Hotchkiss, MD; Mitchell M. Levy, MD; John C. Marshall, MD; Greg S. Martin, MD, MSc; Steven M. Opal, MD; Gordon D. Rubenfeld, MD, MS; Tom van der Poll, MD, PhD; Jean-Louis Vincent, MD, PhD; Derek C. Angus, MD, MPH
SEPSIS CLINICAL CRITERIA

INFECTION

CHANGE IN:

S - SEPSIS-RELATED
O - ORGAN
F - FAILURE
A - ASSESSMENT

≥ 2

PaO₂ / FiO₂
GLASGOW COMA SCALE
BILIRUBIN

HYPOTENSION OR VASOPRESSORS

PLATELETS

CREATININE, OLIGURIA
### Sequential (Sepsis-Related) Organ Failure Assessment Score (SOFA)

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>SCORE</th>
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<tbody>
<tr>
<td>Pulmonary</td>
<td>0</td>
</tr>
<tr>
<td>PaO2/FiO2, mmHg (kPa)</td>
<td>&gt;400 (53.3)</td>
</tr>
<tr>
<td>Coagulation</td>
<td>0</td>
</tr>
<tr>
<td>Platelets, x10 /ul</td>
<td>&gt;150</td>
</tr>
<tr>
<td>Liver</td>
<td>0</td>
</tr>
<tr>
<td>Bilirubin, mg/dL (umol/L)</td>
<td>&lt;1.2 (20)</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>0</td>
</tr>
<tr>
<td>MAP &gt;70 mmHg</td>
<td>MAP&lt;70 mmHg</td>
</tr>
<tr>
<td>Central Nervous System</td>
<td>0</td>
</tr>
<tr>
<td>Glasgow Coma Scale Score</td>
<td>15</td>
</tr>
<tr>
<td>Renal</td>
<td>0</td>
</tr>
<tr>
<td>Creatinine, mg/dL</td>
<td>&lt;1.2 (110)</td>
</tr>
<tr>
<td>Urine Output, mL/d</td>
<td></td>
</tr>
</tbody>
</table>

Sepsis Definition

Life-Threatening Organ Dysfunction Caused by a Dysregulated Host Response

- Renal
- Respiratory
- Hepatic
- Hematological
- Central nervous system
- Unexplained metabolic acidosis
- Cardiovascular

Infection SIRS Sepsis Septic Shock Death
Sepsis Definition

Life-Threatening Organ Dysfunction Caused by a Dysregulated Host Response

- Renal
- Respiratory
- Hepatic
- Hematological
- Central nervous system
- Unexplained metabolic acidosis
- Cardiovascular

Septic shock
Severe sepsis with hypotension refractory to adequate volume resuscitation
The Krebs Cycle
Glucose + Oxygen → Krebs → Pyruvate
Glucose → Krebs → Lactic Acid → Oxygen
# Measurement of Lactate

<table>
<thead>
<tr>
<th>Lactate Level</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 to 2.0 mmol/dl</td>
<td>Normal Lactate Level</td>
</tr>
<tr>
<td>2.0 to 4.0 mmol/dl</td>
<td>Diminished Oxygenation</td>
</tr>
<tr>
<td>Greater than 4.0 mmol/dl</td>
<td>Global Tissue Hypoxia</td>
</tr>
</tbody>
</table>
Important Steps...

- Education, Education, Education!!!
  - The “KNOW WHY for BUY IN” principle
- Standardized Screening Tool (SSC)
- Implementation in ED, ICU, MED SURG, Oncology, Post Partum/OB
- Status Sepsis in ED and RRT (Similar to Code STEMI)
- Computer Documentation and Automation
- Measurement is Essential
- Nurse-Driven Protocols for Ordering Appropriate Labs and beginning Bundle Initiation.
- Compliance with Screening, Bundles, Outcomes
- Unit Auditors/Mentors/Super-users
- Standardized Handoff Measures/SBAR (that include sepsis)
Evaluation for Severe Sepsis Screening Tool

Instructions: Use this tool to screen patients for severe sepsis in the emergency department, on the medical/surgical floors, or in the ICU.

1. Is the patient's history suggestive of a new infection?
   - Pneumonia, empyema
   - Urinary tract infection
   - Acute abdominal infection
   - Meningitis
   - Skin/subcutaneous infection
   - Other infection
   - Bone/joint infection
   - Wound infection
   - Blood stream catheter infection
   - Endocarditis
   - Implantable device infection

   Yes  No

2. Are any two of the following signs & symptoms of infection both present and new to the patient? Note: laboratory values may have been obtained for inpatients but may not be available for outpatients.
   - Hypothermia ≤ 36°C (96.8°F)
   - Tachypnea >= 20 bpm
   - Leukocytosis (WBC count = 12,000/mL - 20,000/mL)
   - Leukopenia (WBC count < 4000/mL)
   - Tachycardia > 90 bpm
   - Hyperglycemia (plasma glucose >140 mg/dl or 7.7 mmol/L in the absence of diabetes)
   - Hypoglycemia

   Yes  No

If the answer is yes, to both questions 1 and 2, suspicion of infection is present:
- Obtain: lactate, blood cultures, CBC with differential, basic chemistry labs, bilirubin.
  - At the physician’s discretion obtain: UA, chest x-ray, amylase, lipase, ABG, CRP, CT scan.

3. Are any of the following organ dysfunction criteria present at a site remote from the site of the infection that are NOT considered to be chronic conditions? Note: in the case of bilateral pulmonary infiltrates the remote site stipulation is waived.
   - SBP < 90 mmHg or MAP < 65 mmHg
   - SBP decrease > 40 mm Hg from baseline
   - Creatinine > 2.0 mg/dl (176.8 mmol/L) or urine output < 0.5 ml/hr for 2 hours
   - Bilirubin > 2 mg/dl (34.2 mmol/L)
   - Platelet count < 100,000 µL
   - Lactate > 2 mmol/L (18.0 mmol/L)
   - C-reactive protein (CRP) > 10 mg/L or ESR > 60 mm
   - Acute lung injury with PaO2/FiO2 < 200 in the absence of pneumonia as infection source
   - Acute lung injury with PaO2/FiO2 < 200 in the presence of pneumonia as infection source

   Yes  No

If suspicion of infection is present AND organ dysfunction is present, the patient meets the criteria for SEVERE SEPSIS and should be entered into the severe sepsis protocol.

Date: / / (circle: dd/mm/yy or mm/dd/yy)  Time: ___ : ___ (24 hr. clock)  Version 7.2.13
Causes of Maternal Death in US

Causes of Pregnancy-Related Death In the United States, 2006-2010

- Cardiovascular disease: 14.6%
- Infection/sepsis: 13.6%
- Noncardiovascular disease: 12.7%
- Cardiomyopathy: 11.8%
- Hemorrhage: 11.4%
- Thrombotic pulmonary embolism: 9.6%
- Preeclampsia/eclampsia: 9.4%
- Cerebrovascular accident: 6.2%
- Amniotic embolism: 5.3%
- Anesthesia complications: 0.7%

Percentage of All Pregnancy-Related Deaths (N = 3,358)

Notes: The cause of death is unknown for 4.7% of all pregnancy-related deaths. "Noncardiovascular disease" refers to endocrine, hematologic, immunologic, and renal conditions.
# SIRS Criteria for Sepsis

<table>
<thead>
<tr>
<th>Variable</th>
<th>SIRS Criteria</th>
<th>Normal For Pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>&gt; 100.4 or &lt; 95.0</td>
<td>96.8 – 101.0</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>&gt; 20</td>
<td>12 – 24</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>&gt; 90 bpm</td>
<td>60 – 119 bpm</td>
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<tr>
<td>White Blood Cell Count</td>
<td>&gt; 12.0 or &lt; 4.0</td>
<td>5.7 – 16.9</td>
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## Sepsis Obstetric Scoring System (SOS)

<table>
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<th>Normal</th>
<th>Low abnormal range</th>
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<tr>
<td></td>
<td>+4</td>
<td>+3</td>
<td>+2</td>
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<tr>
<td>Temperature (°C)</td>
<td>&gt;40.9</td>
<td>39-40.9</td>
<td>38.5-38.9</td>
</tr>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart Rate (beats per minute)</td>
<td>&gt;179</td>
<td>150-179</td>
<td>130-149</td>
</tr>
<tr>
<td>Respiratory Rate (breaths per minute)</td>
<td>&gt;49</td>
<td>35-49</td>
<td>25-34</td>
</tr>
<tr>
<td>SpO₂ (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Blood Cell Count (μL)</td>
<td>&gt;39.9</td>
<td>25-39.9</td>
<td>17-24.9</td>
</tr>
<tr>
<td>% Immature Neutrophils</td>
<td>≥10%</td>
<td>&lt;10%</td>
<td></td>
</tr>
<tr>
<td>Lactic Acid (mmol/L)</td>
<td>≥4</td>
<td>&lt;4</td>
<td></td>
</tr>
</tbody>
</table>
Sepsis Obstetric Scoring System (SOS)

Severe sepsis with acute organ dysfunction has a mortality rate of up to 40%, which increases to 60% if septic shock develops [2]. The early recognition of sepsis and implementation of evidence-based therapies have been documented to improve outcomes and decrease sepsis-related mortality [3].

The Sepsis in Obstetrics Score (S.O.S.) was created by modifying validated scoring systems in accordance with recognized physiologic changes of pregnancy. "The Sepsis in Obstetrics Score is a validated pregnancy-specific score to identify risk of ICU admission for sepsis with the threshold score of 6 having a negative predictive value of 98.6%." A score of less than 6 rules out the need for ICU admission [1,7].

**Sepsis Obstetrics Scoring System**

<table>
<thead>
<tr>
<th>Temperature (Centigrade) (°C)</th>
<th>SpO2% blood oxygen saturation</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 - 38.4 (-36.8 - 101.1°)</td>
<td>&gt; 92% ≥ 92%</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>White blood count ul. (5.7 - 16.9)</td>
</tr>
<tr>
<td>&lt; 90</td>
<td>&gt; 7.7</td>
</tr>
<tr>
<td>Heart Rate (beats per minute)</td>
<td>% Immature Neutrophils (&lt;10%)</td>
</tr>
<tr>
<td>&lt; 119</td>
<td>&lt; 10%</td>
</tr>
<tr>
<td>Respiratory Rate (breaths per minute)</td>
<td>Lactic Acid (mmol/L)</td>
</tr>
<tr>
<td>12 - 24</td>
<td>&gt; 0.4</td>
</tr>
</tbody>
</table>

Calculate Sepsis Obstetrics Score (S.O.S.)
A Better Way
PATIENT INFO

- 42 year old female with a 2 week history of a urinary tract infection.
- Seen in physicians office 1 week earlier & received oral antibiotic
- Presented to the E.R. with fever and general malaise.
- Admitted as an inpatient on to Med-Surg Unit for IV antibiotic treatment.
- This is her third day in the hospital.
# 1600 Assessment

- Patient has Become More Lethargic, But Still Following Commands
- Pupils Round and Reactive
- Warm, Flushed Skin
- Cloudy, Amber Urine in F/C, Decreased Output
- Lung Fields With Congestion In Lower Lobes

## Vital Signs

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp</td>
<td>102.5</td>
</tr>
<tr>
<td>HR</td>
<td>120</td>
</tr>
<tr>
<td>RR</td>
<td>24</td>
</tr>
<tr>
<td>BP</td>
<td>122/68</td>
</tr>
<tr>
<td>SpO2</td>
<td>91% on 2L NC</td>
</tr>
</tbody>
</table>

## Labs

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC</td>
<td>18.0</td>
</tr>
<tr>
<td>BANDS</td>
<td>14</td>
</tr>
<tr>
<td>HGB</td>
<td>8.9</td>
</tr>
<tr>
<td>PLT</td>
<td>112</td>
</tr>
<tr>
<td>Glucose</td>
<td>195</td>
</tr>
<tr>
<td>BUN</td>
<td>43</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.4</td>
</tr>
</tbody>
</table>
**Confirmed or Suspected Infection**

- ? Pneumonia, Empyema
- ? Urinary tract infection
- ? Acute abdominal infection
- ? Meningitis
- ? Skin/soft tissue infection
- ? Bone/joint infection
- ? Wound infection
- ? Bloodstream catheter infection
- ? Endocarditis
- ? Implantable device infection
- ? Perforated viscus
- ? Other
- ? No factors

**S.I.R.S. Criteria**

- ? Hypothermia (<36.0°C/96.8°F)
- ? Hypothermia (<36.0°C/96.8°F)
- ? Tachycardia (>90 BPM)
- ? Tachypnea (>20 BPM)
- ? Acutely altered mental status
- ? Leukocytosis (WBC >12,000)
- ? Leukopenia (WBC < 4,000)
- ? Hyperglycemia (Plasma glucose > 120 in absence of diabetes)
- ? No factors

! (PF15) Exit Pathway & (PF6) Prev Page  Press Enter to Continue

*Must select something in each category, even if it's "No Factors"
WARNING

THIS PATIENT MAY BE AT RISK FOR SEVERE SEPSIS. A STAT LACTATE LEVEL WILL BE ORDERED AUTOMATICALLY BY THE COMPUTER.

*** RE-CHECK THE PATIENT'S BLOOD PRESSURE ***

IF POSSIBLE, ASSESS THE FOLLOWING FOR SIGNS OF ORGAN DYSFUNCTION:

1. Lactate level $\geq 4.0$ mmol/L
2. Decreased urine output ($< 0.5$ cc/kg/hr)
3. Increased Creatinine level ($> 0.5$ mg from baseline level)
4. $\text{PaO}_2 < 70$ mm Hg
5. Systolic blood pressure $< 90$ mm Hg
6. Platelets $< 100,000$
7. New onset of decreased level of consciousness

IF ANY PRESENT, CONTACT OPERATOR TO ACTIVATE RAPID RESPONSE TEAM TO ASSESS PT

? PHYSICIAN ORDERED NOT TO DRAW LACTATE LEVEL

REASON: -----------------------------------------

PRESS ENTER TO CONTINUE
<table>
<thead>
<tr>
<th>Lab Results</th>
<th>Further Orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactate</td>
<td>Fluid Bolus of 30ml/kg of Lactated Ringers over 30 min.</td>
</tr>
<tr>
<td></td>
<td>Levaquin IV Stat</td>
</tr>
<tr>
<td></td>
<td>Repeat Lactate in 4 hours</td>
</tr>
<tr>
<td></td>
<td>Norepinephrine IV gtt for MAP &lt;65</td>
</tr>
<tr>
<td></td>
<td>TXM for 2 units PRBC</td>
</tr>
</tbody>
</table>

- Rapid Response Team Activated
- Physician Called and RRT Recommendation to Transfer to ICU
- Warm, Flushed Skin
- Cloudy, Amber Urine in F/C, Decreased Output
- Lung Fields With Congestion In Lower Lobes
Next day

- Lactate Level: 1.8
- BUN/Creat: 33/1.3
- Temp: 100.5
- BP: 110/64
- Resp: 22
- Sat: 94% on 3L NC

**PATIENT ALERT AND FOLLOWING COMMANDS**
PATIENT REMAINED IN ICU FOR 3 DAYS PRIOR TO TRANSFER.

DISCHARGED TO HOME ON DAY 7
Thank you! Questions?

Jack Jaeger
RHIC Director
jack.jaeger@therhic.org
812-237-8489
➢ Went live with Sepsis bundle in October 2013
➢ Change sepsis screening tool last year – listed criteria for sepsis as first step, second step source of infection
➢ Participate in daily multidisciplinary rounds in ICU
➢ Round daily in medsurge and ED for sepsis
➢ Partnering with neighboring LTC facility for sepsis prevention, education and bundle with processes specific for that institution

Judy Brohm RN, CCRN 812-283-2849
Judy.brohm@clarkmemorial.org
Call to Action

• Assess your Emergency Department and inpatient areas for sepsis screening (& rapid treatment) processes.
• Plan community education event to reduce Time to Treatment.
• Educate hospital staff to be leaders in sepsis awareness.
Knowing my body, I realized that something was horribly wrong with me. I called an ambulance and asked the EMT’s to transport me to the hospital I go for my medical care. By the time I arrived at the Emergency Room, my fever was 103.9. I don’t remember much of what went on in that room in the Emergency Department that night.

My Infectious Disease Doctor told me that when I had the shakes, coldness and shivering that a bacteria was invading my body and if that ever happened again I should go directly to the emergency room. Education is every with sepsis. I know that my Doctor saved my life.

©Rebecca Hancock
Further questions/comments:

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– rhancock@ihaconnect.org
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