These presenters have nothing to disclose

Andy Odden, MD
Diane Jacobsen, MPH, CPHQ

IHI Expedition
Treating Sepsis in the Emergency Department and Beyond
Session 5

Today’s Host

Max Cryns, Project Assistant, Institute for Healthcare Improvement (IHI), assists programming activities for hospital settings including Expeditions (2-4 month web-based educational programs), Passport memberships, and mentor hospital relations. He also supports IHI’s networking and knowledge efforts. Max is currently in the Co-Operative Education Program at Northeastern University in Boston, MA, where he majors in Business Administration with concentrations in Entrepreneurship and Marketing. He enjoys professional and collegiate sports, playing basketball, music, the beach, and trivia.
WebEx Quick Reference

- Welcome to today’s session!
- Please use chat to “All Participants” for questions
- For technology issues only, please chat to “Host”
- WebEx Technical Support: 866-569-3239
- Dial-in Info: Communicate / Join Teleconference (in menu)

When Chatting... 

Please send your message to All Participants
Expedition Director

Diane Jacobsen, MPH, CPHQ, Director, Institute for Healthcare Improvement (IHI) is currently directing the CDC/IHI Antibiotic Stewardship Initiative, NSLIJ/IHI Reducing Sepsis Mortality Collaborative. Ms Jacobsen served as IHI content lead and improvement advisor for the California Healthcare-Associated Infection Prevention Initiative (CHAIPPI) and directed Expeditions on Antibiotic Stewardship, Preventing CA-UTIs, Reducing C. difficile Infections, Sepsis, Stroke Care and Patient Flow. She served as faculty for IHI’s 100,000 Lives and 5 Million Lives Campaign and directed improvement collaboratives on Sepsis Mortality, Patient Flow, Surgical Complications, Reducing Hospital Mortality Rates (HSMR) and co-directed IHI’s Spread Initiative She is an epidemiologist with experience in quality improvement, risk management, and infection control in specialty, academic, and community hospitals. A graduate of the University of Wisconsin, she earned her master's degree in Public Health-Epidemiology.

Today's Agenda

- Introductions
- Debrief: Session 4 Action Period Assignment
- Early Recognition and Monitoring of the Sepsis Patient on the Inpatient Floor
- Action Period Assignment
Expedition Objectives

By the end of the Expedition participants will be able to:

- Describe the latest evidence based care for patients with severe sepsis and septic shock
- Design reliable processes to ensure that each patient receives all elements of the best possible care at each opportunity
- Identify key opportunities and test changes on medical/surgical units to improve early recognition of sepsis in a care context which has been challenging for providers

Schedule of Calls

Session 1 – Clinical Updates to the Surviving Sepsis Campaign Guidelines: The 3 Hour Resuscitation Bundle
Date: Thursday, September 12, 1:00-2:30 PM ET

Session 2 – Key Considerations for Enhancing Reliability with Antibiotic Therapy in the Emergency Department and in Inpatient Floor
Date: Thursday, September 26, 1:00-2:00 PM ET

Session 3 – Lactate and Blood Culture Collection: Getting to Results Within One Hour
Date: Thursday, October 10, 1:00-2:00 PM ET

Session 4 – Ensuring Reliable Care from the Patient Perspective
Date: Thursday, October 24, 1:00-2:00 PM ET

Session 5 – Early Recognition and Monitoring of the Sepsis Patient on the Inpatient Floor
Date: Thursday, November 7, 1:00-2:00 PM ET

Session 6 – Considerations and Challenges with Fluid Resuscitation
Date: Thursday, November 21, 1:00-2:00 PM ET
**Faculty**

Andy Odden, MD, is a hospitalist at the University of Michigan and the Ann Arbor VA. His research focuses on the management and outcomes of severe sepsis on the general inpatient ward. He is the founder and Director of the Hospitalist Program at the Ann Arbor VA, where he serves as Chief of the Hospital Medicine Section and Director of the Inpatient Care Coordinator Program at that institution. He is a faculty mentor for the Michigan Transitions of Care Collaborative and an active member of the Society of Hospital Medicine. As a member of the IHI faculty, he is working with the North Shore–Long Island Jewish Health System to reduce inpatient sepsis mortality.

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**Debrief: Session 4 Action Period Assignment**

**Ensuring Reliable Care From the Patient Perspective**

- Identify one (or more) elements of the 3 hour bundle with an opportunity to improve reliability:
  - Lactate collection
  - Blood cultures prior to antibiotics
  - Antibiotics
  - Fluids

- Design a PDSA within the process of care to improve the timeliness of one (or more) of the 3 hour bundle elements
Intermountain Experience: Impact of Increased Reliability on Mortality

![Graph showing Mortality Rate over time with confidence intervals.]

Session 5 Action Period Assignment

- Design a PDSA to enhance early recognition of sepsis on the inpatient floor, considering:
  - MEWS (modified early warning system)
  - Rapid Response Team/System
  - Situational awareness
Early Recognition and Monitoring of the Sepsis Patient on the Inpatient Floor

Roadmap

- Why do we care about early recognition on the floor?
- What is the scope of sepsis on the inpatient floors?
- What are the unique barriers to identifying sepsis on the inpatient floors?
- How can sepsis recognition be improved?
Four Main Types of Patients

- Admitted with a diagnosis of sepsis from the ED
- Progression of sepsis/severe sepsis/infection from the ED
- “De novo” floor sepsis
- Transfer from the ICU after stabilization

Failure to Recognize

- Partial or substandard care to individual patients
- Incomplete view of process improvement initiatives
Surviving Sepsis Floor Sepsis Initiative

- National collaborative announced October 2013
- Recognizes the importance and unique challenges of non-ICU sepsis
- Aim: Increase early recognition and treatment of patients with sepsis outside of the ICU

Poll Question

- Does your hospital have a quality improvement effort specifically focused on improving floor (non-ED, non-ICU) sepsis?
  - Yes
  - No
  - Unknown
Sepsis on the Inpatient Floor

- Much progress in the care of the sepsis syndrome
- Recognition, treatment, and improvement efforts:
  Focused on ED and ICU populations
- Enormous potential to save and improve lives
- But is it a problem on the floor...

The “Septic” Patient
Is Sepsis a Problem on the Floor?

Where is sepsis diagnosed?
ED and ICU?

Where are these patients cared for?
The floor: “Diet Sepsis”?

How well is it recognized?
The few that “slip through the cracks”

Poll Question

- What percentage of patients with severe sepsis or septic shock outside the ICU do you think are recognized as such at the time of treatment?
  - >80%
  - 60-80%
  - 40-60%
  - 20-40%
  - <20%
Where Do Sepsis Patients Receive Care?

- Angus (CCM 2001;29(7):1304-1310)
  - 48.9% of severe sepsis patients do not receive ICU care
    - Academic: 48.2%
    - Non-academic: 49.2%
  - 32% receive all care on the inpatient ward (CCU, chronic vent excluded)

- Sundarajaran (CCM 2005;33(1):71-80)
  - 50% of severe sepsis patients do not receive ICU care

Where Do Sepsis Patients Receive Care?

<table>
<thead>
<tr>
<th>Phase of Sepsis</th>
<th>ICU Admission Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>12%</td>
</tr>
<tr>
<td>Severe Sepsis</td>
<td>32%</td>
</tr>
<tr>
<td>Septic Shock</td>
<td>75%</td>
</tr>
</tbody>
</table>


- Prospective cohort
- Rigorous definition for sepsis
- 3 Spanish hospitals
- 702 patients followed until hospital discharge
Inpatient Sepsis: A Problem

- Most conservative estimates: 32%-50% of severe sepsis do not receive ICU care

- Are the numbers inflated by the inherent flaws of epidemiologic studies? Do these data apply to the inpatient floor?

Do these Data Apply?

- Concern regarding applicability of Angus implementation using ICD-9 codes to non-ICU patients
  - Selection bias, patient differences

- Patient-level validation for non-ICU severe sepsis patients (Iwashyna et al. Med Care 2012)
  - PPV 71%
  - NPV 92%
Are the Patients Different?

- 32%-50% of severe sepsis patient never receive ICU care
- Are there systematic differences between ICU and non-ICU patients?
- Are floor sepsis patients just “less sick”?

Inpatient Sepsis: Mortality

<table>
<thead>
<tr>
<th>Phase of Sepsis</th>
<th>Non-ICU Mortality</th>
<th>Location of Treatment</th>
<th>Severe Sepsis Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe Sepsis</td>
<td>26%</td>
<td>ICU</td>
<td>32%</td>
</tr>
<tr>
<td>Septic Shock</td>
<td>53%</td>
<td>Non-ICU</td>
<td>29%</td>
</tr>
</tbody>
</table>

Esteban CCM 2007;35:1284-1289
Sundarajan (CCM 2005;33(1):71-80
Rivers Study: Baseline Variables

<table>
<thead>
<tr>
<th>Physiologic Variable</th>
<th>Treatment arm</th>
<th>Control arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>35.9 °C (+/- 3.2)</td>
<td>36.6 °C (+/- 2.3)</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>117 (+/-31)</td>
<td>114 (+/- 27)</td>
</tr>
<tr>
<td>Systolic Blood Pressure</td>
<td>106 (+/-36)</td>
<td>109 (+/-34)</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>32 (+/- 11)</td>
<td>30 (+/- 11)</td>
</tr>
<tr>
<td>WBC</td>
<td>13,600 (+/- 8,300)</td>
<td>14,200 (+/- 9,600)</td>
</tr>
<tr>
<td>Lactate</td>
<td>7.7 (+/- 4.7)</td>
<td>6.9 (+/- 4.5)</td>
</tr>
</tbody>
</table>

Other characteristics:
- Diagnosis: Pneumonia (39%), UTI (26%)
- Age: 66
- Co-morbidities: Diabetes (31%), renal failure (21%), COPD (16%)
- Blood cultures negative in 65%
- All cultures negative in 24%


Differences Between ICU and Non-ICU

- The Michigan Non-ICU Sepsis Group (Rohde JHM 2013)
  - Site of infection
  - Organ dysfunction
  - Documentation of sepsis

- Retrospective cohort
  - Detailed hospitalist review: Site of infection, organ dysfunction
  - 64 patients included in the final cohort: Limitation
Site of Infection: ICU and non-ICU

Organ Dysfunction: ICU and non-ICU
Documentation Gap = Recognition Gap?  

Rohde JHM 2013;8(5):243-247

How Well is it Recognized?

- 50% of non-ICU severe sepsis patients did not have “sepsis” of any degree documented by the treating clinician

- The clinician’s view: infection and a new organ dysfunction, not severe sepsis
Barriers to Recognition: Patient-Level

- Identifying the patient who clearly has sepsis
  - Less of a diagnostic challenge
  - Typically: septic shock, systemic hypoperfusion

- Ambiguity: Infection plus SIRS plus new organ dysfunction
  - Under-recognized
  - Anchoring bias

Barriers to Recognition: Systems

- Asynchronous information
  - Labs, vital signs, assessments

- Handoffs
  - Shift, transfer
  - MD, RN, NP, PA

- Communication within/between disciplines
  - MA, RN, physician, mid-level
Barriers to Recognition: Providers

- No single pattern to recognize
- Anchoring heuristic
  - Pneumonia + renal failure = severe sepsis?
- Multiplicities
  - Physicians
  - Nurses
  - Pharmacists
  - Wards/units

Poll Question

- What is your hospital’s biggest barrier to timely diagnosis of sepsis on the inpatient floors?
  - Timing of vital signs
  - Timing of labs
  - Physician acceptance of non-ICU sepsis
  - Delay of physician assessment
  - Handoffs between providers
  - Other
Time Zero: A Word

- Improvement strategies require an agreed-upon time zero from which process measures can be assessed
- ED: Triage time serves as a convenient time zero
- On the inpatient floor, defining time zero is challenging

Strategies for Sepsis Recognition

- MEWS-based sepsis screening
- Provider education
- Situational Awareness
- “Code sepsis”
- RRT
MEWS

- Modified Early Warning System
- Detect subtle changes in patient status before major problems develop
- Parameters: HR, BP, pulse, temp, urine output, LOC
- Develop a clear action plan based on MEWS results
  - When to involve physician, RRT, intensivist, etc.
  - Not a substitute for clinical judgment

Provider Education

- Multiple aspects: Diagnostic criteria, importance, impact
- Physicians, nursing, medical assistants, laboratory
- Help people to see how their work has an impact on patient care
  - Data and anecdotes
  - Tie to daily work flow
Questions?

Raise your hand

Use the Chat

Action Period Assignment

- Design a PDSA to enhance early recognition of sepsis on the inpatient floor, considering:
  - MEWS (modified early warning system)
  - Rapid Response Team/System*
  - Situational awareness

* i.e. – incorporating sepsis screen
Expedition Communications

- Listserv for session communications: TreatingSepsis@ls.ihi.org
- To add colleagues, email us at info@ihi.org
- Pose questions, share resources, discuss barriers or successes

Next (Final) Session

Thursday, November 21st, 1:00-2:00 PM ET

Session 6 - Considerations and Challenges with Fluid Resuscitation