IHI Expedition
Treating Sepsis in the Emergency Department and Beyond Session 2

Thursday, September 26

These presenters have nothing to disclose

John D’Angelo, MD, FACEP
Andy Odden, MD
Diane Jacobsen, MPH, CPHQ

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.
Welcome to today’s session!
- Please use chat to “All Participants” for questions
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Raise your hand
Select Chat recipient
Enter Text

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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 (CHAIPi) 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: Action Period Assignment
- Key Considerations for Enhancing Reliability with Antibiotic Therapy in the Emergency Department and in 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

John D’Angelo, MD, FACEP, Chairman, Department of Emergency Medicine, Glen Cove Hospital, North Shore-Long Island Jewish Health System, has worked as an emergency physician for 15 years. Dr. D’Angelo also serves as the co-chair for the North Shore-LIJ Sepsis Task Force tasked with improving sepsis recognition and management across the health system.

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.
Faculty

**Sean R. Townsend, MD**, Vice President of Quality and Safety, California Pacific Medical Center (CPMC), is also a practicing intensivist in the Division of Pulmonary and Critical Care at CPMC. Previously, he was Assistant Professor of Medicine at the University of Massachusetts and at Brown University Medical School. Dr. Townsend has been faculty advisor to IHI’s 100,000 Lives and 5 Million Lives Campaigns for the ventilator-associated pneumonia and catheter-related bloodstream infections interventions. He led IHI’s work on sepsis as part of the Improving Outcomes for High-Risk and Critically Ill Patients Learning and Innovation Community, and he is current faculty for the Reducing Sepsis Mortality Collaborative. A member of the Surviving Sepsis Campaign (SSC) executive committee, he is an author of the 2008 SSC International Guidelines on the Management of Severe Sepsis and Septic Shock and 2010 SSC Results of an International Guideline-based Performance Improvement Program Targeting Severe Sepsis.

Debrief: Action Period Assignment

- Identify a unit-based multidisciplinary team (ED, ICU or inpatient floor) to actively test changes, identifying key roles in your organization that may not currently be involved in the process
- Assess your current process for ensuring the elements of the 3 hour bundle to prioritize areas for improvement/focus:
  - Lactate collection
  - Blood cultures prior to antibiotics
  - Antibiotics
  - Fluids
Session Objectives

- Discuss the relationship between timing of antibiotics and mortality in the severe sepsis population.
- Discuss the barriers to timely antibiotic administration.
- Review potential solutions to expedite appropriate antibiotics in an expedited manner.
- Identify 1-2 specific ideas to test in their hospital for enhancing antibiotic timing and selection.
Severe Sepsis vs. Current Care Priorities

<table>
<thead>
<tr>
<th>Care Priorities</th>
<th>U.S. Incidence</th>
<th># of Deaths</th>
<th>Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMI (^{(1)})</td>
<td>900,000</td>
<td>225,000</td>
<td>25%</td>
</tr>
<tr>
<td>Stroke (^{(2)})</td>
<td>700,000</td>
<td>163,500</td>
<td>23%</td>
</tr>
<tr>
<td>Trauma (^{(3)})</td>
<td>2.9 million</td>
<td>42,643</td>
<td>1.5%</td>
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<tr>
<td>(Motor Vehicle)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe Sepsis (^{(4)})</td>
<td>751,000</td>
<td>215,000</td>
<td>29%</td>
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</table>


Figure 1. Cumulative effective antimicrobial initiation following onset of septic shock-associated hypotension and associated survival. The x-axis represents time (hrs) following first documentation of septic shock-associated hypotension. Black bars represent the fraction of patients surviving to hospital discharge for effective therapy initiated within the given time interval. The grey bars represent the cumulative fraction of patients having received effective antimicrobials at any given time point.
Figure 2. Mortality risk (expressed as adjusted odds ratio of death) with increasing delays in initiation of effective antimicrobial therapy. Bars represent 95% confidence interval. An increased risk of death is already present by the second hour after hypotension onset (compared with the first hour after hypotension). The risk of death continues to climb, though, to >36 hrs after hypotension onset.

Hospital Mortality by Time to Antibiotics

<table>
<thead>
<tr>
<th>Time to ABX, hrs</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
<th>Probability of mortality</th>
<th>95% CI</th>
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<tr>
<td>Severe sepsis group</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>0 (ref)</td>
<td>1.00</td>
<td>--</td>
<td>--</td>
<td>13.7</td>
<td>12.3</td>
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<tr>
<td>1</td>
<td>1.10</td>
<td>1.05</td>
<td>1.15</td>
<td>&lt; 0.001</td>
<td>14.9</td>
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<tr>
<td>2</td>
<td>1.21</td>
<td>1.10</td>
<td>1.32</td>
<td>&lt; 0.001</td>
<td>18.1</td>
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<td>3</td>
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<td>1.16</td>
<td>1.52</td>
<td>&lt; 0.001</td>
<td>17.4</td>
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<td>4</td>
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<td>1.22</td>
<td>1.75</td>
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<td>18.8</td>
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<td>5</td>
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<td>1.76</td>
<td>1.34</td>
<td>2.31</td>
<td>&lt; 0.001</td>
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<td>Septic shock group</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 (ref)</td>
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<td>--</td>
<td>22.2</td>
<td>20.7</td>
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<tr>
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<tr>
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<td>1.00</td>
<td>1.33</td>
<td>0.046</td>
<td>24.8</td>
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<tr>
<td>6</td>
<td>1.19</td>
<td>1.00</td>
<td>1.41</td>
<td>0.046</td>
<td>25.4</td>
</tr>
</tbody>
</table>
Other Time Sensitive Interventions

- **AMI – “Door to PCI” “Door to Thrombolytics”**
  - Focus on the timely return of blood flow to the affected areas of the heart.
- **Stroke – “Door to TPA”**
  - The sooner that treatment begins, the better are one’s chances of survival without disability.
- **Trauma – “The Golden Hour”**
  - Requires immediate response and medical care “on the scene.”
  - Patients typically transferred to a qualified trauma center for care.

Same mindset regarding Antibiotics?

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NQF BUNDLE: Sepsis 0500

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 triage in the Emergency Department or, if presenting from another care venue, from the earliest chart annotation consistent with all elements severe sepsis or septic shock ascertained through chart review.
Antibiotic Therapy

1. We recommend that intravenous antimicrobial therapy be started as early as possible and within the first hour of recognition of septic shock (1B) and severe sepsis without septic shock (grade 1C).

3 hours vs. 1 hour: Why the Difference?

- If the data support one hour, why do we endorse three hours as the standard of care?

- “Although the weight of the evidence supports prompt administration of antibiotics following the recognition of severe sepsis and septic shock, the feasibility with which clinicians may achieve this ideal state has not been scientifically evaluated.”
  - SSC 2012
Poll Question

- What is your hospital’s time from antibiotic order to antibiotic delivery?
  - Less than 1 hour
  - 1 – 2 hours
  - 2 – 3 hours
  - Greater than 3 hours
  - Unknown

A Question of Value

- What aspect of antibiotic delivery for sepsis provides value for the patient?

- Ordering the correct antibiotics confer no benefit until they are actually administered– and the effect decays linearly over time
The Key Point

- Your patients receive no value from antibiotics until the antibiotics are administered

- A careful examination of every step in the system of antibiotic delivery, analysis of how these steps can fail, and collection of the necessary data is needed to improve patient outcomes
  - Value stream mapping

Potential Barriers

“We agree it’s the right thing to do, but we can’t do it!”

- Sepsis guidelines are demanding: much to be done within a few hours

- Challenges for EDs and Med-Surg Units:
  - Diagnostic testing (labs, imaging)
  - Frequent vital sign monitoring and interventions requiring intense physician and nurse presence
  - Physician and nursing handoffs (shift and geographic)
  - ICU bed availability
  - Recognition: “This patient isn’t septic”
Potential Barriers

- Challenges unique to the floor (examples):
  - Under-recognition (anchoring heuristic)
  - Patients spread across multiple units
  - Physician factors (communication, census)
  - Pharmacy (availability of antibiotics, distance between pharmacy and patient care unit)
  - Nursing factors (IV access, patient ratios, communication)

- Other “hyper-local” barriers
  - “Stat” definition
  - Notification of stat orders (RN, pharmacy, patients)

Performance Goals Challenges

- Not feasible to apply similar metrics, expectations and goals for the entire Spectrum

  - Sepsis
  - Severe Sepsis
  - Septic Shock

- Data Collection Confusion
- Push back related to T-0, performance expectation and goals

- Example: Antibiotics within 1 Hour of arrival
  - If patient presents in shock then T-0 of triage time is reasonable
  - If stable patient presents with common complaint deteriorates and meets criteria at hour 2, creates triage based T-0 and expectations challenging
Reliability = Guidelines & Protocols

- Guideline Example:
  - Give antibiotics within 1 hour of severe sepsis diagnosis

- Protocol Example:
  - Give Ceftriaxone 2 grams IV every 24 hours for 7 days

- Why does this speed up the delivery?

- Why does it produce better outcomes?

The Steps To Change

- Prerequisites for change
- Develop a change
- Prototype a change
- Implement a change
- Test under a variety of conditions
- Embed in daily operations
- Spread throughout the system
Accelerating Antibiotics Delivery

- Antibiotic decision-making should occur offline
- Transform guidelines into a specific executable set of orders
  - Should satisfy antibiotic best practices
  - Make Instructions Specific and Complete
  - Match to local practice patterns: Improve acceptability and facilitate implementation
- Develop a protocol to select proper antibiotic(s) for common septic conditions

Change Ideas

- Antibiotic protocols for common conditions
- “Code sepsis” team
- Store common antibiotics on the unit
- Sepsis Dashboard
  - Time to antibiotics
  - Percent severe sepsis/septic shock patients receiving antibiotics within 1 and 3 hours
### Options

<table>
<thead>
<tr>
<th>Source</th>
<th>Options</th>
<th>This column (Drug #1)</th>
<th>This Column (drugs #2 and in some case #3)</th>
<th>Suspected Source</th>
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<td>Ampicil 500 mg IV</td>
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<td>Cefepime 1 gm IVPB</td>
<td>Ampicil 500 mg IV</td>
<td>intra-abdominal infection</td>
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<td>Cipro 400 mg IVPB</td>
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<td></td>
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<td>Intravenous Tract Infection: Healthcare aquired</td>
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<td>Sildamycin 900 mg IV</td>
<td>Wound/Soft Tissue Infection (Staph) suspect MRSA</td>
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<td>4</td>
<td>Linezolid 600 mg IV</td>
<td>Sildamycin 900 mg IV</td>
<td>Wound/Soft Tissue Infection (Staph) suspect MRSA</td>
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<td>Other</td>
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<td>Sildamycin 900 mg IV</td>
<td>Wound/Soft Tissue Infection (Clostridium, Group A Strept)</td>
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<td>Sildamycin 1 gm IV</td>
<td>Unknown Source of Infection</td>
</tr>
</tbody>
</table>

# Can substitute: Cefepime 1 gram IV, Zosyn 3.375 gm IV, Imipenem (PRIMAXIN) 500 mg IV, Meropenem 1 gram IV
Hospital-Specific Aim

Reduce Door to Antibiotic Time

- **Goal #1**
  - 70% of patients who present at triage with Probable Severe Sepsis will have a Door to Antibiotic time of 60 minutes or less by July 1, 2012.

- **Goal #2**
  - 80% of all Sepsis patients (Sepsis, Severe Sepsis and Septic Shock) will have a T-0 to Antibiotic time of 180 minutes or less by July 1, 2012.

Process Map - Code Sepsis
Non-ICU Sepsis: A Final Word

- Up to 50% of sepsis patients never receive ICU-level care

- SSC12 specifically notes that the greatest outcome improvements can likely be made through process improvement and education in the non-ICU setting

- Key challenges: Recognition (stay tuned…) and systems complexity
Questions?

Raise your hand

Use the Chat

Action Period Assignment

For the Emergency Department:

- Develop a high level process map for 2-3 patients identified with sepsis in the ED to identify delays or constraints from time of antibiotic selection to delivery (e.g., timing, communication, availability of antibiotic, etc.)

- Complete a PDSA based on the delay or constraint identified:
  - Complete a PDSA of using a visual clock at bedside with time for antibiotic to be administered
  - Focus in ED – complete a PDSA to make commonly used antibiotics immediately available in the ED
Action Period Assignment

For the inpatient floor:
- Develop a high level process map for 2-3 patients identified with sepsis on the inpatient floor to identify delays or constraints from antibiotic selection to delivery (e.g., timing, communication, availability of antibiotic, etc.)
- Complete a PDSA based on the delay or constraint identified:
  - Complete a PDSA of using a visual clock at bedside with time for antibiotic to be administered
  - Complete a PDSA on one unit by placing key antibiotics in electronic dispensing (i.e., Pyxis) to decrease the time to antibiotic administration
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 Session

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