RELIABLE APPLICATION OF THE SEPSIS BUNDLE ELEMENTS

North Shore-LIJ Health System
in partnership with
The Institute for Healthcare Improvement

Speakers

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Disclosures

- None of the participants discloses a conflict of interest in the work presented.
- Dr. Doerfler consults on Sepsis topics for Ortho Clinical Diagnostics; Part of the Johnson & Johnson Family of Companies

Presentation Outline

- The NSLIJ HS and Sepsis Initiative
- Current state
- The North Shore – LIJ / IHI Partnership
- Structure of the collaborative
- Process for Improvement
  - Adjunct improvement techniques
- Evolving focus
- Next Steps
We Are Organized as a System

- Common Mission, Vision and Values
- Single Governance: All entities are under common control with a unity of purpose
- Single System-wide management
- Clinical Leadership involved in all aspects of operations and strategy - e.g. Chairs, Service Line leaders, etc.
- Corporate Services infrastructure supports all System activities

North Shore-LIJ Health System
A Case for Change

- In 2008, there were approximately 3,500 patients discharged with a Sepsis diagnosis across the System.
- In 2008, Septicemia ranked as the top APR-DRG by number of deaths across the System (883).
- Greatest single cause of in-hospital mortality in our health system.
- Michael Dowling (NSLIJ CEO) identifies sepsis as our key opportunity for preventable mortality.
- Considerable variation in care at all levels throughout the System.
- Evidence-based approaches to care exist that have been shown to improve outcomes.

System Sepsis Task Force - Formed 2009

- Developed Evidence Based Sepsis Management Guidelines (algorithm, screening tool, order sets and management bundles).
- Guidelines intended for all patients with Sepsis, regardless of location.
- Developed database and data collection process.
- Established buy-in from Hospital Administrative and Clinical Leadership at each site.
- Identified Sepsis Champions at each site.
**Our journey thus far……..**

Highlights of the progress of the sepsis collaborative:

- Health System Outcomes and Process Improvements
- Structure of the Collaborative
- Action Period Details
- Adding Synergistic Initiatives
- Where next?

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**Sepsis Task Force Guidelines issued**

Focus on early identification and timely antibiotics in the ED

Sepsis Collaborative kicks off

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Sepsis and Severe Sepsis/Septic Shock Discharges Based on the Following Secondary ICD9 Diagnosis Codes: 99591 (Sepsis) and 99592 (Severe Sepsis). 78552 (Septic Shock) is a subset of 99592 and is included in this report. Includes patients 16 and older.
Sepsis Collaborative ED Metrics for North Shore-LIJ Health System
Severe Sepsis/Septic Shock Percent Compliance Analysis
January 2012 - October 2013

Blood Cultures Prior to Antibiotic Administration for Severe Sepsis/Septic Shock Patients Identified in the ED

Serum Lactate Order to Result within 30 Minutes for Severe Sepsis/Septic Shock Patients Identified in the ED

Fluid Resuscitation Administration begun within 30 Minutes of Severe Sepsis/Septic Shock Patients Identified in the ED

Antibiotic Administration within 180 Minutes for Severe Sepsis/Septic Shock Patients Identified in the ED

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Sepsis Collaborative ED Metrics for North Shore-LIJ Health System
Severe Sepsis/Septic Shock Average Minutes Analysis
January 2012 - October 2013

Average Antibiotic Time for Severe Sepsis/Septic Shock Patients Identified in the ED meeting Sepsis-3 Criteria at Time

Average Serum Lactate Order to Result for Severe Sepsis/Septic Shock Patients Identified in the ED

Average Fluid Resuscitation Time for Severe Sepsis/Septic Shock Patients Identified in the ED

Average Antibiotic Administration Time for Severe Sepsis/Septic Shock Patients Identified in the ED
How IHI Fosters Change

- New Knowledge in:
  - Accelerating reduction in Sepsis Mortality
  - Improving Quality and Accessibility of Palliative Care
  - Preparing the Students and Professionals to be Outstanding Improvers
  - Strengthening the Infrastructure for Improvement of Large Systems
  - Together we will learn for the North Shore Health System and for the health care field
Basics of Sepsis

The Sepsis Continuum

- **SIRS**
  - A clinical response arising from a nonspecific insult, with ≥2 of the following:
    - T >38°C or <36°C
    - HR >90 beats/min
    - RR >20/min
    - WBC >12,000/mm³ or <4,000/mm³ or >10% bands

- **Sepsis**

- **Severe Sepsis**
  - SIRS with a presumed or confirmed infectious process
  - Sepsis with organ failure

- **Septic Shock**
  - Refractory hypotension

SIRS = systemic inflammatory response syndrome

Focus on Reducing Sepsis Mortality

- Two Converging pathways:
  - Increasing reliability with resuscitation bundle in patients with severe sepsis/septic shock identified in the ED and then hospital wide
  - Identifying patients on the floors with sepsis before they have progressed to the severe stage

Performance Goals Challenges

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

- Example Goal: Lactate draw within 30 minutes of arrival to emergency department
  - If patient presents in shock then T – 0 of triage time is reasonable
  - If stable patient presents with common complaint (ex. Cough, Temp 101 and pulse of 92) then in busy ED may not see MD for 30 minutes
NSLIJ/IHI Collaborative: Accelerating Reduction in Sepsis Mortality

From the Internal & External Faculty Perspective

- Describe the “gap” between current practice and what is possible
- Share leading edge thinking and approaches
- Share success stories to help motivate change
- Provide ongoing support and coaching to participating hospitals

From the Participant Perspective

- Get “how to” ideas for changing/enhancing current process
- Talk to other hospitals
- Talk through challenges
- Define clear action steps to achieve high reliability/improvement

Outcomes

- Reduce mortality among patients with severe sepsis/shock by 50% system-wide in 5 years

Primary Drivers

- Vigorous and effective leadership
- Well structured, committed, high-functioning clinical teams
- Reliable identification of sepsis and execution of sepsis protocols
- Organizational infrastructure supports effective sepsis care

Secondary Drivers

- Team roles and personnel are clearly defined, understood, and trusted by all participants
- All staff recognize and prioritize patient needs, and appreciate importance of timely and appropriate sepsis care
- Teams transparently and immediately share process defects, ideas for change, and outcome metrics
- Standard methods for onboarding new personnel
- Timely, sensitive & specific recognition of sepsis and severe sepsis
- Explicit standard process is ‘ready to go’ when sepsis is diagnosed
- Required clinical personnel are available and ready to respond, including required escalation of care
- Timely MD engagement and orders
- Timely & effective communication & handoffs: ED to Floor & ICU, Floor to ICU, ICU to floor
- Sr leadership aligns incentives and strategy to focus on sepsis care & mortality reduction
- Sr and mid-level leaders regularly review results, allocate resources, activate improvement
- Provide feedback on performance; continue to emphasize importance of sepsis care
- Efficient, timely data collection and reporting of key sepsis process metrics (KQMI)
- System wide change management support for front line teams (CLI)
- Support processes respond in a timely fashion: Lab, Pharmacy, supply chain & support services
IHI Model for Improvement

- **AIM**: What are we trying to accomplish.

- **MEASURE**: How will we know the change is an improvement?

- **CHANGE CONCEPT**: What change can we make that will result in an improvement?

Rapid Cycle Testing

Using Multiple Repeat Cycles to Create Ramps

Test the Local Protocol on a Patient

Obtain a Local Consensus of a CAP Abx Protocol

Test Revised CAP Protocol on Another Pt.

Test Revised CAP Protocol Until successful on 5 Patients

Standardize CAP Protocol In This Unit

Langley, Nolan, Nolan, Norman & Provost

'The Improvement Guide'
Using Multiple Ramps

NSLIJ/IHI Collaborative Timeline - focus on early identification & treatment in the ED

Getting Started: includes calls & activities
Learning Session 1 February 2012
Learning Session 2 July 2012
Learning Session 3 January 2013
Action Period includes monthly calls & team reports

Learning Sessions:
- Clinical Content – IHI/NSLIJ faculty
- Improvement Science – What changes can we make that will result in improvement?
- Increasing emphasis on participating hospitals sharing their learnings and experience
**NSLIJ/IHI Collaborative Timeline - expanding the focus to early recognition & treatment on the inpatient floor**

<table>
<thead>
<tr>
<th>Learning Session</th>
<th>Action Period</th>
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<td></td>
<td>calls &amp; team reports</td>
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**Learning Sessions:**
- Evolving Faculty
  - ED to Inpatient; IHI to NSLIJ
- Evolving to greater interaction, fewer plenary sessions
- Open critique and self examination

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**Learning Session Structure**

- **Focused Plenary Sessions**
  - PDSA methodology
  - Antibiotic Timing
  - Antibiotic Stewardship (in conflict with Antibiotic timing?)

- **Detailed breakout sessions**
  - Lactate assessment: importance and Kinetics
  - Fluid administration
  - Data analysis
  - The role of the Executive Sponsor

- **Team work reports**
  - Each hospital team presents an update of their focus / progress
Learning Session 1 Focus & Topics

- Making the case for improvement in the ED
  - The Problem and the Vision
- A “face to the case” A patient story of sepsis
- Creating a Culture for Change
- Understanding the “current state”
- Process Maps and Walkthroughs
- What Changes Can We Make?
- Tools to support improvement
- How Can We Improve?
  - Part I: Model for Improvement
  - Part II: Measures, Changes, and Reliable Design
- Exercise: Setting Your Project Aim & 90 day plan

Learning Session 2 Focus & Topics

- Increasing Reliability with the sepsis bundle:
  - The Early Recognition of Sepsis
  - Antibiotic Timing, Selection and Stewardship
  - Responding to Elevated Lactates
  - Fluid Resuscitation
- What are we learning?
  - Individual team Progress reports from all sites
- What is the data telling us?
  - Focus on: Real Time Data Collection
  - Data collection, preparing charts and graphs
Learning Session 3 Focus & Topics

- Enhancing Reliable care:
  - From the Patient Perspective – Ensuring Reliable Care
  - Focus on: Real Time Patient-level Data
  - Fluid Resuscitation: Taking it to the Next Level
  - Engaging the Front Line Team
  - Handoffs and Transitions: Transfer of Care Related Issues
  - Focus on: Situational Awareness
- What are we learning?
  - Individual team Progress reports from all sites
- Tools to support improvement:
  - More About PDSA: Getting Results From Small-scale Testing

Learning Session 4 Focus & Topics

- Expanding the Focus: ED and Inpatient floor
  - Early detection & triggering on the inpatient floor: guidelines & treatment challenges
  - Focus on Fluids
  - Transitions between levels of care
  - Increasing Reliability with the sepsis “bundle”
- What are we Learning?
  - Collaborative Rounds: challenges and issues:
  - Tools to support improvement:
  - Improvement Tools Bazar
  - Value Stream Mapping: defining the process on the inpatient floor
  - Data collection on the inpatient floor
Learning Session 5 Focus & Topics

- Expanding the Focus:
  - Enhancing the role/partnership with Pharmacy
  - Inpatient Team Breakout Sessions
  - Focus on Fluids
  - Transitions between levels of care
- What are we learning?
  - Team highlights: successes, challenges, in progress
- Tools to support improvement:
  - Improvement Tools Bazar
  - Value Stream Mapping:
    - process of transitions from ED to the inpatient floor
    - process of sepsis care on the inpatient floor

Inpatient Specific Processes

- Identifying patients on the floors with sepsis before they have progressed to the severe stage
  - MEWS triggers for Sepsis Screens
  - Provider notification and response
- Focus and transitions and handoffs between levels of care
- Inpatient Code Sepsis
- Data collection on the inpatient floor
Overlapping Synergistic Initiatives

- **JCCTHC**
  - Six Sigma project at Tertiary Hospital with most cases
  - All Sepsis all inpatient environments
  - 6 bundle target; 4 bundle focus

- **HVHC**
  - LEAN RIE at 2 additional Tertiary Hospitals
  - Severe Sepsis ED to ICU
  - 6 bundle target; 4 bundle focus

- **Metrics**
- **Knowledge gained**

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Hospitals’ Progress
QUESTION: Which patient has Sepsis?

Answer: They both do!
Don’t allow compensation to become decompensation.

Early identification and treatment of Sepsis saves lives.

PROBLEM: Timely recognition and appropriate treatment are not consistent for patients with sepsis, severe sepsis, and septic shock, resulting in increased morbidity and mortality.

PROJECT GOAL

Primary - 20% reduction in sepsis mortality rate within 18 months
Secondary - Absolute sepsis mortality rate of 10% within 24 months

System Metrics

Y1 - Increase percent of blood cultures prior to antibiotic administration to 90%
Y2 - Average serum lactate order to result within 90 minutes
Y3 - % administered ABX with 180 minutes
Y4 - % fluid administration of 30mL/Kg within 180 minutes of severe sepsis diagnosis and patients who received fluids within 30 minutes of recognition of sepsis
Institute for Clinical Excellence & Quality

Vital X

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<th>Root Causes</th>
<th>Solution Details</th>
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<tr>
<td>ABX Admin &gt;180 minutes</td>
<td>1. ABX not readily available&lt;br&gt;2. ABX ordered &quot;next round&quot;&lt;br&gt;3. Staffing (RN:PT ratio causes difficulty in administering med upon arrival on the unit)&lt;br&gt;4. No prioritization as to which patient receive have meds first&lt;br&gt;5. &quot;Wait and See Approach&quot;</td>
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Failure to Order Serum Lactate and/or Blood Cultures

<table>
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<th>Solution Details</th>
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<tbody>
<tr>
<td>Failure to Order Serum Lactate and/or Blood Cultures</td>
<td>1. Wait and See approach&lt;br&gt;2. Higher priority on one over the other&lt;br&gt;3. Time to receive results&lt;br&gt;4. Failure to diagnose&lt;br&gt;5. Physician diagnoses all criteria but not the actual sepsis&lt;br&gt;6. Physicians should communicate with RN regarding which patients should have the medications administered first&lt;br&gt;7. Use ABG as an alternative for serum lactates</td>
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Bundle Compliance

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<th>Variable</th>
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<th>N*</th>
<th>Mean</th>
<th>SE Mean</th>
<th>StDev</th>
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<table>
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<th>Q3</th>
<th>Maximum</th>
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<tbody>
<tr>
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<td>100.00</td>
<td>100.00</td>
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RIE Overview:
Severe Sepsis and Septic Shock mortality represent a large fraction of in-hospital mortality for adult patients. A bundle of evidence-based care processes has been demonstrated to improve the morbidity and mortality of patients with Severe Sepsis/Septic Shock and decrease the cost of care. The purpose of a Rapid Improvement Event (RIE) is to identify and understand current workflow processes. RIE allows participants to break down the flow of the process, identify the individuals who touch and impact each step, and reduce inefficiencies that cause delays, waste, rework, excess motion, and inventory.

Accomplishments:
- In-service RN/PCA/MD
- Delineate roles/responsibilities for expediting specimens to lab
- PCT workflow to include pump procurement
- One pump with multiple modules
- IV Pressure Bags in IV cart
- Pharmacist participation in bedside report
- Pharmacist educated staff on how to administer multiple antibiotics concurrently after confirming past allergies

Learnings / Insights:
- Helpful to see the whole process
- Increased awareness of different processes across departments
- Importance of a multi-disciplinary approach
- Change is harder than it may appear

Issues / Questions:
- Improper placement of labels on lactate tube caused delays
- Delay in sending specimen to the lab
- Stocking of key supplies
- Access for all staff
- Rapid infusion of IVF
- Lack of ice near resuscitation room
- No standardized handoff tool to accompany patient when transferred

Barriers:
- Scope of issues were more complex than originally anticipated

Completion Plan Next Steps:
- Investigate point of care capabilities for lactate testing to improve result time
Barriers to recognition on Floor & Potential solutions

- How does a floor RN identify subtle changes in patient status?
- How does RN know a patient is becoming septic to notify Physician?
- How does the RN get timely response from physicians outside hospital?
- How do we have outside physician perform physical assessment of patient who is septic on floor?
- Does everyone accept the use of serum lactate as a marker for tissue hypo perfusion?
- Follow Mews score, an trend Vital signs
- Perform sepsis screen at Mews of “3”
- Incorporate sepsis into high risk cat orgy for situational awareness
- Education: Physician education, increase awareness and promotional events.

Barrier to fluid administration & Possible Solutions

- Have physician order 30ml/kg bolus
- Have Floor RN give bolus on pumps properly
- Availability of pumps on floors
- Monitor patient frequently on large volume bolus on floors
- **Involves physicians**
- Revise order sets
- Educate nurses how to give fluid bolus on the pumps
- Have pumps available on the floor
- Increase physicians awareness: educational sessions, provide signs in areas where orders are written. Promotional items for physicians on fluid.
Antibiotics Administration for Severe Sepsis / Septic Shock

- Average Time is Decreasing
- Less Variation in the Process

Fluid Bolus Time for Severe Sepsis / Septic Shock

- Average Time is High
- Less Variation in the Process

- Slight Decreasing Trend
Next Steps

- Value Stream Mapping at all sites with inpatient project
- Expansion of our Taming Sepsis Educational Program (TSEP)
  - HRSA Grant funded for RN training (ED and ICU)
  - Med / Surg
  - Physicians
- 6 Hour Bundle elements
- Intensive Care
- Highly Reliable Sepsis recognition and treatment
  - Target Below 10% Morality Rate

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