HEN 2.0 QUALITY IMPROVEMENT (QI)
OFFICE HOURS: SEPSIS
Welcome & Introductions
Katie Harris, Program Manager, HRET
SPEAKERS

- Dr. Marty Doerfler
- Jane Taylor
- Kathy Luther
- Kathy Duncan
Beyond Regulatory Requirements: Addressing the Sepsis Spectrum

Martin E. Doerfler, MD
SVP, Clinical Strategy and Development
Northwell Health
Sepsis Definition

A documented or suspected infection with two or more of the following:

• Fever (core temperature >38.3°C)
• Hypothermia (core temperature <36°C)
• Heart rate >90 min⁻¹ or >2 SD above the normal value for age
• Tachypnea > 20 bpm
• Leukocytosis (WBC count >12,000 µL⁻¹)
• Leukopenia (WBC count <4000 µL⁻¹)
• Normal WBC count with >10% immature forms
Why the Diagnosis Is So Difficult

• No single criteria makes the diagnosis (Unlike New ST Elevation on ECG, or New Onset Focal Neuro. Exam)
• Changing patient status during encounter
• Diagnosis not black and white but gray
• Patient may look good and yet crash two hours later
• Many physicians like an observation period before reacting, and they lose the critical window of opportunity

HUMAN FACTORS
• Competing priorities, lack of awareness, patient looking good leads physicians to going down another path.
The Sepsis Continuum

SIRS | Sepsis | Severe Sepsis | Septic Shock

A clinical response arising from a nonspecific insult, with ≥2 of the following:
- \( T > 38^\circ \text{C} \text{ or } < 36^\circ \text{C} \)
- HR > 90 beats/min
- RR > 20/min
- WBC > 12,000/mm\(^3\) or < 4,000/mm\(^3\) or > 10% bands

SIRS = systemic inflammatory response syndrome

Chest 1992; 101:1644
# Mortality Increasing with Successive Organ Failures

<table>
<thead>
<tr>
<th>Mortality Rate</th>
<th># of Organ Dysfunctions</th>
</tr>
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<tbody>
<tr>
<td>21.2%</td>
<td>1</td>
</tr>
<tr>
<td>44.3%</td>
<td>2</td>
</tr>
<tr>
<td>64.5%</td>
<td>3</td>
</tr>
<tr>
<td>76.2%</td>
<td>4</td>
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</tbody>
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Time-Sensitive Interventions

AMI – “Door to PCI”
• Focus on the timely return of blood flow to the affected areas of the heart.

Stroke – “Time is Brain”
• The sooner that treatment begins, the better one’s chances of survival without disability are.

Trauma – “The Golden Hour”
• Requires immediate response and medical care “on the scene.”
• Patients typically transferred to a qualified trauma center for care.
Examples of Level Two Reliability Methods:

• Standardized Recognition Process: Use “screening check list/handoff tool/data collection tool” on all admissions, and shift handoffs.

• Use redundancy: everyone is responsible to speak up if sepsis is suspected

• Emphasize early lactate and blood cultures

• Early feedback regarding compliance and using Real Time Data Collection
Achieving Sepsis Goals 3-hour & 6-hour bundles

Process Development
• Brainstorm, map workflow, assess what you actually do, collect data, test change

Standardize the process
• Everyone does the same thing repeatedly - omissions become more obvious

Education about the process
• Formal education so everyone is aware of the common goal and how to achieve it
# Driver Diagram

## Outcomes

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

## Primary Drivers

- **P1 ED Timely Detection, Treatment and handoff of patients with sepsis, severe sepsis & septic shock**
- **P2 ICU: Timely Detection, treatment and handoff, to higher level of care of patients with sepsis**
- **P3 Floor: Timely Detection, treatment and monitoring & handoff**
- **P4 Implementation of complex changes across organizational boundaries**

## Secondary Drivers

<table>
<thead>
<tr>
<th>S1</th>
<th>Reliable triage to identify sepsis, severe sepsis &amp; septic shock</th>
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<tbody>
<tr>
<td>S2</td>
<td>Reliable Dx of severe sepsis via labs, vitals, lactate, clinical obs</td>
</tr>
<tr>
<td>S3</td>
<td>Reliable Tx and monitoring: BC, AB, Lactate, Fluid Resuscitation</td>
</tr>
<tr>
<td>S4</td>
<td>Handoff to floor or ICU maintains Tx, initiates MEWS assessment</td>
</tr>
<tr>
<td>S5</td>
<td>Risk assessment for sepsis</td>
</tr>
<tr>
<td>S6</td>
<td>Reliable, flexible monitoring for emergent sepsis / severe sepsis</td>
</tr>
<tr>
<td>S7</td>
<td>Reliable execution of protocol: Antibiotics, Blood cultures, Fluid bolus, Venous lactate</td>
</tr>
<tr>
<td>S8</td>
<td>Handoff to floor or ICU maintains Tx, MEWS assessment</td>
</tr>
<tr>
<td>S9</td>
<td>Senior leadership at the hospital level</td>
</tr>
<tr>
<td>S10</td>
<td>Culture is ‘paranoid’ re sepsis</td>
</tr>
<tr>
<td>S11</td>
<td>Championship, clinician engagement and skilled &amp; empowered front line team</td>
</tr>
<tr>
<td>S12</td>
<td>Workable plan for local prototype spread</td>
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<tr>
<td>S13</td>
<td>Support processes: measurement, training, etc.</td>
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## Changes / Interventions

- Enhance ED triage to reliably ID pts with sepsis.
- Integrate sepsis screen into routine ED triage.
- Reliably implement the sepsis resuscitation bundle.
- Standardize all Handoffs.
- Integrate sepsis screen into MDR.
- Assess patients for probability of early sepsis.
- Consider ICU consult and / or immediate transfer to the ICU for patients w/SS/Septic Shock.
- Provider-provider handoff employs standardized communication (e.g. ISBAR, IPASS BATON).
- Engage & inform Senior leaders at the hospital level.
- Create vital partnerships between ED, ICU and the floor.
- Recruit clinician champions & frontline team.
- Capture successful process changes to expand more broadly.
- Use real-time data to foster change/improvement.
POSSIBLE SEPSIS
SIRS Criteria: Two of the following:
• Temp > 101 F or < 96.8 F
• Pulse > 90 bpm
• Resp Rate > 20/min
• WBC > 12K, < 4K or Bands > 10%

Clinician evaluates patient and suspects early sepsis; orders labs (must include lactate/ BCs X 2).

SEPSIS
Lactate Order

ACTIVATE “Code Sepsis”
1. Activate “Code Sepsis™” in ED
2. Two RNs to bedside if possible.
3. Place 18 G IV, Ask MD re: 2nd Line & Foley
4. Draw Labs for Sepsis Panel in < 30 min.
5. Prepare for Fluid Bolus, Alert X-Ray tech
6. Source Control as appropriate

Severe Sepsis Resuscitation Elements
• Lactate draw < 30 min and result < 90 min
• BCs X 2 ordered and drawn before Antibiotic
• Antibiotics < 60 min of Code Sepsis
• IVF bolus started < 30 min of Code Sepsis
• Fluids: NS 500 mL boluses q 15 min to total 30mL/kg of actual body weight
• Repeat lactate approximately 30 - 60 min s/p fluid bolus completion
• Cont. monitoring, document VS q 15 min x 90 minutes, then q 60 minutes

Repeat Lactate > 4 or Persistent SBP < 90

Severe Sepsis Bundle
• Consider Additional NS boluses and/or
• Start Vasopressor Norepinephrine (0.05 micrograms/kg/min)
• Repeat Lactate level approximately 30 - 60 min s/p fluid bolus completion
• Clinical volume reassessment within 6 hrs

Path Complete
Document Primary Dx: Septic Shock, Secondary Dx: Suspected Source

Septic Shock Bundle
• Path Complete
Document Primary Dx: Septic Shock, Secondary Dx: Suspected Source

Consultation, disposal, and transfer of care can occur at any point in the above care map. Hand off communication is critical and must include discussion of incomplete and complete elements.
Sepsis
Patient with known or suspected significant infection

**PLUS**

SIRS Criteria: Two of the following:
- Temp > 101°F or < 96.8°F
- Pulse > 90 bpm
- Resp Rate > 20/min
- WBC >12K, <4K or Bands >10%

Clinician evaluates patient and suspects early sepsis; orders labs (must include lactate/ BCs X 2).

1. Document Accurate Blood Culture and Lactate draw times
2. Repeat Vital Signs in 30 minutes
3. Source Control as appropriate

**SEVERE SEPSIS**

Severe Sepsis Resuscitation Elements
- Lactate draw < 30 min and result < 90 min
- BCs X 2 ordered and drawn before Antibiotic if not already drawn within past 48 hrs
- Initiate or confirm appropriate Antibiotics < 60 min
- IV fluids – consider NS 1 - 2 L over 2 hrs
- Repeat lactate if initial lactate is elevated

Severe Sepsis Dx Criteria met (Dx SS) if:
- SBP < 90, or ↓ in SBP > 40 mm Hg from baseline, OR MAP < 65
- New End Organ Dysfunction (SEE BOX)
- Lactate  >  2.0

Continue monitoring VS, mental status, etc.

**Path Complete**
- Document Primary Dx: Severe Sepsis
- Secondary Dx: Suspected Source

**NEW (otherwise unexplained) End Organ Dysfunction**
- PaO2/FiO2 ratio < 300
- Increasing O2 demand to maintain sat > 90%
- Cr > 2.0 or > 50% increase from known baseline
- Urine Output < 0.5 mL/kg/hr for > 2 hrs
- Bilirubin > 2.0 mg/dL
- Platelet Count < 100K
- INR > 1.5, PTT > 40 sec
- New onset altered Mental Status
- Lactate > 2.0

Monitor VS, mental status, etc.

**Path Complete**
- Document Primary Dx: Septic Shock
- Secondary Dx: Suspected Source

**Septic Shock Bundle**
- Consider Additional NS boluses and/or
- Start Norepinephrine (0.05 microgram/kg/min)
- Repeat lactate approximately 30 - 60 min s/p fluid bolus completion
- Clinical volume reassessment within 6 hrs

Consultation, disposition, and transfer of care can occur at any point in the above care map.
Hand off communication is critical and must include discussion of incomplete and complete elements.
Northwell Health
ED Sepsis/Severe Sepsis Management

Patient with suspected significant infection (i.e. possible admission)

**POSSIBLE SEPSIS**
SIRS Criteria: Two of the following:
- Temp > 101 F or < 96.8 F
- Pulse > 90 bpm
- Resp Rate > 20/min
- WBC > 12K, < 4K or Bands > 10%

Clinician evaluates patient and suspects early sepsis; orders labs (must include lactate/ BCs X 2).

**SEPSIS**

**Probable Severe Sepsis**
Two of the following:
- Temp > 101 F or < 96.8 F OR Recent Fever, OR clinical suspicion of Infection.
- SBP < 90 or ↓ in SBP > 40 mm Hg from baseline, or MAP < 65
- Pulse ≥ 120 bpm
- Resp rate ≥ 24 / min
- New Unexplained Altered Mental Status

T-0 = Triage Time

**ACTIVATE “Code Sepsis”**
1. Activate “Code Sepsis” in ED
2. Two RNs to bedside if possible.

**Code SEPSIS**
ARRIVAL AND EVALUATION

- Pulse > 90 bpm
- Resp Rate > 20/min
- WBC > 12K, < 4K or Bands > 10%

Clinician evaluates patient and suspects early sepsis; orders labs (must include lactate/BCs X 2).

SEPSIS

1. Document **Accurate** Blood Culture and Lactate draw times
2. Repeat Vital Signs in 30 minutes
3. Source Control as appropriate

Sepsis Resuscitation Elements
(Unless clinically contraindicated)
- Lactate ordered and resulted < 90 min
- BCs X 2 ordered and drawn before Abx
- Abx ≤ 3 hrs of arrival
- IV fluids – consider NS 1 - 2 L over 2 hrs
- Repeat lactate if initial lactate is elevated
- Monitor, document VS ≤ q 60 min

Code SEPSIS

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<table>
<thead>
<tr>
<th><strong>Gather</strong> together the subject matter experts</th>
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<tr>
<th><strong>Brainstorm</strong> “to achieve our goal, the things we need to improve are . . .”</th>
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<table>
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<tr>
<th><strong>Cluster</strong> the ideas to see if groups represent a common driver</th>
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<tr>
<th><strong>Expand</strong> the groups (or single ideas) to see if new drivers come to mind</th>
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<table>
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<tr>
<th><strong>Logically link</strong> together the groups into a driver diagram format</th>
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<table>
<thead>
<tr>
<th><em>(Work backwards from project ideas if that helps!)</em></th>
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![Diagram](image-url)
Collaborative Swim lane/PDSA Process

Create a current map of process

Identify current challenges and areas that have opportunities for Improvement

Brainstorm Causes to process inefficiencies

Ease Implementation

Prioritize Causes found during Brainstorm, then Vote for one to try to solve

Ease Implementation

Brainstorm Potential Solutions to the cause chosen in prior step

Prioritize Solutions found during Brainstorm. Then vote for one for your 1st PDSA

Design your PDSA Using PDSA form

Before After

Post your PDSA form and Swim lane on team site for

Run and test Your PDSA. You can use a Run chart to Graph your defined Process Metric

Scale and Ramp-up your PDSA
Keys to Success

Teams needed from each site that consist of

- A designated champion to serve as team lead at each site
- Sponsor/Hospital Lead

Clinical Leads
- physician and nurse “champions”
- Teams ~ 5-8 members and should expect a cumulative work load of ~ 40 hours per week per team in early stages; decreasing significantly over time but never disappearing.
- Weekly logistical support for Sepsis teams – protected time, meeting rooms, access to records, database support, etc.
- Engaged med. staff, especially ED and hospitalist at each facility
- IT support for sites needing to automate tools (ED algorithm, handoff tools, order sets, Modified Early Warning Score (MEWS), etc.)
- Educational commitment:
  - ED and ICU RN participation in CLI Sepsis Education Program (TSEP)
- Engagement of medical surgical-ward teams
- Near real-time metrics and review by physician and nursing leadership
Northwell Health
Raw Sepsis and Severe Sepsis/Septic Shock Mortality Rate
January 2008 - March 2016

Note: Sepsis and Severe Sepsis/Septic Shock discharges based on the following secondary ICD-9 codes: 99591 (Sepsis), 99592 (Severe Sepsis). 78552 (Septic Shock) is a subset of 99592 and is included in this report. The following ICD-10 codes for Sepsis, Severe Sepsis and Septic Shock are included after September 2015: A400, A401, A403, A408, A409, A4101, A4102, A411, A412, A413, A414, A4150, A4151, A4152, A4153, A4159, A4181, A4189, A419, A427, A5486, A021, A227, A267, A327, B377, R6520, R6521. Excludes patients under 18 years of age.
WHAT WOULD YOU LIKE TO SHARE OR ASK?

Share

Ask
BRING IT HOME
Katie Harris, Program Manager, HRET | 11:50 – 11:55
MEASURING YOUR OVERALL SEPSIS RATE

http://www.hret-hen.org/topics/sepsis/20160126-Sepsis-FactSheet.pdf
SEPSIS CHANGE PACKAGE

• Sepsis driver diagrams and change ideas
• Example PDSA cycles
• Descriptions and guidance on how to use change package effectively
• Referenced appendices
THANK YOU!

Find more information on our website: www.hret-hen.org

Questions/Comments: hen@aha.org