NS-LIJ Health System
Emergency Medicine Sepsis Algorithm

John D’Angelo, MD  FACEP
Senior Vice President, Emergency Services
North Shore – LIJ Health System

“These presenters have nothing to disclose.”
North Shore-LIJ Health System

- **15 Hospitals (5,000 Beds)**
  - 5 Tertiary
  - 7 Community
  - Children
  - Psychiatric
  - 1 Affiliate
- **2 Long Term/Rehab Care Facilities (376 Beds)**
- Feinstein Institute
- Hospital and LTC Affiliate Network

- **Largest provider in the NY Metro area - 16 % share**
- **7 M Service Area Population**
- **3.6 million patient contacts**
- **278,000 Discharges**
- **137,000 Ambulatory Surgeries**
- **605,000 Emergency Visits**
- **817,000 Home Care Visits**
- **67,000 Ambulance Transports**

- **$6 Billion in Revenue**
- **2nd Largest Secular Health System**
- **9,000 Physicians & 10,000 Nurses**
- **42,000 Employees**
  - L.I.’s Largest Employer
  - NYC’s 9th Largest Employer
- **3,200 Volunteers**
- **2010 NQF National Quality Award**
- Hofstra North Shore-LIJ School of Medicine
Relationship of SIRS, Sepsis, Infection

- BACTEREMIA
- FUNGEMIA
- PARASITEMIA
- VIREMIA
- OTHER
- INFECTION
- SEPSIS
- SEVERE SEPSIS
- SEPTIC SHOCK
- SIRS
- PANCREATITIS
- TRAUMA
- BURNS
- OTHER

SIRS | Severe Sepsis | Septic Shock
---|---|---
Antibiotics and Source Control | Early Goal Directed Therapy
IHI NS-LIJ Collaborative
Focus on Reducing Sepsis Mortality

Two converging pathways:

1) Increasing reliability with resuscitation bundle in patients with severe sepsis/septic shock identified in the ED and then hospital wide

2) Identifying patients on the floors with sepsis before they have progressed to the severe stage
ED Sepsis Management Algorithm
ED Sepsis Management Algorithm

Severe Sepsis - Septic Shock Bundle
(Unless clinically contraindicated)

- Insert central venous catheter and Measure CVP
  Repeat 500 NS boluses until CVP > 10 ( > 14 if on Vent)
  Vasopressors for refractory hypotension after volume resuscitation
  Norepinephrine: start 0.05mcg/kg/min (Range 0.05 - 2 mcg/kg/min)

- Once CVP in range, check ScvO2
  If ScvO2 < 70 %, choose one option:
  Hb < 7: transfuse 1 unit of PRBC
  Additional Fluids: administer an additional liter of saline
  Inotropes: Administer dobutamine 5-20 mcg/kg/min.
  Intubate: to decrease pulmonary metabolic load

- Repeat lactate and ScvO2. If ScvO2 < 70 or if lactate still has not
  cleared by ≥10%, continue with the above options, trending lactates
  and ScvO2 every 1 hour until these two goals are met.

- If MAP < 65 after adequate Fluid Bolus
  MAP = 1/3 SBP + 2/3 DBP
  Norepinephrine: start 0.05mcg/kg/min. (Range 0.05 - 2 mcg/kg/min)
ED Algorithm

**ARIVAL AND EVALUATION**

**POSSIBLE SEPSIS**
Two of the following:
- Temp \( \geq 101 \text{ F} \) or \( \leq 96.8 \text{ F} \)
- Pulse \( \geq 90 \text{ bpm} \)
- Resp Rate \( \geq 20/\text{min} \)

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

**SEPSIS**

**T-O = Lactate Order**

**PLUS**

**PROBABLE SEVERE SEPSIS**
Two of the following:
- Temp \( \geq 101 \text{ F} \), or \( \leq 96 \text{ F} \) OR Recent Fever, OR clinical suspicion of Infection.
- SBP \( \leq 90 \) or MAP \( < 60 \)
- Pulse \( \geq 120 \text{ bpm} \)
- Resp rate \( \geq 24 / \text{min} \)
- New Unexplained Altered Mental Status

**CODE SEPSIS**

**T-O = Triage Time**

**ACTIVATE “CODE SEPSIS”**
SEPSIS
T-0 = Lactate Order

1. Draw labs and document Accurate Blood Culture and Lactate draw times
2. Repeat Vital Signs in 30 minutes

Sepsis Resuscitation Elements
(Unless clinically contraindicated)
- Lactate ordered and resulted \( \leq 90 \) min
- BCx X 2 ordered and drawn before Abx
- Abx \( \leq 3 \) hrs of arrival
- IV fluids - consider NS 1 - 2 L over 2 hrs
- Repeat lactate 4h after initial draw
- Monitor, document VS \( \leq q 60 \) min

CODE SEPSIS
T-0 = Triage Time

ACTIVATE “CODE SEPSIS”
1. OVERHEAD in ED “CODE SEPSIS”
2. Two RNs to bedside if possible.
3. Place \( \geq 18 \) G IV, Ask MD re: 2\textsuperscript{nd} Line & Foley
4. Draw Labs for Sepsis Panel in \(< 30 \) min.
5. Prepare for Fluid Bolus, Alert X-Ray tech

Severe Sepsis Resuscitation Elements
- Lactate draw \( < 30 \) min and result \( < 90 \) min
- BC 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
- Repeat lactate \( > 30 \) min s/p fluid bolus
- Cont. monitoring, document VS q 15 min x 90 minutes, then q 60 minutes

North Shore LIJ
Institute for Healthcare Improvement
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.
CODE SEPSIS

• Suspected significant infection (i.e. possible admission) with 2 or more of the following:
  • Temp $\geq 101$ F, $\leq 96.8$ F
  • SBP $\leq 90$ or MAP $< 60$
  • HR $\geq 120$
  • RR $\geq 24$
  • New unexplained AMS

  OR

• Lactate $\geq 2$
• New End Organ Dysfunction Criteria Met

On arrival or at any point in ED Course
Severe Sepsis - Septic Shock Bundle  
(Unless clinically contraindicated)

- Insert central venous catheter and Measure CVP  
  Repeat 500 NS boluses until CVP > 10 ( > 14 if on Vent)  
  Vasopressors for refractory hypotension after volume resuscitation  
  Norepinephrine: start 0.05mcg/kg/min (Range 0.05 - 2 mcg/kg/min)

- Once CVP in range, check ScvO2  
  If ScvO2 < 70 %, choose one option:  
    Hb < 7: transfuse 1 unit of PRBC  
    Additional Fluids: administer an additional liter of saline  
    Inotropes: Administer dobutamine 5-20 mcg/kg/min.  
    Intubate: to decrease pulmonary metabolic load

- Repeat lactate and ScvO2. If ScvO2 < 70 or if lactate still has not  
  cleared by ≥10%, continue with the above options, trending lactates  
  and ScvO2 every 1 hour until these two goals are met.

- If MAP < 65 after adequate Fluid Bolus  
  MAP = 1/3 SBP + 2/3 DBP  
  Norepinephrine: start 0.05mcg/kg/min. (Range 0.05 - 2 mcg/kg/min)
Performance Goals Summary

• Sepsis plus Super SIRS on arrival
  – T-0 = Triage time
  – T-0 to Antibiotics = 60 Minutes
  – T-0 to Fluid Bolus Initiated = 30 minutes
• All other cases of Sepsis and Severe Sepsis
  – T-0 = Lactate Order Time
  – T-0 to Antibiotics = 180 minutes
• All cases
  – Blood Cultures prior to Antibiotics
  – T-0 to Lactate Draw = 30 minutes
  – Lactate TAT (Order to Result) = 90 minutes