Sepsis
Objectives

1. Define SIRS / sepsis / severe sepsis / septic shock
2. Early recognition of Sepsis
3. Early Goal Directed Therapy
• 64yr Samoan male
• 24 hr Fever, productive cough, SOB and delirium
• Initial Obs
  ○ HR 162, RR 40, sats 90% on 15l, BP 85/50 (60), T 103
• History
  ○ 24 hr Fever, productive cough, SOB and delirium. Last few hours with altered mental status and progressively less responsive to wife and inability to complete sentences 2/2 SOB. Wife called 911
1. A continuum of severity describing the host systemic inflammatory response.
1. SIRS – systemic inflammatory response syndrome
2. Must have at least 2 of the following:
   » *Temperature* >38.5°C or <36°C
   » *Heart rate* >90 beats/min
   » *Respiratory rate* >20 breaths/min or *PaCO2* <32 mmHg
   » *WBC* >12,000 cells/mm³, <4000 cells/mm³, or >10 % immature (band) forms
3. SIRS is the body’s response to infection, inflammation, stress.
### Sepsis and Severe Sepsis

1. **Sepsis** – SIRS + suspected or confirmed infection (documented via cultures or visualized via physical exam/imaging)
2. **Severe Sepsis** – Sepsis + at least one sign of organ hypo-perfusion or dysfunction

<table>
<thead>
<tr>
<th>Area</th>
<th>Condition</th>
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<tbody>
<tr>
<td>Areas of mottled skin</td>
<td>Disseminated intravascular coagulation</td>
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<tr>
<td>Capillary refill &gt; 3 secs</td>
<td>AKI</td>
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<tr>
<td>UOP &lt; 0.5cc/kg/hr</td>
<td>ARDS or acute lung injury (ALI)</td>
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<td>Lactate &gt; 2mmol/L</td>
<td>Cardiac dysfunction on echo</td>
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<tr>
<td>Altered mental status</td>
<td>Plt &lt; 100</td>
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<tr>
<td>Abnormal EEG</td>
<td>Troponin Leak</td>
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1. Septic Shock - Severe sepsis plus one of the following conditions:
   » MAP <60 mm Hg (<80 mm Hg if previous hypertension) after adequate fluid resuscitation
   » Need for pressors to maintain BP after fluid resuscitation
   » Adequate fluid resuscitation = 40 to 60 mL/kg saline solution (NS 5L-10L)
   » Lactate > 4mmol /L
SURVIVING SEPSIS CAMPAIGN

1. STEP 1: Identify SEPSIS
2. STEP 2: Categorize SEPSIS
3. STEP 3: Initiate TREATMENT
Sepsis is confirmed or suspected infection, plus two or more of the following:
- T > 38.3°C or < 36°C
- HR > 90 bpm
- RR > 20, or PaCO₂ > 32
- WBC > 12 or < 4, or > 10% bands

Sepsis screening & management algorithm:

1. RN screens for sepsis
2. Sepsis suggested:
   - RN contacts MD for evaluation
   - MD evaluates patient
   - MD initiates order set
3. Nurse will attempt to contact attending physician:
   - If no response in 20 mins, then will attempt to contact attending physician
   - If response from attending physician within 20 mins, consultation paperwork will be ordered

Severe Sepsis / Sepsis Shock:

- Administer oxygen
- Start IV fluids
- Obtain serum lactate
- Obtain cultures
- Start antibiotics
- Monitor UOP

Sepsis resuscitation bundle:
- (to be completed within 6 hours)
  - Obtain serum lactate and cultures
  - If MAP < 65 or lactate > 4
    - Crystalloids 20 mL/kg or colloid 500 mL
    - Start antibiotics
    - If MAP < 65 or lactate > 4
      - Crystalloids 20 mL/kg or colloid 500 mL
      - CVP may be estimated using ultrasound or directly measured.
      - For patients on mechanical ventilation, goal CVP 4-8 mmHg
    - MAP > 65 mmHg?
      - YES: Vasopressors
      - NO: PRBC to Hct ≥ 30%
      - SevO₂ > 70%?
        - YES: Consider steroids
        - NO: Consider steroids
        - Resuscitation complete
  - MAP ≥ 65 mmHg?
    - YES
      - SevO₂ > 70%?
        - YES
        - NO: Consider steroids
        - PRBC to Hct ≥ 30%
        - SevO₂ > 70%?
          - YES: Consider steroids
          - NO: Consider steroids
          - Resuscitation complete
    - NO: Noradrenaline
      - PRBC to Hct ≥ 30%
      - SevO₂ > 70%?
        - YES: Consider steroids
        - NO: Consider steroids
        - Resuscitation complete

Sepsis management bundle:
- (to be completed within 24 hours)
  - Consider low-dose steroids for septic shock
  - Maintain blood glucose < 180 mg/dL
  - Maintain inspiratory plateau pressures < 30 cmH2O

Developed by the Sepsis Task Force 2011. For more detailed information, refer to the UCI sepsis guideline at https://internet2.uci.edu/ucisapath.
Antibiotics

 lược / Antibiotics / Labs

- Cultures PRIOR to Antibiotics (2 Sets, one peripheral and one from any line older than 48hrs)
- IV Abx within 3 hrs in the ED, within 1 hr in the ICU
- Broad Spectrum, combination therapy for neutropenic and patients with pseudomonas risk factors
- Vancomycin PLUS Zosyn

Think need for Source Control!

- Drainage of abscess or cholangitis, removal of infected catheters, debridement or amputation of osteomyelitis
Fluid therapy

1. Central Line Access (Fluid hydration +/- pressor)
2. 1st line therapy – fluids, fluids, fluids!
3. Crystalloid equivalent to colloid
4. Initial 1-2 Liters (20mg /kg) crystalloid or 500 ml colloid
5. Careful in CHF patients !!
Pressors

1. See separate lecture on vasopressors
   » Start with Levophed (norepinephrine) as first line therapy +/- Vasopressin
   » Consider Dopamine peripherally on floor
   ** This is available in crash cart ** If not responding to fluids, don’t want for pharmacy to send levophed.
Corticosteroids

1. Use in Septic Shock, if NO response to vasopressors and fluids
   » HYDROCORTISONE 200mg -300mg / day Divided doses (Q6hrs)
   Initial Dose 100mg IV x1
   Consider for patients who received etomidate
   No need for cosyntropin stim test
   Wean Steroids QUICKLY once off pressors
KEY TAKE HOME POINTS

1. Recognize Sepsis **EARLY** and determine **SEVERITY**
2. **EARLY** Antibiotics are critical to resolution of shock
3. **RESUSCITATE** severe sepsis and septic shock ASAP
4. **EARLY GOAL DIRECTED THERAPY**