Sepsis in 15 Minutes

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Adapted from prior lectures by Dr. Romain, et al.
What is Clinical Sepsis?

• A medical condition that is characterized by a whole body inflammatory state and the presence of a known or suspected infection.
• In the United States, it is the 2nd leading cause of death among ICU patients.
• It accounts for 2% of all hospitalizations and 25% of all ICU bed utilizations.
Sepsis at the Molecular Level
Case Presentation

• 55 y/o male s/p unknown bowel resection by unknown surgeon at unknown outside hospital unknown time ago.

• Hospital course complicated by anastomotic leak requiring washout and diversion, ARF, pneumonia, UTI, and multiple line infections.

• Transferred late Saturday night as a direct admission to the SICU (EGS).

• Vitals: T: 102 HR: 120 BP: 90/50 RR: 31 O2sat: 94%
SIRS

- **Systemic Inflammatory Response Syndrome**
- An inflammatory state involving the whole body frequently in response to infection
  - Criteria:
    - Body temperature $< 36^\circ C$ or $> 38^\circ C$
    - HR $> 90$
    - RR $> 20$ or pCO2 $< 32$
    - WBC $< 4000$ or $> 12000$ or the presence of $> 10\%$ bands
  - SIRS can be diagnosed when two or more of the criteria are present
Sepsis Equations

- **SIRS** + infection source
- **Sepsis** + organ dysfunction
- **Sepsis** + refractory hypotension
- **Sepsis** + lack of a line + lack of fluids + 24 G PIV
- Sepsis
- Severe Sepsis
- Septic Shock
- MICU!
Why Should I Care About Sepsis?

• More than 750,000 patients develop **severe sepsis** each year in North America
• 175,000 people die from sepsis each year
• People with **severe sepsis** are 35% more likely to die in the hospital than patients with uncomplicated sepsis
• Patients with **septic shock**: 50% hospital mortality rate
• Important to **recognize** these patients **early and treat** them appropriately
• One of your patients will become septic at some point, and you will likely be the first one called when that happens...
Early Identification and Source Control

• How to recognize the septic patient:
  – Changes in vital signs (i.e. SIRS criteria)
  – Mental status changes
  – Lab work abnormalities

• Sources of Infection:
  – Lungs
  – Blood stream
  – GI
  – Urinary Tract
  – Skin (i.e. central lines)
The Surviving Sepsis Campaign

- 55 international experts in sepsis meet in 2004 and publish recommendations as to the treatment of sepsis
- Recommendations were revised again in 2008
- Available in format of poster, card, podcast, YouTube videos, etc.
The Bundle Concept

• A “bundle” is a group of therapies for a given disease when implemented together may result in better outcomes than if implemented individually.

• Goal of the campaign:
  – For hospitals to use the bundles to create customized protocols and pathways.
  – Improve patient outcomes.
The Resuscitation Bundle

Eight goals that need to be accomplished within the first six hours of onset of severe sepsis or septic shock

1. Measure serum lactate
2. Obtain blood/urine cultures prior to abx*
3. Broad spectrum antibiotics (within the first hour)
4. Treatment of hypotension or ↑ lactate with fluids
5. Maintain CVP 8 - 12
6. Vasopressor use to keep MAP ≥ 65 mmHg
7. SvO2 > 70
8. Urine output 0.5 cc/kg/hr
Sepsis Management Bundle

• Other adjuncts that need to be considered after the onset of severe sepsis or septic shock:
  – Steroids
  – Blood product administration
  – Ventilator Management
  – Invasive Monitors
  – Small Stuff
Vasopressors

• First line agent
  • Norepinephrine (Levophed)*
    » β at lower doses, α at higher doses
    – Vasopressin may be added as an additional agent
  • Dopamine
    » Also has β and α activity

• Second line agents
  - Epinephrine (α & β agonist)
    • Decrease splanchnic circulation and tachycardia
  - Phenylephrine (pure α)
    • Increase afterload (decreases stroke volume)
Corticosteroids

- Refractory hypotension (i.e., fluid resuscitation and vasopressors)

- Consider performing cortisol stimulation test
  - Cortisol level difference of $\leq 9$ is diagnostic of relative adrenal insufficiency and patients should be placed on IV steroid therapy

- Hydrocortisone is the preferred choice
Blood Product Administration

• Transfuse for hemoglobin $\leq 7.0$, depending on patient and comorbidities

• Higher H&H levels may be needed in certain specific patients; ie. those with ischemic heart disease, severe hypoxemia, cyanotic heart disease, etc.

• Fresh frozen plasma should not be given unless the patient shows clinical signs of bleeding or clotting disorder

• Do not use Epo for sepsis-related anemia.
Ventilator Management

• Targets for sepsis-induced ALI/ARDS
  – Tidal volume of 6 ml/kg
  – Inspiratory plateau pressures ≤ 30
  – Set PEEP to avoid alveolar collapse, usually ≥ 5

• No single ventilator mode has been shown to be more advantageous than any other.
Invasive Monitoring

• Vascular access
  – Central venous catheters (TLC or MAC)
    • Advantages (CVP, Drugs, Labs)
    • Disadvantages (Complications, Infection)

• Arterial lines
  – Titrate vasopressor therapy to goal MAP (>65 mmHg)

• Pulmonary Arterial Catheters (“Swans”)
  – Cardiac output/index, EDV, SVO2, SVRI
  – www.pacep.org

• Foley catheter
Don’t Forget the Small Stuff

• Bicarbonate therapy only should be used in patients with pH < 7.15

• DVT prophylaxis = YES!

• Glucose levels should be targeted for < 150 and ideally 100-150 → more to come on this topic soon.

• Stress ulcer prophylaxis = YES!
Take Home Points..

- Sepsis kills....
- Early identification & source control
  - Key to survival
- Access and monitoring
- Resuscitation Bundle Accomplished in the first 6 hours
- Intravenous fluids +/- vasopressors
- Broad spectrum antibiotics (within 1st hour)
- Endpoints (CVP, MAP, UOP, SVO2)
- Severe sepsis/Septic shock, steroids, blood (i.e. phone a friend time)