Sepsis in Fifteen Minutes

July 12th, 2013
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 2\textsuperscript{nd} 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 some bowel resection by some surgeon at some outside hospital some time ago
• Hospital course complicated by anastomotic leak requiring washout and diversion, ARF, pneumonia, UTI, and multiple line infections
• Transferred late one Saturday night as a direct admission to the SICU (EGS)
• Vitals: T: 102 HR: 120 BP: 90/50 RR: 31 O2sat: 91%
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
Fun Sepsis Equations

- **SIRS** + infection source = **SEPSIS**
- **Sepsis** + organ dysfunction = **SEVERE SEPSIS**
- **Sepsis** + refractory hypotension = **SEPTIC SHOCK**
- **Sepsis** + lack of a line + lack of fluids + 24 G PIV = **MICU !**
Why Do I Care about Fun Sepsis Equations?

• 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
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
  - GI
  - Urinary Tract
  - Skin (i.e. central lines)
  - CNS
  - MSK
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 2012

Special Article

Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock: 2008

R. Phillip Dellinger, MD; Mitchell M. Levy, MD; Jean M. Carlet, MD; Julian Bihoray, MD; Margaret M. Parker, MD; Roman Jaeschke, MD; Konrad Reinhart, MD; Derek C. Angus, MD, MPH; Christian Brun-Buisson, MD; Richard Beale, MD; Thierry Calandra, MD, PhD; Jean-François Dhainaut, MD; Harwig Gerlach, MD; Maureen Harvey, RN; John J. Marini, MD; John Marshall, MD; Marco Ranieri, MD; Graham Ramsey, MD; Jonathan Serranisky, MD; E. Taylor Thompson, MD; Sean Townsend, MD; Jeffrey S. Vender, MD; Janice L. Zimmerman, MD; Jean-Louis Vincent, MD, PhD; for the International Surviving Sepsis Campaign Guidelines Committee
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 that will function well within their institutions in order to improve patient outcomes.
The Resuscitation Bundle

- Seven tasks 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
4. Treatment of hypotension or ↑ lactate with fluids
5. Vasopressor use to keep MAPS ≥ 65
6. Maintain CVP > 8
7. SvO2 > 70
The Sepsis Management Bundle

• Three tasks that need to be completed within the first 24 hours after the onset of severe sepsis or septic shock:

1. Administer low dose steroids for septic shock in accordance with a standardized ICU protocol
2. Target glucose level 150 to 180
3. Maintain plateau pressures $\leq 30$ cm H2O for vented patients
Vasopressor Use

- Norepinephrine (levophed) is first line agent
- Vasopressin may be added as an additional agent
- Epinephrine can be used but also causes decrease in splanchnic circulation and tachycardia
- Phenylephrine can cause an increase in afterload and decrease in stroke volume
When the blood pressure is not responsive to fluid resuscitation and vasopressors, consider performing cort stim test.

A cortisol level difference of $\leq 9$ is diagnostic of relative adrenal insufficiency and patients should be placed on IV steroid therapy.
Blood Product Administration

• Transfuse for hemoglobin $\leq 7.0$
• Red cell transfusion in septic patients does increase tissue oxygen delivery but does not usually increase oxygen consumption
• Fresh frozen plasma should not be given unless the patient shows clinical signs of bleeding or clotting disorder
Vent Management

- Target tidal volume of 6 ml/kg in patients with ALI/ARDS, and plateau pressures kept ≤ 30
- No single mode of ventilation has been shown to be more advantageous than the others in the patient with septic shock
- Permissive hypercapnea and high PEEP are acceptable
Miscellaneous...

- Bicarbonate therapy only should be used in patients with pH < 7.15
- DVT prophylaxis = YES!
- Glucose levels should be targeted for < 180 and ideally 100-150
- Stress ulcer prophylaxis = YES!
Surviving Sepsis Campaign: Great Success!

- Levy et. al in *Crit Care Med* 2010 examined registry data from 15,022 patients in ICUs across North America, Europe, and South America from 2005 to 2008
- Those ICUs with protocols to in place to help adhere to the campaign bundles increased from 10.9% to 31.3% and 18.4% to 36.1%
- ICU mortality decreased from 37% to 30.8% (p = .001)