Why an Increased Focus on Sepsis? Why Now?

- 1,665,000 cases diagnosed in U.S. in 2009
- Principal diagnosis in 2% of all admissions
- Single most expensive condition treated in U.S. ($20.3B in 2011)
- Inpatient mortality rate is 8X higher in septic pts than the overall U.S. inpatients
Do the right thing. It will gratify some people and astonish the rest.

Mark Twain
American Author and Humorist
(1835-1910)

What is Sepsis?
New Sepsis Definitions and Clinical Criteria: SEP3
2016 Sepsis Guidelines

Developing a New Definition and Assessing New Clinical Criteria for Septic Shock
For the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)

Published
February 15, 2016

JAMAsepsis.com

THE THIRD INTERNATIONAL CONSENSUS DEFINITIONS FOR SEPSIS AND SEPTIC SHOCK (SEPSIS-3)

JAMA
The JAMA Network

SEPSIS
INFECTION

INFECTION

ORGAN INJURY
A Quick Calculation of Mortality Risk?

qSOFA Calculator

- Is the patient in the ICU? Yes
- Altered Mentation Yes
- Respiratory rate (breaths per minute) 26
- Systolic blood pressure (mmHg) 63

Total Score: 3

Your patient with suspected infection in the intensive care unit has a 27% risk of a bad outcome. This is a prompt to consider that sepsis is very likely.

SEPTIC SHOCK

SEPSIS + 2mmol/L
Vasopressors to maintain MAP 265 mmHg
AND
Serum lactate level 218 mg/dL

IN THE ABSENCE OF HYPOVOLEMIA

A Work in Progress...
Suspected or Actual Infection

Sepsis

2 or more of the following SIRS criteria:

- Temperature > 38°C or < 36 °C
- HR > 90 beats/min
- Respiration > 20/min or PaCO2 < 32mm Hg
- WBC > 12,000 or < 4,000 or > 10% bands

- Trauma
- Acute MI
- Stroke
- Sepsis

Old vs. New Definitions

Sepsis I, II

Subjective or objective evidence for infection with 2 SIRS criteria

Sepsis III

Subjective or objective evidence for infection vs. SIRS criteria

Evidence of organ dysfunction

Symptoms, expected, or perhaps adaptive response to infection

SIRS criteria:

- Hypoperfusion state with increased lactate
- Coag dysfunction
- Hypotension despite 30 mg/kg crystalloid
- Hypochromic microcirculation, vasopressor to maintain MAP > 55 plus lactate ≥ 0.4 mmol/L

A Trauma Code, Heart Attack or Brain Attack...

WHAT AM I SUPPOSED TO DO NOW?

Keep Calm and Carry On

The Golden Hour

- Trauma
- Acute MI
- Stroke
- Sepsis

WHAT CAN I DO?

- Put the pieces together
  - Look for Sepsis!
    - Mental status changes esp in elderly
    - Creatinine or Liver enzymes
    - Hypoperfusion state with increased lactate
    - Coag dysfunction
    - Hemodynamic instability (very late sign)
  - Take ACTION within the GOLDEN HOUR
    - Order lactate & BC X 2
    - Identify source of infection and control
    - Order broad spectrum ABX & ensure administration within 1 hour
    - Order 30mL/kg of fluid
    - Follow serial lactate sampling
Guidelines Recommend:
- 30 mL/kg of IV crystalloid fluid sepsis-induced hypoperfusion, within the first 3 hrs (strong recommendation, low quality of evidence).
- Additional fluids based on reassessment of hemodynamic status (Best Practice Standard / BPS)
  - NOTE: Reassessment must include a thorough clinical examination and evaluation of available physiologic variables e.g., HR, BP, PaO2, RR, temp, urine output, etc or other available types of noninvasive or invasive monitoring
- Target mean arterial pressure (MAP) 65mmHg for pts

Guidelines Suggest:
- Dynamic over static variables to predict fluid responsiveness (weak recommendation, low quality of evidence).
- Give fluids to normalize lactate in patients with elevated lactate levels as a marker of tissue hypoperfusion (weak recommendation, low quality of evidence).

Guidelines Recommend:
- Hospitals and hospital systems have a performance improvement program including sepsis screening (BPS)
  - Note: Appropriate routine microbiologic cultures always include at least two sets of blood cultures (aerobic and anaerobic)
- Administration of IV antimicrobials are initiated ASAP possible ideally within one hour (strong recommendation, moderate quality of evidence)
- Empiric broad-spectrum therapy with 1 or more antimicrobials to cover all likely pathogens (including bacterial and potentially fungal or viral coverage) (strong recommendation, moderate quality of evidence)
- Narrow antimicrobial therapy once pathogens are identified and sensitivities available and/or adequate improvement is noted (BPS)
- Avoid systemic antimicrobial prophylaxis for patients with severe non infectious inflammatory states e.g., severe pancreatitis, burn injury (BPS)
- Combination therapy for the routine treatment of neutropenic sepsis/bacteremia is not recommended (strong recommendation, moderate quality of evidence)
  - NOTE: This does not preclude the use of multidrug therapy to broaden antimicrobial activity.
Antimicrobial Therapy

Guidelines Suggest:
- Empiric combination therapy with at least 2 antibiotics of different classes aimed at the most likely pathogen(s) (weak recommendation, low quality of evidence).
- Combination therapy should not be routinely used for ongoing treatment for bacteremia and sepsis without shock (weak recommendation, low quality of evidence).
- Remarks: Does not preclude the use of multidrug therapy to broaden antimicrobial activity.
- Duration of 7 to 10 days is adequate for most serious infections associated with sepsis and septic shock (weak recommendation, low quality of evidence).

Guidelines Suggest:
- Longer courses are appropriate in patients who have a slow clinical response, undrivable foci of infection, bacteremia with Staphylococcus aureus, some fungal and viral infections, or immunologic deficiencies, including neutropenia (weak recommendation, low quality of evidence).
- Shorter courses for patients with rapid clinical resolution after effective source control of intra-abdominal or urinary sepsis and those with anatomically uncomplicated pyelonephritis (weak recommendation, low quality of evidence).
- Procalcitonin levels can be used to support shortening duration and or discontinuation of antimicrobial therapy (weak recommendation, low quality of evidence).

Source Control

Guidelines Recommend:
- Identify, treat or exclude specific possible sources ASAP
- Prompt removal of intravascular access devices that are a possible source after other vascular access has been established

Guidelines Recommend:
- Fluid challenges continue until hemodynamic factors improve
- Initial and subsequent resuscitation with crystalloids
- Avoid hydroxyethyl starches

Fluid Therapy

Guidelines Suggest:
- Balanced crystalloids or saline for resuscitation (weak recommendation, low quality of evidence).
- Use albumin in addition to crystalloids for initial resuscitation and subsequent intravascular volume replacement in patients requiring substantial amounts of crystalloids (weak recommendation, low quality of evidence).

Guidelines Recommend:
- Norepinephrine as the first-choice vasopressor (strong recommendation, moderate quality of evidence).
- Against using low-dose dopamine for renal protection (strong recommendation, high-quality evidence)

Vasoactive Medications
**Vasoactive Medications**

**Guidelines Suggest:**
- Adding either vasopressin (up to 0.03 U/min) or epinephrine to norepinephrine to raise MAP to target or to wean norepinephrine (weak recommendation, moderate quality of evidence)
- Using dopamine as an alternative to norepinephrine only in highly selected patients e.g., patients with low risk of tachyarrhythmias and absolute or relative bradycardia (weak recommendation, low quality of evidence)
- Using dobutamine with persistent hypoperfusion despite adequate fluid loading and use of vasopressor agents (weak recommendation, low quality of evidence).
- All patients requiring vasopressors arterial catheter placed as soon as practical (weak recommendation, very low quality of evidence).

**Corticosteroids**

**Guidelines Suggest:**
- Adding IV hydrocortisone only adequate fluid resuscitation and vasopressor therapy do not improve MAP
  - NOTE: 200mg IV daily (weak recommendation, low quality of evidence)

**Blood Products and Immunoglobulins**

**Guidelines Recommend:**
- RBC transfusion only when Hgb < 7.0 g/dL in the absence of MI, severe hypoxemia, or acute hemorrhage (strong recommendation, high quality of evidence)
- Against erythropoietin for treatment of anemia (strong recommendation, high quality of evidence)

**Guidelines Suggest:**
- Avoid FFP to correct clotting abnormalities in absence of bleeding or planned invasive procedures (weak recommendation, very low quality of evidence)
- Give platelets for <10K without bleeding and when < 20K for significant risk of bleeding
- Higher platelet counts ≥ 50K for active bleeding, surgery, or invasive procedures (weak recommendation, very low quality of evidence)
- Against the use of IV immunoglobulins (weak recommendation, low quality of evidence).

**Stress Ulcer Prophy**

**Guidelines Recommend:**
- Against stress ulcer prophy unless at risk for GIB
  - Strong recommendation low quality of evidence

**Guidelines Suggest:**
- Using either PPI or H2 blocker for pts with high risk of GIB
  - Weak recommendation, low quality of evidence

**Venous Thromboembolism (VTE) Prophylaxis**

**Guidelines Recommend:**
- LMWH or heparin (strong recommendation, moderate quality of evidence)
- LMWH preferred unless contraindicated (strong recommendation, moderate quality of evidence)

**Guidelines Suggest:**
- Combine pharmacological and mechanical prophylaxis (weak recommendation, low quality of evidence)
- If chemical contraindicated use mechanical (weak recommendation, low quality of evidence)

**Bye, Bye Bicarbonate Therapy**

**Guidelines Suggest:**
- Do not use sodium bicarbonate therapy to improve hemodynamics or to reduce vasopressor requirements in patients with hypoperfusion-induced lactic acidemia if pH ≥ 7.15
  - Weak recommendation, moderate quality of evidence
### Sedation and Analgesia
- IV over drips
- Minimize IV or drips in mechanically ventilated, target titration end point (BPS)

### Mechanical Ventilation
**Guidelines Recommend:**
- Use 6 mL/kg predicted body weight for sepsis-induced acute respiratory distress syndrome (ARDS) (strong recommendation, high quality of evidence)
- Upper limit goal for plateau pressures of 30 cm H$_2$O (strong recommendation, moderate quality of evidence)
- Using prone over supine positioning for pts on in adult with sepsis-induced ARDS and a PaO$_2$/FiO$_2$ ratio < 150 (strong recommendation, moderate quality of evidence)
- Avoid high-frequency vents (strong recommendation, moderate quality of evidence)
- Recommend a conservative fluid strategy in established sepsis-induced ARDS without tissue hypoperfusion (strong recommendation, moderate quality of evidence)

**Guidelines Recommend:**
- Avoid s-2 agonists for the treatment of patients with sepsis-induced ARDS without bronchospasm (strong recommendation, moderate quality of evidence)
- Avoid routine PA catheter for patients with sepsis-induced ARDS (strong recommendation, high quality of evidence)
- Maintain HOB elevation between 30-45 degrees to limit aspiration risk and prevent VAP (strong recommendation, low quality of evidence)
- Using spontaneous breathing trials for pts ready for weaning (strong recommendation, high quality of evidence)
- Using a weaning protocol for pts ready to wean (strong recommendation, moderate quality of evidence)

**Guidelines Suggest:**
- High PEEP over Low PEEP (weak recommendation, moderate quality of evidence)
- Use recruitment maneuvers (weak recommendation, moderate quality of evidence)
- Use prone over supine positioning for pts on in adult with sepsis-induced ARDS and a PaO$_2$/FiO$_2$ ratio < 150 (strong recommendation, moderate quality of evidence)
- Avoid high-frequency vents (strong recommendation, moderate quality of evidence)
- Neuromuscular blocking agents for ≤ 48 hours for sepsis-induced ARDS and a PaO$_2$/FiO$_2$ ratio < 150 mm Hg (weak recommendation, moderate quality of evidence)
- Using lower tidal volumes over higher tidal volumes in sepsis-induced respiratory failure without ARDS (weak recommendation, moderate quality of evidence)
- Using arterial blood rather than capillary POC if A-line in use (weak recommendation, low quality of evidence)

### Glucose Control
**How Sweet It Is!**
**Guidelines Recommend:**
- Intensive insulin protocol should be instituted for pts with 2 consecutive BS >180 mg/dL (strong recommendation, high quality of evidence)
- Check BS q1 - 2 hrs until BS and insulin infusion rates are stable then q4hrs (pts)

**Guidelines Suggest:**
- Using arterial blood rather than capillary POC if A-line in use (weak recommendation, low quality of evidence)

**Guidelines Recommend:**
- Either continuous renal replacement therapy (CRRT) or intermittent renal replacement therapy used for AKI (weak recommendation, moderate quality of evidence)
- Continuous therapies for fluid balance management hemodynamically unstable (weak recommendation, very low quality of evidence)
- Avoid RRT in sepsis AKI for creatinine or oliguria without other definitive indications (weak recommendation, low quality of evidence)
Guidelines Recommend:

- Avoid early parenteral nutrition with or without combo enteral (strong recommendation, moderate quality of evidence)
- Initiate IV glucose and advance enteral feeds as tolerated over the first 7 days when early enteral feeding is not feasible (strong recommendation, moderate quality of evidence)
- Avoid omega-3 fatty acids as an immune supplement (strong recommendation, low quality of evidence)
- Avoid IV selenium & glutamine (strong recommendation, moderate quality of evidence)

Guidelines Suggest:

- Early enteral feeding initiation vs. complete fast or only IV glucose (weak recommendation, low quality of evidence)
- Early trophic/hypocaloric or early full enteral feeding – advance as tolerated (weak recommendation, moderate quality of evidence)
- Avoid routine monitoring gastric residual volumes (weak recommendation, low quality of evidence)
- Using prokinetic agents and post pyloric tubes for intolerance (weak recommendation, very low quality of evidence)

NO Recommendation for use of carnitine

Guidelines Recommend:

- Goals & prognosis discussed with pts & families (BPS)
- Goals incorporated into treatment and end-of-life care planning, using palliative care principles (strong recommendation, moderate quality of evidence)

Guidelines Suggest:

- Goals addressed as early as feasible but no later than 72 hours of ICU admission (weak recommendation, low quality of evidence)

UNDERSTANDING ICD-10 and SEPSIS

- Accurate documentation is necessary to:
  - Maximize facility reimbursement
  - Provide accurate estimates of the incidence of sepsis so appropriate resources can be estimated & allocated
    - Public health officials
    - Policy makers
    - Hospital administrators
- Historically sepsis has been UNDER diagnosed and UNDER documented
- Facilities need all money they deserve

Lagu, Rothberg, Shieh, Pekow, Steingrub & Lindauer, Journal of Critical Care, 2012
**SEPSIS**

- **Infection** -
  - ICD 10 – type of infection: abscess, cellulitis, nec fasc, peritonitis
  - Include site and laterally
  - Link to source or cause – peritonitis due to ruptured diverticulum
  - Don’t document empiric or “covering for”
  - Despite negative cultures e.g., despite negative cultures, E. coli sepsis from UTI d/t quadraplegia with indwelling Foley (American College of Chest Physicians and Society of Critical Care Medicine Consensus Conference, 1992)

**Drug Resistant Infection**

- Document the type of drug resistance
  - MRSA, Beta lactam resistant, VRE etc
  - Antifungal resistant
  - MDR

**SEPSIS**

- **SIRS**
  - Any of 2 of the following:
    - Heart rate > 90 beats per minute
    - WBC > 12,000/mm³, < 4000/mm³, or > 10% immature (band) forms
    - RR > 20 breaths/min or PaCO₂ < 32 mm Hg
    - Temp> 38°C or < 36°C

**SIRS –Noninfectious Origin**

- **Cause**
  - Trauma
  - Pancreatitis
- **With or without organ dysfunction**
- **Link the organ dysfunction to SIRS**
  - AKI d/t SIRS
  - SIRS with ARF

**Severity of Illness (SOI)**

- Need to specific
- Sepsis has >SOI than bacteremia
- Septicemia ≠ sepsis
- Document what the sepsis is d/t
  - Peritonitis d/t
  - Organism
  - Drug resistance

**SEPSIS**

- **Sepsis**
  - Onset – present on admission or develops during the admission
- **Severe sepsis**
  - Document evidence that the **ACUTE** organ failure is d/t sepsis
- **Septic shock**
  - Document that the circulatory failure is d/t sepsis
True or False
1. Bacteremia codes as sepsis
2. Urosepsis codes as sepsis
3. Sepsis syndrome codes as sepsis
4. Septicemia codes as sepsis

Some CMS Pointers on What Not to Document
- Severe sepsis or septic shock without SIRS criteria, organ dysfunction, or hypotension
  - You document it, ensure the bundle components are completed within 3 hours of the documentation
- "Presented with" or "Admitted with" sepsis, severe sepsis or septic shock
  - Unless the ED documented and treated these conditions, abstractors will take your documentation as the truth
- Abnormal lab values in a patient with infection that are not attributable to sepsis e.g., elevated creatinine in ESRD pt

2020 Global Targets
- The incidence of sepsis will decrease globally by at least 20% through prevention strategies
- Sepsis survival will increase for children (including neonates) and adults in all countries through the promotion and adoption of early recognition systems and standardized emergency treatment

Research Results
An intervention that included interprofessional education resulted in a statistically significant difference between the three phases studied:
- There was a statistically significant improvement between the phases for lactate completion $X_2 = 16.908$ ($p < .01$) after education
- Frequency of blood cultures being obtained before antibiotic administration was nearing statistical significance ($p < .054$)
- There was an improvement in time to antibiotic administration between phase 2 (182.09 mean average minutes, $SD = 234.06$) and phase 3 (91.62 mean average minutes, $SD = 167.99$).
SEPtember is SEPSIS Month
World Sepsis Day September 13

Thank you!
Questions?
mpalles@dmc.org
RORY STAUNTON FOUNDATION
rorystaunton.com

SAVE THE DATE!!

SEPSESS CHALLENGE
SUPPORTING SELL-ALCULES
SEPSIS LEADERSHIP

5K Sepsis Walk
Sunday, September 10, 2017
Stony Creek Metro Park
Baypoint Beach 10a.m

The many faces of SEPSIS

Stomp Out Sepsis Now!

Brother

Mother

Sepsis can strike anyone

Thank you!
Questions?
mpalles@dmc.org
RORY STAUNTON FOUNDATION
rorystaunton.com

References


