

IN THIS ISSUE: What Can We Do About Sepsis in Washoe County?

**SEPTEMBER IS SEPSIS AWARENESS MONTH
What Can We Do About Sepsis in Washoe County?**

Introduction

Sepsis is the body's overwhelming and life-threatening response to infection which can lead to tissue damage, organ failure, and death. Severe sepsis and septic shock are major healthcare problems, affecting millions of people around the world each year, killing one in four (and often more), and increasing in incidence. On August 31, 2015, CDC Director Dr. Tom Frieden announced that September is the "Sepsis Awareness Month". The objectives of this article are to:

- Review several definitions which are frequently confusing to healthcare providers;
- Review the burden of sepsis in Washoe County;
- Describe a screening tool for early recognition of sepsis;
- Describe sepsis bundles of care recommended by the Surviving Sepsis Campaign Executive Committee.

Definitions^{1 2 3}

Infection

- Inflammatory response to microorganisms, or
- Invasion of normally sterile tissues

Systemic Inflammatory Response Syndrome (SIRS)

- Systemic response to a variety of processes
- Manifested by ≥ 2 SIRS criteria, i.e., any two of following:
 - Temperature: $> 38.3^{\circ}\text{C}$ or $< 36^{\circ}\text{C}$;
 - Heart Rate >90 beats per minute or more than two standard deviation (SD) above the normal value for age;
 - Respiratory rate: >20 breaths per minute or $\text{PaCO}_2 < 32$ mmHg;
 - White blood cell count $> 12,000/\mu\text{L}$ or $< 4,000/\mu\text{L}$ or $>10\%$ immature (band) forms.

Sepsis

- Infection + ≥ 2 SIRS criteria

Severe Sepsis

- Sepsis + organ dysfunction

Septic Shock

- Sepsis + hypotension despite fluid resuscitation

The following two graphs better describe the relationship between infection, SIRS, sepsis (Figure 1) and the staging of sepsis (Figure 2). It is important to note the differences:

Sepsis \neq Hypotension

Sepsis \neq Bacteremia

It is also important to point out that septicemia has been used interchangeably with sepsis for a long time even on the current CDC's website

<http://www.cdc.gov/sepsis/datareports/index.html>, it is suggested that the term "septicemia" be eliminated from current usage.

Figure 1.

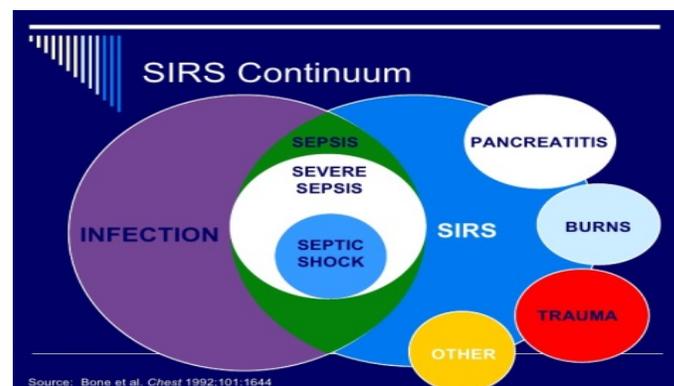
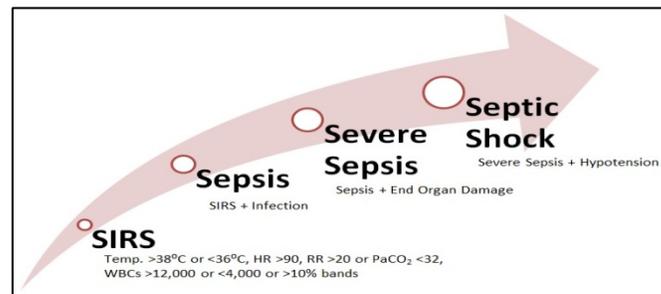


Figure 2.



Burden of Sepsis in Washoe County

According to CDC, there are over 1 million cases of sepsis each year, and it is the ninth leading cause of disease-related deaths. It kills more than 258,000 Americans each year and leaves thousands of survivors with life-changing after effects. Septicemia was the most expensive reason for hospitalization in 2009 – totaling nearly \$15.4 billion in aggregate hospital costs, which is the most current national statistics.⁴

¹ Mitchell Levy, et. al. 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference. Intensive Care Med (2003) 29:530-538

² Bone RC et al. Chest. 1992;101:1644-55

³<http://www.survivingsepsis.org/Guidelines/Pages/default.aspx>

⁴ <http://www.cdc.gov/sepsis/index.html>

In Washoe County, Emergency Department (ED) visits due to septicemia averaged 155 per month, which accounted for 1.1% of total ED visits (unpublished BioSense data). In 2014, the age-adjusted mortality rate for septicemia was 17.8 per 100,000 population in Washoe County, which was the 10th leading cause of death.⁵ Washoe County Health District (WCHD) is currently collaborating with the University of Nevada Las Vegas (UNLV) to analyze hospital discharge/billing data associated with sepsis admission and hospitalization. Results will be published via Epi-News in the future when they become available.

Early Recognition of Sepsis

According to published studies, 45-72% of surgical site infections (SSIs) were detected after discharge from the hospital. One study states that postdischarge SSI results in more outpatient visits, readmissions, emergency department visits, and use of home health services, compared with in-hospital SSI, and also results in vastly increased costs.⁶ Therefore, healthcare providers in all settings are highly encouraged to know and memorize the tips for early recognition of sepsis. It is easy to remember this formula:

Sepsis = Infection + ≥ 2 SIRS criteria

See page one for definitions of infection and SIRS criteria. For evaluation of **severe** sepsis, it is highly recommended for healthcare providers to print the screening form on page 3, which contains more information, and use this as your desktop reference.⁷

Sepsis Bundles of Care

Similar to "Golden Hour" for polytrauma, "Door to PCI" for acute myocardial infarction (AMI), or "Time is Brain" for stroke, the speed and appropriateness of therapy administered in the initial hours after severe sepsis develops are likely to influence outcome. In April 2015, the Surviving Sepsis Campaign (SSC) Executive Committee revised Surviving Sepsis Campaign Bundles (SSCB) of care⁸. The updated bundles of care are:

TO BE COMPLETED WITHIN 3 HOURS OF PRESENTATION:

- 1) Measure lactate level
- 2) Obtain blood cultures prior to administration of antibiotics
- 3) Administer broad spectrum antibiotics
- 4) Administer 30 ml/kg crystalloid for hypotension or lactate ≥ 4 mmol/L

"Time of presentation" is defined as the time of triage in the emergency department or, if presenting from another care venue, from the earliest chart annotation consistent with all

⁵ Data source: Nevada Division of Public and Behavioral Health (NDPBH) (Unpublished, May 2015)

⁶ The Society for Healthcare Epidemiology of America (SHEA): Practical Healthcare Epidemiology, 3rd Edition. 2010. P177.

⁷ <http://www.survivingsepsis.org/Resources/Pages/Protocols-and-Checklists.aspx>

⁸ http://www.survivingsepsis.org/SiteCollectionDocuments/SSC_Bundle.pdf

elements of severe sepsis or septic shock ascertained through chart review.

TO BE COMPLETED WITHIN 6 HOURS:

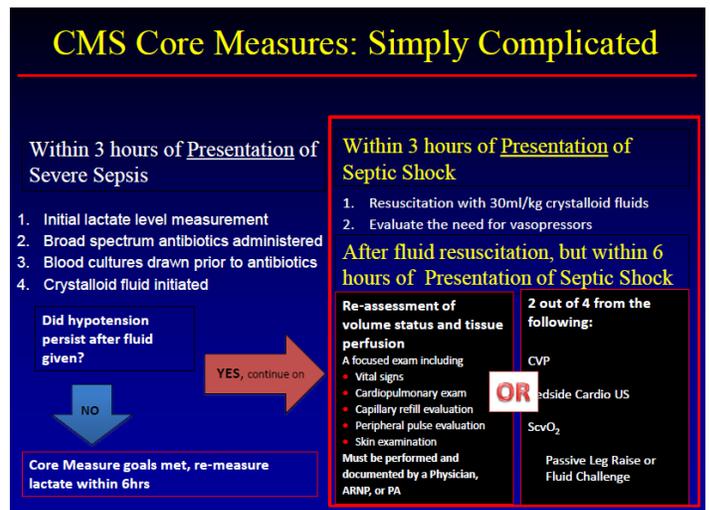
- 5) Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65 mm Hg
- 6) In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was ≥ 4 mmol/L, re-assess volume status and tissue perfusion and document findings according to Table 1.
7. Re-measure lactate if initial lactate elevated.

Table 1. Document Reassessment of Volumes Status and Tissue Perfusion with:

| | |
|-----------------|--|
| Either | Repeat focused exam (after initial fluid resuscitation) by licensed independent practitioner including vital signs, cardiopulmonary, capillary refill, pulse, and skin findings. |
| Or Two of These | <ul style="list-style-type: none"> • Measure CVP • Measure ScvO₂ • Bedside cardiovascular ultrasound • Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge |

CVP=Central venous pressure, ScvO₂=central venous oxygen saturation

The following algorithm summarizes the above bundles of care very well⁹.



Prevention of Sepsis

Vaccination and prevention of infections are the two primary prevention measures. It is highly recommended that your patients keep their vaccinations up-to-date, clean scrapes and wounds, and practice good hygiene.

For more information on sepsis, please check CDC's website <http://www.cdc.gov/sepsis/basic/index.html> and SSC's website <http://www.survivingsepsis.org/About-SSC/Pages/default.aspx>.

⁹ Steven Q Simpson, MD, FCCP, FACP, Professor of Medicine, University of Kansas. Severe Sepsis: Diagnosis and Treatment across the Care Continuum. September, 2015 (Webinar).

Chart record – use patient label. Do not remove from chart

Evaluation for Severe Sepsis Screening Tool

Instructions: Use this optional tool to screen patients for severe sepsis in the emergency department, on the medical/surgical floors, or in the ICU.

1. Is the patient's history suggestive of a new infection?

- | | | |
|---|--|---|
| <input type="checkbox"/> Pneumonia, empyema | <input type="checkbox"/> Bone/joint infection | <input type="checkbox"/> Implantable device infection |
| <input type="checkbox"/> Urinary tract infection | <input type="checkbox"/> Wound infection | <input type="checkbox"/> Other infection |
| <input type="checkbox"/> Acute abdominal infection | <input type="checkbox"/> Blood stream catheter infection | _____ |
| <input type="checkbox"/> Meningitis | <input type="checkbox"/> Endocarditis | |
| <input type="checkbox"/> Skin/soft tissue infection | | |

___ Yes ___ No

2. Are any two of following signs & symptoms of infection both present and new to the patient? Note: laboratory values may have been obtained for inpatients but may not be available for outpatients.

- | | | |
|--|---|---|
| <input type="checkbox"/> Hyperthermia > 38.3 °C (101.0 °F) | <input type="checkbox"/> Tachypnea > 20 bpm | <input type="checkbox"/> Hyperglycemia (plasma glucose >140 mg/dL) or 7.7 mmol/L in the absence of diabetes |
| <input type="checkbox"/> Hypothermia < 36 °C (96.8°F) | <input type="checkbox"/> Leukocytosis (WBC count >12,000 μL^{-1}) | |
| <input type="checkbox"/> Altered mental status | <input type="checkbox"/> Leukopenia (WBC count < 4000 μL^{-1}) | |
| <input type="checkbox"/> Tachycardia > 90 bpm | | |

___ Yes ___ No

If the answer is yes, to both questions 1 and 2, *suspicion of infection* is present:

- ✓ Obtain: **lactic acid, blood cultures**, CBC with differential, basic chemistry labs, bilirubin.
- ✓ At the physician's discretion obtain: UA, chest x-ray, amylase, lipase, ABG, CRP, CT scan.

3. Are any of the following organ dysfunction criteria present at a site remote from the site of the infection that are NOT considered to be chronic conditions? Note: in the case of bilateral pulmonary infiltrates the remote site stipulation is waived.

- SBP < 90 mmHg or MAP <65 mmHg
- SBP decrease > 40 mm Hg from baseline
- Creatinine > 2.0 mg/dl (176.8 mmol/L) or urine output < 0.5 ml/kg/hour for 2 hours
- Bilirubin > 2 mg/dl (34.2 mmol/L)
- Platelet count < 100,000 μL
- Lactate > 2 mmol/L (18.0 mg/dl)
- Coagulopathy (INR >1.5 or aPTT >60 secs)
- Acute lung injury with PaO₂/FiO₂ <250 in the absence of pneumonia as infection source
- Acute lung injury with PaO₂/FiO₂ <200 in the presence of pneumonia as infection source

___ Yes ___ No

If *suspicion of infection* is present AND *organ dysfunction* is present, the patient meets the criteria for SEVERE SEPSIS and should be entered into the severe sepsis protocol.

Date: ___/___/___ (circle: dd/mm/yy or mm/dd/yy)

Time: ___: ___ (24 hr. clock)