



Sepsis Screening and Management for Inpatient Units

Martina Adams, BS, RN, CCRN
Froedtert & The Medical College of Wisconsin
May 2013



Objectives

- ❑ Define the three stages of sepsis
- ❑ Describe the sepsis screening process
- ❑ Explain early treatment strategies for sepsis



Severe Sepsis Statistics

- ❑ Mortality rate is 30-50%
- ❑ The #1 cause of death in the ICU nationally
- ❑ 7-14 days in ICU plus 10-14 days in hospital following ICU stay
- ❑ Treat costs hospitals \$17 billion annually



What is sepsis?

- It is the *response* to an infection
- Evolves in phases
 - Infection
 - Sepsis
 - Severe sepsis
 - Septic shock
- Severity determined by specificity and severity of *host response*, more than the causative organism
- Cause of death in septic shock is from lack of perfusion, not the bacterium, fungi, parasite, or virus



SIRS: Systemic Inflammatory Response Syndrome

- ❑ Widespread inflammatory response to microbial invasion or cell injury
- ❑ Signs and symptoms: *Fever or hypothermia, tachycardia, tachypnea, leukocytosis or leukopenia*
- ❑ “Pure” SIRS typical in trauma, pancreatitis, burns, postoperative patients



Sepsis

***Two* SIRS criteria plus infection**



Severe sepsis

**Sepsis plus organ dysfunction or
tissue hypoperfusion**

(at least one organ system)




Septic shock

Hypotension persisting despite adequate
fluid resuscitation

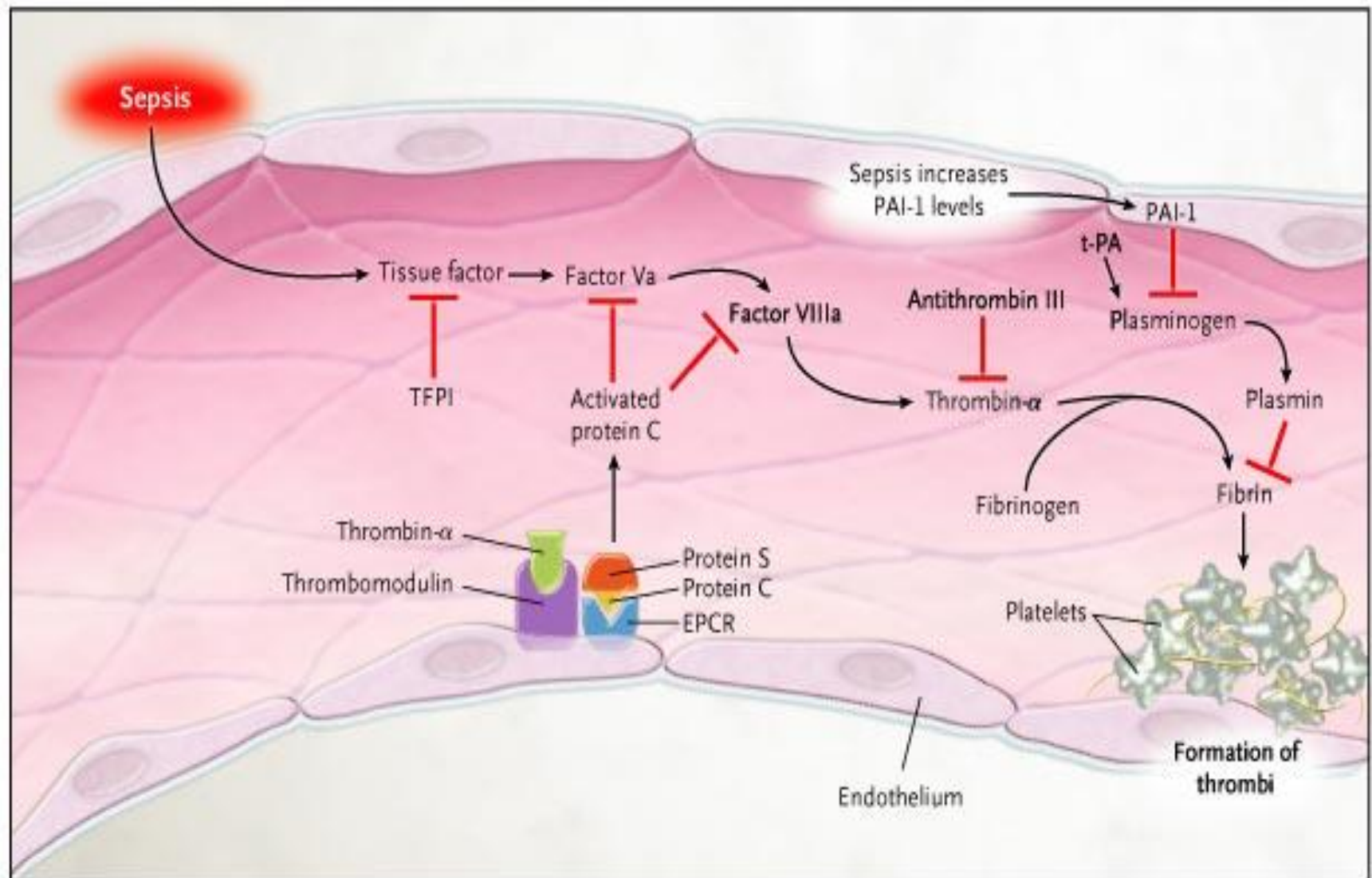
– or

Lactic acidosis with lactate > 4.0
(patient can have normal BP)



Severe sepsis / septic shock pathophysiology

- ❑ *Abnormal fluid distribution* due to vasodilation, capillary leakage, osmotic pressure changes
- ❑ Decreased perfusion to vital organs
- ❑ Hypoperfusion leads to anaerobic metabolism, causing increased lactate levels and acidosis
- ❑ *Coagulation problems* – inflammation increases coagulation and inhibits fibrinolysis
- ❑ Cells die from lack of oxygen





Surviving Sepsis Campaign: Early Goal-Directed Therapy

- ❑ Early, routine screening
- ❑ Early and aggressive treatment
- ❑ Bundled care improves outcomes
- ❑ NEJM Nov. 2001 published results of study:
Initiating therapy before admission to the ICU
resulted in 16% decrease in mortality compared
to patients receiving standard therapy



GENESIS Project

- ❑ Multicenter Quality Improvement Collaborative
- ❑ Studied use of EGDТ in community and tertiary hospitals with both treatment and control groups
- ❑ Published August, 2012
- ❑ Patients receiving EGDТ experienced in-hospital **mortality reduction of 14% and a 5.1 day decrease in LOS**



Speed of therapy influences outcome

Approach sepsis like:


- Acute MI
- Stroke
- Polytrauma

Severe sepsis is an emergency!

Sepsis Screening – Step 1


Are any two of the following signs and symptoms of infection both present and new to the patient?

- ❑ Temperature $> 100.4^{\circ}\text{F}$ or $< 96.8^{\circ}\text{F}$
- ❑ Tachypnea RR > 20 bpm
- ❑ Tachycardia HR > 90 bpm
- ❑ WBC $> 12,000$ or $< 4,000$ per uL
- ❑ Acutely altered mental status



Step 2 - patient must also have a confirmed or suspected infection

- ☐ Pneumonia; empyema
- ☐ Urinary tract infection
- ☐ Bloodstream catheter infection
- ☐ Acute abdominal infection
- ☐ Meningitis
- ☐ Skin/soft tissue infection
- ☐ Wound infection
- ☐ Implantable device infection
- ☐ Endocarditis
- ☐ Bone/joint infection



Steps 1 + 2 = Sepsis


If patient meets criteria in both steps,
they have screened positive for

“simple” sepsis

Assess organ dysfunction - Step 3

- ❑ Circulatory: SBP < 90 or MAP < 65 or SBP decrease > 40 mmHg
- ❑ Respiratory: SpO2 < 90% or increasing O2 needs
- ❑ Central nervous system: Acutely altered mental status
- ❑ Hypoperfusion: Lactic acid level > 2.0 mmol/L
- ❑ Renal: U/O < 0.5 mL/kg/hr for > 2 hrs despite adequate fluid resuscitation
- ❑ Renal: Creatinine > 0.5 mg/dL
- ❑ GI: Ileus (absent bowel sounds)
- ❑ GI: Bilirubin > 2.0 mg/dL
- ❑ Hematologic: Platelet count < 100,000;
INR > 1.5 (non-liver failure patients)
- ❑ Hepatic: Total bilirubin >

~ Do not include chronic organ dysfunction in screening ~



Steps 1+2+3 = Severe Sepsis

- If the patient has evidence of a single **new** organ system dysfunction, in addition to screening positive for sepsis, they have

severe sepsis

- Risk of death is 30-50%
- Without appropriate treatment, patient will progress to the next phase – **septic shock**



Surviving Sepsis Campaign 3-hour Bundle

Goal: Start immediately and complete within 3 hours of recognition

- ❑ Measure lactate level
- ❑ Obtain blood cultures prior to administration of antibiotics (unless > 45 min. delay)
- ❑ Administer broad spectrum antibiotics
(1st dose within 1 hr. of sepsis recognition)
- ❑ Administer 30 mL/kg crystalloid for hypotension or lactate \geq 4 mmol/L



SSC 6-hour Bundle

Goal: To be completed within 6 hours (in ICU)

- ❑ Vasopressors for hypotension not responding to initial fluid resuscitation to maintain $\text{MAP} \geq 65 \text{ mmHg}$
- ❑ For persistent hypotension despite volume resuscitation (septic shock) **or**
initial lactate $\geq 4 \text{ mmol/L}$:
 - Measure CVP
 - Measure ScvO_2
- ❑ Re-measure lactate if initial lactate was elevated



Lactic acid level

- ❑ Reflects global tissue hypoxia
- ❑ Not specific to sepsis (liver failure, metformin, anemia may cause increased lactate level)
- ❑ A standard, early step in sepsis screening
- ❑ Document when it was drawn in relation to IV fluid resuscitation – may show a diluted result after IV fluids
- ❑ Patient can have a normal lactate level and still have *regional* hypoperfusion (to kidneys, brain, or gut, for example), requiring fluids to improve perfusion to vital organs



Surgical patients

- ❑ Screening sensitivity – patient can have “pure SIRS” for 24-48 hrs. post-op (SIRS positive, without infection)
- ❑ Sepsis and septic shock are more prevalent than PE and MI in the general surgery patient
- ❑ 10% of all cancer deaths are attributable to sepsis



Sepsis is a clinical diagnosis

- ❑ Symptoms can be vague
- ❑ Many high-risk patients already look very ill
- ❑ Development of sepsis does not require bacteremia
- ❑ > 50% of patients with severe sepsis have negative blood culture results
- ❑ Patients on antibiotics can become septic

*Need to develop a high index of suspicion
~ screen every patient ~*



Best practice

- ❑ Screen your patient for sepsis at the start of your shift
- ❑ Notify the RRT RN if you have any concerns about your patient having severe sepsis, or sepsis without current treatment
- ❑ Trust your routine vital signs, and count respirations with your Timex! Tachypnea is a frequent, reliable sign
- ❑ The patient with actual or imminent septic shock requires emergent ICU transfer



Become an expert

- ❑ Know the sepsis screening process and use it consistently
- ❑ Journal articles, contact hours
- ❑ Orient new staff to sepsis screening & support your peers
- ❑ Questions? Call the RRT RN

Sepsis screening saves lives

Early, routine screening

Early and aggressive treatment



References

- Cannon, C. M., & Holthaus, C. V., Zubrow, M. T., Posa, P., Gunaga, S., Kella, V., . . . Rivers, E. P. (2012, August). The GENESIS project: A multicenter quality improvement collaborative. *Journal of Intensive Care Medicine*. doi:10.1177/0885066612453025
- Dellinger, R. P., Levy, M. M., Rhodes, A., Annane, D., Gerlach, H., Opal, S. M., . . . Moreno, R. (2013). Surviving sepsis campaign: International guidelines for management of severe sepsis and septic shock. *Critical Care Medicine*, 41(2), 580-637.
- Marini, J., & Wheeler, A. (2010). Critical care medicine: The Essentials (4th ed.). Philadelphia, PA: Lippincott, Williams & Wilkins.
- Mato, A. R., Fuchs, B. D., Heitjan, D. F., Mick, R., Halpern, S. D., Shah, P. D., . . . Luger, S. (2009, June). Utility of the systemic inflammatory response syndrome (SIRS) criteria in predicting the onset of septic shock in hospitalized patients with hematologic malignancies. *Cancer Biology and Therapy*, 8(12), 1095-1100.
- Moore, L. J., Moore, F. A, Todd, S. R., Jones, S. L., Turner, K. L., & Bass, B. L. (2010). Sepsis in general surgery. *Archives of Surgery*, 145(7), 695-700.
- Nelson, D. P., Lemaster, T. H., Plost, G. N., & Zahner, M. L. (2009). Recognizing sepsis in the adult patient. *American Journal of Nursing*, 109(3): 40-45.
doi:10.1097/01.NAJ.0000346928.90369.10
- Rivers, E., Nguyen, B., Havstad, S., Riessler, J., Muzzin, A., Knoblich, B., Peterson, E., & Tomlanovich, M. (2001, November). Early-goal directed therapy in the treatment of severe sepsis and septic shock. *New England Journal of Medicine*, 345(19), 1368-1377.
doi:10.1056/NEJMoa010307
- Tazbir, J. (2012). Early recognition and treatment of sepsis in the medical-surgical setting. *MEDSURG Nursing Journal*, 21(4): 205-208.