


SEPSIS

Clara Zamorano, MD
ANW Intensivists

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DISCLOSURE

- No financial or academic conflicts of interest

OBJECTIVES

- Define sepsis
- Understand the physiology of sepsis
- Describe the treatment of sepsis

What is sepsis

- Sepsis = dysregulated host response to infection
 - SIRS + infection
- Severe Sepsis= Sepsis +organ dysfunction
 - Respiratory failure
 - Oliguria or AKI
 - DIC or coagulopathy
 - Shock liver
- Septic shock-sepsis PLUS hypoperfusion
 - MAP < 65
 - Lactate > 2

Adapted from ACCP/SCCM consensus statement

Definitions

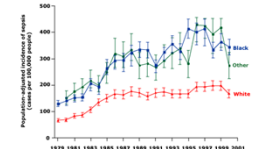
	ESTABLISHED DEFINITIONS (used by CMS)	SEPSIS-3 DEFINITIONS	SSC GUIDELINES
SEPSIS	Presumed/known infection + ≥2 systemic inflammatory response syndrome criteria	≥2 SOFA criteria (present or increased) includes hypotension + normal lactate (shock)	Sepsis = severe sepsis
SEVERE SEPSIS	Sepsis + end organ dysfunction, lactate >4 mmol/L	Not a category	"Sepsis" = established severe sepsis definition
SEPTIC SHOCK	Sepsis + refractory hypotension (± lactate)	Vasopressors and lactate >2 mmol/L	Sepsis + refractory hypotension (± lactate)
MORTALITY RATIO = OBSERVED MORTALITY / EXPECTED MORTALITY	Sepsis = low acuity Observed mortality low Expected mortality low	Sepsis = higher acuity Observed mortality higher Expected mortality low	NA

- SEP-1 and 'Sepsis-3'
 - 'Sepsis 3' definition: CMS will NOT be using or transitioning to the new Sep-3 definitions at this point due to "significant" lack of evidence

Epidemiology

- 2017: Global Burden of Disease study estimated 48.9 million incident cases reported
 - Approx 15 cases of septic shock per 1000 admissions
 - 11 million deaths
 - Mortality as high as 51%
 - Incidence greatest during winter
 - Risk factors:
 - Age > 65
 - Immunosuppression
 - Obesity / Diabetes
 - Cancer
 - Previous hospitalization
 - G->G->fungal
 - >50% cases with no identified source

Population-adjusted incidence of sepsis, according to race, 1979 - 2000

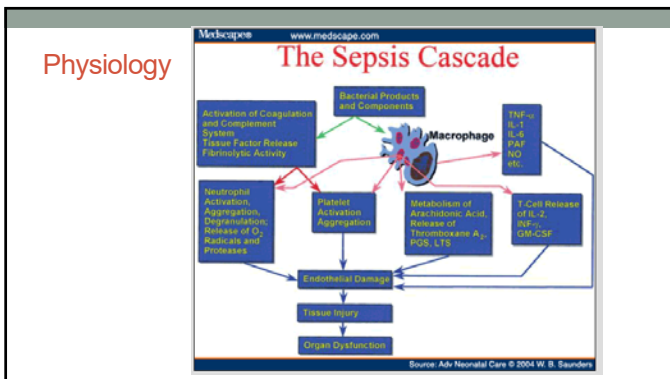
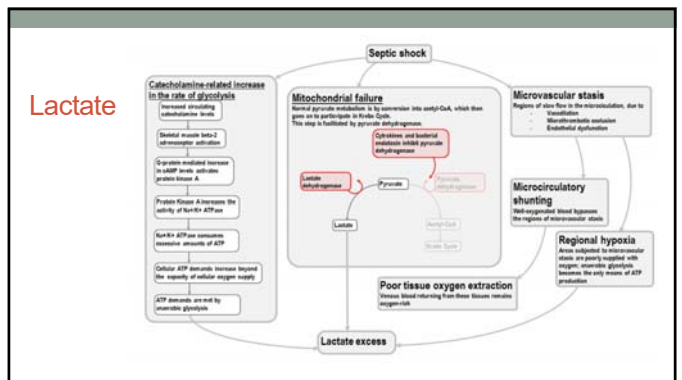
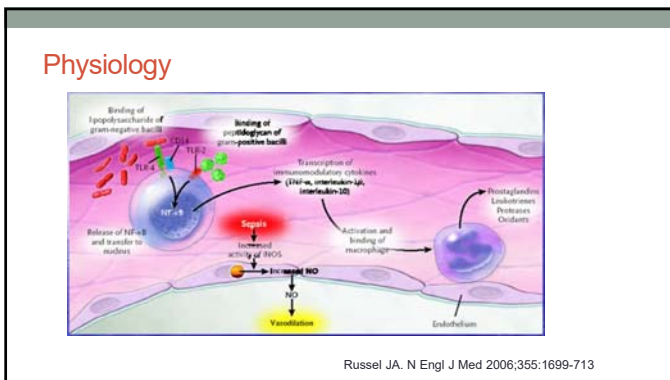
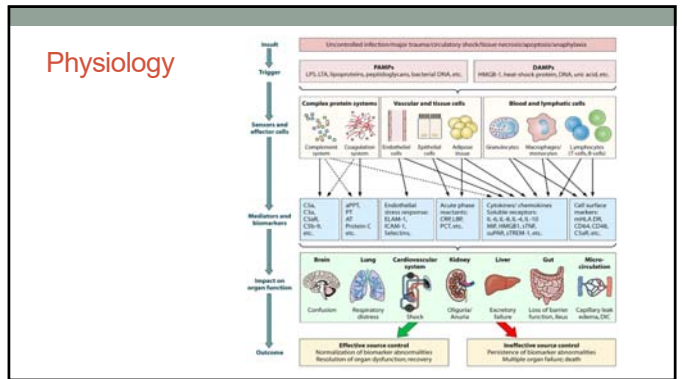


Points represent the annual incidence rate, and I bars the standard error.
Data from: Martin, GS, Mannino, DM, Eaton, S, Moss, M. The epidemiology of sepsis in the United States from 1979 through 2000. N Engl J Med 2003; 348:1546.

UpToDate

Clinical Presentation

- Infection
- SBP < 90, MAP < 70
- Fever or hypothermia
- HR > 90
- Tachypnea, RR > 20
- Signs of malperfusion
 - Cool skin
 - Decreased cap refill, cyanosis, mottling
 - Mental status changes
- Hyperglycemia
- Low or high WBC (> 12K or < 4K)
- Coag abnormalities
- Thrombocytopenia
- Hyperbilirubinemia
- Elevated lactate
- Elevated procalcitonin



Prognosis

- Mortality rate increases linearly with disease severity
- Sepsis > 10%, septic shock > 40%
- Long-term:
 - Up to 20% increased risk of death post discharge from hospital
 - Increased risk of recurrent sepsis
 - Decreased quality of life

Prognostic Factors

- Host-related
- Site and type of infection
- Antibiotics
- Restoration of perfusion

Initial Resuscitation

- Stabilize respiratory status
 - Oxygen
 - Intubation for airway protection or for altered mental status
 - Work of breathing often high if acidosis present
- Obtain IV access
 - Central line placement should not delay delivery of fluids, antibiotics or even pressors
- Labs
- Antibiotics within first hour
- Fluid resuscitation

Sepsis Bundle

Required Action	Severe Sepsis		Septic Shock	
	3-Hr Bundle	6-Hr Bundle	3-Hr Bundle	6-Hr Bundle
Initial Lactate Collection	Yes	Must be completed within 3-hrs of Severe Sepsis Presentation		
Blood Culture Collection	Yes			
Initial Antibiotic Started	Yes			
Repeat Lactate Collection (if Initial Lactate is > 2)	N/A	Yes	Completed within 6-hrs of Severe Sepsis presentation	
30 mL/kg Crystalloid Fluids Started	N/A	N/A	Yes	Completed within 3-hrs of initial hypotension and/or septic shock
Vasopressor Given (if hypotension persists)	N/A	N/A	Completed within 6-hrs of septic shock	Yes
Repeat Volume Status Assessment	N/A	N/A		Yes

Septic Shock

- Vasopressors

- Additional Considerations
 - Steroids
 - Inotropes/cardiac evaluation
 - Transfusion?
 - IV vitamin C?

Vasoactive agents in septic shock

Drug	Effect on heart rate	Effect on contractility	Arterial constriction effects
Dobutamine	++	+++	- (dilates)
Dopamine	+++	++	++
Epinephrine	+++	+++	++
Norepinephrine	++	++	+++
Phenylephrine	0	0	+++

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Follow Up

- Invasive monitoring
- Frequent clinical re-evaluation
- Lab monitoring
 - Lactate
 - ScVO2
- Source control

REFERENCES

- Neviere, R. (2020). Sepsis syndromes in adults: Epidemiology, definitions, clinical presentation, diagnosis and prognosis. In G. Finlay (Ed.) UpToDate. Retrieved from Feb 3, 2020 from <https://www.uptodate.com/contents/sepsis-syndromes-in-adults-epidemiology-definitions-clinical-presentation-diagnosis-and-prognosis>
- Schmidt, GA, Mandel J. (2020). Evaluation and management of suspected sepsis and septic shock in adults. In G. Finlay (Ed.), UpToDate. Retrieved from November 22, 2019 from <https://www.uptodate.com/contents/evaluation-and-management-of-suspected-sepsis-and-septic-shock-in-adults>
- Kalantary A, Mallema H, Weingart SD. Sepsis Definitions: The Search for Gold and What CMS Got Wrong. West J Emerg Med. 2017 Aug; 18(5): 951-956
- Minasyan, H. Sepsis: mechanisms of bacterial injury to the patient. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine. 2019 Feb; 27:19

TO CONTACT ME

- Clara.Zamorano@allina.com

