

# SEPSIS: IT ALL BEGINS WITH INFECTION

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Appetite

Endocrine

GLF

Chronic conditions

Age



# Suspect **SEPSIS**



## Save Lives

LTAC

Recent hospitalization

NH

SNF

AMS

# Identifying Sepsis



# OBJECTIVES

- Review the new Sepsis – 3 definitions of sepsis and how they differ from Sepsis – 2 and CMS SEP – 1 Sepsis Core Measure
- Review the epidemiology of sepsis in the acute care setting

# ACUTE INFECTION IS THE TIP OF THE SPEAR FOR ALL CURRENT AND PAST DEFINITIONS OF SEPSIS

**Early  
identification  
Early  
intervention  
Less of this?**



# REDEFINING SEPSIS PART III

<https://emcrit.org/pulmcrit/problems-sepsis-3-definition/>

# ACUTE INFECTION IS THE TIP OF THE SPEAR FOR ALL CURRENT AND PAST DEFINITIONS OF SEPSIS

- Sepsis – 2 and the CMS SEP – 1 Sepsis Core Measure
- CMS sepsis core measures went live in 2015. Still collecting baseline data for the SEP – 1 Severe sepsis/Septic shock early management bundle
- Patients 18 y/o or older with ICD – 10 CM principal or other diagnosis of severe sepsis or septic shock.
- Not scoring the SEP – 1 measure validation for Hospital Inpatient Quality Reporting (IQR) Fiscal Year (FY) 2018.

# TOOLS USED WITH SEP – 2 AND CMS

- In the presence of infection & SIRS of 2 or more and/or a change of 2
- Manual abstraction for ICD – 10 based on identifying sepsis patients
- THEN
- Identifying severe sepsis (organ dysfunction) or septic shock (lactate  $\geq 4$  mmol/L or persistent hypotension after fluid resuscitation).
- Are we missing patients?
- Are we casting a broad net?

# SEPSIS – 3

- Sepsis – 3 Definitions:
- **Sepsis** is life-threatening organ dysfunction caused by a dysregulated host response to infection.
- **Severe sepsis** – is gone.
- **Septic shock** – is a subset of sepsis in which profound circulatory, cellular and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone.

# TOOLS TO USE WITH THE NEW DEFINITIONS

- **Higher mortality** (> 10%) identified with organ dysfunction
- **qSOFA** – for use in the ED and non-ICU areas
  - Altered mental status
  - Respiratory rate  $\geq$  22/minute
  - Systolic blood pressure  $\leq$  100 mmHg
- What does the evidence show?
- In the presence of infection or not?
- Is it a better indicator of mortality or risk for sepsis?
- Sequential (sepsis related) organ failure assessment (**SOFA**) for use in the ICU
  - 0 – 24 points; 13 variables, clinical labs, therapeutic data

# SOFA

- Respiration: PaO<sub>2</sub>/FiO<sub>2</sub> ration
- Coagulation: platelets
- Liver: bilirubin
- Cardiovascular: hypotension/use of vasopressors to maintain BP
- CNS: GCS score
- Renal: creatinine and urine output
- *Scoring 1-4 for each criteria based on worsening data*

# THE SEQUENTIAL ORGAN FAILURE ASSESSMENT (SOFA) SCORE

SYSTEM	0	1	2	3	4
<b>Respiration</b> PaO <sub>2</sub> /FIO <sub>2</sub> mm Hg (kPa)	≥400 (53.3)	<400 (53.3)	<300 (40)	<200 (26.7) with respiratory support	<100 (13.3) with respiratory support
<b>Coagulation</b> Platelets ×10 <sup>3</sup> /uL	≥150	<150	<100	<50	<20
<b>Liver</b> Bilirubin mg/dL (umol/L)	<1.2 (20)	1.2-1.9 (20-32)	2.0-5.9 (33-101)	6.0-11.9 (102-204)	>12.0 (204)
<b>Cardiovascular</b>	MAP ≥70mmHg	MAP <70mmHg	Dopamine <5 or Dobutamine (any dose)	Dopamine 5.1 - 15 or Epinephrine ≤ 0.1 or Norepinephrine ≤ 0.1	Dopamine >15 or Epinephrine >0.1 or Norepi- nephrine >0.1
<b>CNS</b> GCS Score	15	13-14	10-12	6-9	<6
<b>Renal Creatinine,</b> mg/dl (umol/L)	<1.2 (110)	1.2 -1.9 (110-170)	2.0 - 3.4 (171- 299)	3.5 - 4.9 (300 -440)	> 5.0 (440)
<b>Urine Output, ml/d</b>				<500	<200

Catecholamine Doses = ug/kg/min for at least 1hr

# QSOFA

- SBP  $\leq$  100 mmHg
- RR  $\geq$  22/minute
- Mental status: GCS  $<$  15
- *Positive score if 2 or more of these indicators*

# Sepsis Summary Report

Sepsis Summary

Go to now 11/2/2017

Thursday 0300 - Today 1459

1 Hr 4 Hr 8 Hr 1 Day View All

4 Hr: ◀	No department found			TX Health F...			T...			HFW Medical Surgical ICU										HFW Medical Surgical ICU				11/06				
	11/02	11/02 0700 - 11/03 0659						11/03 0700 - 11/04 0659						11/04 0700 - 11/05 0659						11/05 0700 - 11/06 0659								
	03-07	07-11	11-15	15-19	19-23	23-03	03-07	07-11	11-15	15-19	19-23	23-03	03-07	07-11	11-15	15-19	19-23	23-03	03-07	07-11	11-15	15-19	19-23	23-03	03-07	07-11	11-15	
<b>▼ Sepsis Tool</b>																												
Think Sepsis Score				3+	3+	3+																						Think Seps...
<b>▼ Vitals</b>																												
BP				102/51	90/55	97/50	83/54+	96/61	105/63+	117/56+	92/46	102/50+	89/53+	99/53+	99/54	105/55+	102/67+	121/62+	137/62+	118/69+	93/54	98/57+	96/53+	99/55	103/58+	109/57+	BP	
BP Mean(MAP)*				68+	67+	66+	64+	73+	77+	76+	61+	67+	65+	68+	69+	72+	79+	82+	87+	85+	67+	71+	67+	70+	73+	74+	BP Mean(...	
Temp*				99.8 (...)		98.2 (...)	103.1...	100.1...	102.3...	98.5 (...)	101 (3...	98.3 (...)	99 (37...	97.7 (...)	98 (36...	98.1 (...)	98.1 (...)	97.8 (...)	97.4 (...)			99.5 (...)	97.8 (...)	98 (36...	97.8 (...)	98 (36...	Temp*	
Temp Src				Oral		Oral	BLAD...	BLAD...	BLAD...	Axillary	Axillary	Axillary	Axillary	Oral	Oral	Oral	Oral	Oral	Axillary			Axillary	Oral	Oral	Oral	Oral	Temp Src	
Pulse*				96+	84+	82+	83+	70+	71+	70+	68+	65+	62+	70+	69+	65+	64+	69+	54+	59	74	76+	75+	67+	60+	62+	Pulse*	
Resp*				18+	18+	22+	25+	17+	14+	18+	16+	15+	15+	17+	19+	21+	20+	21+	21+	19+	22+	21+	25+	17+	15+	15+	Resp*	
Shock Index				0.94+	0.93+	0.85+	1+	0.73+	0.68+	0.6+	0.74+	0.64+	0.7+	0.71+	0.7+	0.62+	0.63+	0.57+	0.39+	0.5+	0.8+	0.76+	0.72+	0.68+	0.58+	0.57+	Shock Index	
CVP					5	3+																					CVP	
Weight				90.7 k...		90.7 k...																				97.7 k...	Weight	
MEWS Total Score				1+	3+	4+	6+	5+	3+	1+	1+	0+	1+	2+	2+	2+	1+	2+	2+	1+	4+	4+	3+	3+	1+	1+	MEWS Tot...	
SpO2				99+	97+	98+	95+	100+	100+	100+	99+	100+	100+	100+	94+	100+	96+	93+	97+	99+	98+	99+	94+	98+	100+	100+	SpO2	
FINAL SIRS SCORE (...)				1+	0+	1+	3+	2+	2+	2+	2+	1+	1+	1+	1+	2+	1+	2+	2+	2+	2+	2+	2+	2+	1+	0+	FINAL SIR...	
Glasgow Coma Scale...				14+	14	14		14	14	15	15			15		15	15			14		14	14+	14+	14		Glasgow C...	
<b>▼ Output</b>																												
Urine (mL)																										0mL	Urine (mL)	
<b>▼ Labs</b>																												
POC Lactate				5.44	3.49																						POC Lactate	
Lactic Acid						1.8	1.9		1.5																		Lactic Acid	
Platelet Count				187		208						174						126							82		Platelet Co...	
Creatinine				1.4		2.0						2.9						3.0							3.1		Creatinine	
WBC				9.42		18.52						15.06						12.79							6.69		WBC	
Bands %						43.3						41.9													1.9		Bands %	
Total Bilirubin						2.0						2.3						1.2							0.8		Total Biliru...	
<b>▼ Medication</b>																												
NORMAL SALINE Sol...				1x																							NORMAL...	
D5W Solp (mL)					500					250																	D5W Solp...	
0.9 % SODIUM CHLO...								10				10		10		20+		10	10				10		10		0.9 % SOD...	
<b>▼ Oxygen profile</b>																												
Oxygen Therapy O2 D...				simpl...+	nasal...+	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	nasal ...	Oxygen Ther...
<b>▼ Chemistry</b>																												
Sodium				139		138						138						140							142		Sodium	
Potassium				3.8		4.1						4.3						3.9							3.4		Potassium	

# SO WHAT'S THE DIFFERENCE?

- Who are you missing by using the new SEP – 3 definitions?
- Sterling, Puskarish, Glass, Guirgis, and Jones (2017) noted in their study:
  - Comparison of old septic shock criteria with new Sep – 3 septic shock
  - 57% of patients meeting old criteria did not meet new Sep – 3
  - Sep – 3 identified a group of patients with increased organ failure and higher mortality
  - Patients who met old criteria and *not* SEP – 3 still demonstrated “significant” organ failure and 14% mortality rate.

# SEPSIS OR NOT SEPSIS?

- If a patient with an acute infection is ill enough to be admitted to an acute care facility, especially to an ICU, consider those patients septic until proven otherwise
- Just the facts:
  - 80% of sepsis cases admitted to acute care facilities in the U.S. are present on admission
  - 80% of the cases of sepsis discharged from an acute care facility in the U.S. were admitted through the Emergency Department

# EPIDEMIOLOGY OF SEPSIS IN THE ACUTE CARE SETTING

- CMS Sepsis Core Measures
  - 3 hour interventions:
    - lactate
    - blood culture – prior to starting antibiotics
    - antibiotics – broad spectrum
    - fluids - 30 ml/Kg for lactate  $\geq 4$  mmol/L or MAP  $\geq 65$  mmHg
  - 6 hour interventions:
    - vasopressors to maintain MAP  $\geq 65$  mmHg hypotension unresponsive to initial fluid retention
    - Reassess volume status and tissue perfusion
    - Remeasure lactate if initial one is  $\geq 2$  mmol/L

# CMS SEPSIS CORE MEASURE INTERVENTIONS

- Which part is actually making a difference for your patients?
  - Antibiotics & antibiotic stewardship
  - Source control
  - Resuscitation management: fluids; resuscitation targets, vasopressors
  - Mechanical ventilation in patients with sepsis-related ARDS
  - Or?
- System wide standardization programs
  - RCB and our initiatives
  - DSRIP

# SEPSIS 3 GUIDELINES

- 5 sections
  - Hemodynamics
  - Infection
  - Adjunctive
  - Metabolic
  - Ventilation

# HEMODYNAMICS

- EGDT no longer supported
- Initial resuscitation –  $\geq 30$  ml/Kg of crystalloids for sepsis induced hypoperfusion within first 3 hours
- Target goal – MAP  $\geq 65$  mmHg
- Target goal – normalize lactate in patients
- Dynamic versus static measurements; for example PPV (pulse pressure variation) versus CVP measurement

# INFECTION

- Antibiotic stewardship program
- Narrow the ABX therapy once pathogen is identified target of 6-12 hours after diagnosis
- Emergent source control: i.e. central line infection, chronic foley catheter, etc.
- Procalcitonin levels to shorten the duration of therapy

# ADJUNCTIVE

- RBC transfusion only when hemoglobin concentration is less than 7.0 – 7.5 g/dl
- In the absence of extenuating events such as MI, severe hypoxemia, or acute hemorrhage
- Do not use stress ulcer prophylaxis in patients without risk factors for GI bleeding
- Do use stress ulcer prophylaxis for patients with sepsis or septic shock who have risk factors for GI bleeding
- Use either proton pump inhibitors (PPIs) or histamine – 2 receptor antagonists (H<sub>2</sub>RAs) when stress ulcer prophylaxis is indicated

# METABOLIC

- Recommend early use of full enteral nutrition rather than early parenteral nutrition along or the combination of parenteral & enteral feedings in critically ill patients with sepsis or septic shock who can be fed per enteral routes.
- Either early trophic or early full enteral feeding – advance per patient tolerance.
- Do not routinely monitor gastric residual volumes in critically ill patient with sepsis or septic shock unless patient has feeding intolerance or are considered high risk for aspiration.
- Recommend placement of postpyloric feeding tubes in patients who are considered high risk for aspiration.

# VENTILATION

- Prone over supine positioning in adults with sepsis-induced ARDS and a  $\text{PaO}_2/\text{FiO}_2$  ratio  $<150$
- Recommend not using HFOW in adult patients with sepsis-induced ARDS
- Use NMBA for  $\leq 48$  hours in these same patients
- Use lower tidal volumes over higher tidal volumes in adult patients with sepsis – induced respiratory failure without ARDS

Septic  
or not?

## Identifying Sepsis



# SPECIAL POPULATION - ELDERLY

- Even more complicated to diagnose and treat.
- Which chronic condition puts the elderly patient at a 143% increased risk of sepsis?
- What do multiple co-morbidities do to that risk of mortality with sepsis for the elderly?
- What are the most common admission diagnosis for sepsis in the elderly?
- What are the most common clinical s/s of sepsis in the elderly?

# SO WHAT WILL THE IMPACT OF SEPSIS 3 BE ON YOUR CLINICAL PRACTICE?

- Fine tune our clinical screening criteria
- New sepsis – 3 definitions and criteria will help meet our goal of early identification for patients with a risk of higher mortality and early treatment.
- Beware the stable sepsis patient!
- We are evaluating the use of qSOFA and SOFA along with other logistical analysis programs pulling information from our EHR.
- Reminding our physicians that CMS and other payers do not recognize sepsis – 3 documentation; i.e. qSOFA 3 = sepsis

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# QUESTION AND ANSWER

- At the end of the three presentations.
- Thank you for your patience.

