

# Sepsis: New Definitions, New Direction

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# Disclosure

- No conflicts of interest to report related to this talk

# Learning Objectives

- 1. Discuss the justification and criteria establishing the new definitions of sepsis and how their development impacts changes among the adult and pediatric population
- 2. Compare and contrast the predictive value for in hospital mortality by using the SOFA score, SIRS criteria, LODS score and the development of the qSOFA score in identifying suspected infection in patients outside of a critical care setting

# Outline

- The New Definition of Sepsis
- Addition of qSOFA
- Strengths & Weaknesses of The New Definitions
- Other considerations

# The New Definition of Sepsis

- The New Definition of Sepsis
  - Justification and Criteria
  - Removal of Severe Sepsis Diagnosis
  - Use in Adult vs. Pediatric Population

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# The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)

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- Published in February 2016
- Intended to improve the clarity of the definitions for
  - clinical care, epidemiology, quality improvement and research
- The new definitions have been validated [retrospectively](#) in [adult patients](#), using large databases in the U.S. and Europe.

# The New Definition of Sepsis

## ▣ Justification

- ▣ The definitions of sepsis, septic shock, and organ dysfunction have remained largely unchanged for over 2 decades
- ▣ There is improved understanding of sepsis pathobiology
  - ▣ Differentiating sepsis from uncomplicated infection
  - ▣ Updating definitions of sepsis and septic shock
  - ▣ Creating a validated criterion standard diagnostic test
  - ▣ Providing a more consistent and reproducible picture of sepsis incidence and outcomes

# The New Definition of Sepsis

- Criteria
  - Sepsis is *"life threatening organ dysfunction caused by dysregulated host response to infection"*
  - Organ Dysfunction
    - The clinical diagnosis of sepsis is based on the Sequential Organ Function Assessment score (SOFA)
    - An acute change in score of 2 or greater is diagnostic
      - Identifies patients with in-hospital mortality of >10%
      - And a 2-25 fold increased risk of mortality compared to patients with a SOFA score of <2.



# SOFA Score

System	Score				
	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> /μL	≥150	<150	<100	<50	<20
<b>Liver</b>					
Bilirubin, mg/dL (μmol/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 ≥70 mm Hg	MAP <70 mm Hg	Dopamine <5 or dobutamine (any dose) <sup>b</sup>	Dopamine 5.1-15 or epinephrine ≤0.1 or norepinephrine ≤0.1 <sup>b</sup>	Dopamine >15 or epinephrine >0.1 or norepinephrine >0.1 <sup>b</sup>
<b>Central nervous system</b>					
Glasgow Coma Scale score <sup>c</sup>	15	13-14	10-12	6-9	<6
<b>Renal</b>					
Creatinine, mg/dL (μmol/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)
Urine output, mL/d				<500	<200

Abbreviations: Fio<sub>2</sub>, fraction of inspired oxygen; MAP, mean arterial pressure; Pao<sub>2</sub>, partial pressure of oxygen.

<sup>b</sup> Catecholamine doses are given as μg/kg/min for at least 1 hour.

<sup>c</sup> Glasgow Coma Scale scores range from 3-15; higher score indicates better

# The New Definition of Sepsis

## ■ Criteria

- Sepsis is *"life threatening organ dysfunction caused by dysregulated host response to infection"*
- Organ Dysfunction
  - The clinical diagnosis of sepsis is based on the Sequential Organ Function Assessment score (SOFA)
  - An acute change in score of 2 or greater is diagnostic
    - Identifies patients with in-hospital mortality of >10%
    - And a 2-25 fold increased risk of mortality compared to patients with a SOFA score of <2.
- Septic Shock
  - Persistent hypotension requiring vasopressors (MAP>65mm HG)
  - Serum lactate >2 mmol/L despite adequate resuscitation
  - These criteria identify patients with in-hospital mortality >40%

# The New Definition of Sepsis

- Removal of Severe Sepsis
  - The new term 'sepsis' involves organ dysfunction
    - Separating it from simple infection and septic shock
  - 'Severe sepsis' becomes superfluous
    - Greater concern for and treatment of the patient should occur with 'sepsis' without needing the additional adjective

# The New Definition of Sepsis

- Adult vs. Pediatric Population
  - Updated definitions are for **adult populations only**
- Pediatric patients comprise a complicated subset of sepsis patients
  - Due to age-dependent variations in physiologic ranges and responses
- Task Force recognizes the need to develop similar definitions in pediatric patients

# Addition of qSOFA

- Addition of qSOFA
  - As a Screening Tool
  - As a Predictor of Mortality

# Addition of qSOFA – Screening Tool

## Box 4. qSOFA (Quick SOFA) Criteria

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Respiratory rate  $\geq 22$ /min

Altered mentation

Systolic blood pressure  $\leq 100$  mm Hg

- AMS is defined as Glasgow Coma Scale  $< 15$
- Score is considered to be positive if at least 2 of the criteria are met
- Does not include a measurement of lactate or any other lab tests

# Addition of qSOFA – Screening Tool

- The Taskforce recommends use of qSOFA to prompt clinicians to:
  - Further investigate for organ dysfunction
  - Initiate or escalate therapy as appropriate
  - Consider referral to critical care or increase the frequency of monitoring, if not already done

# Addition of qSOFA –Predictive Value

- As a predictor of mortality
  - Within the ICU, SOFA is better than qSOFA
  - Outside the ICU, qSOFA is similar to SOFA
  - qSOFA identifies adult patients with infection who are more likely to have poor outcomes

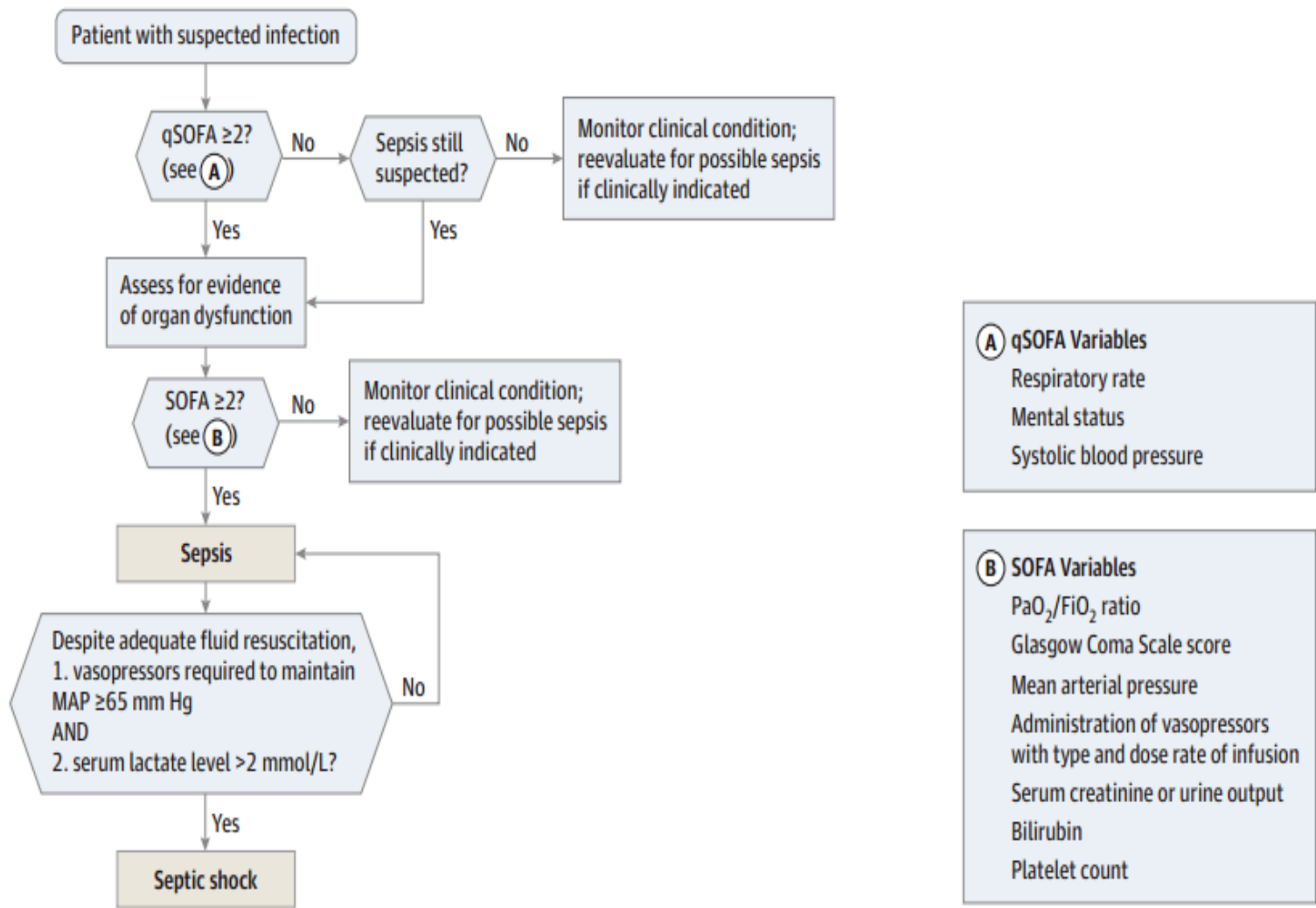


# Addition of qSOFA –Predictive Value

	In ICU	Out of ICU
SOFA	74%	79%
Change in SOFA	72%	79%
SIRS	64%	76%
qSOFA	66%	81%
LODS*	75%	-----

\*LODS=Logistic Organ Dysfunction System

Figure. Operationalization of Clinical Criteria Identifying Patients With Sepsis and Septic Shock



The baseline Sequential [Sepsis-related] Organ Failure Assessment (SOFA) score should be assumed to be zero unless the patient is known to have preexisting (acute or chronic) organ dysfunction before the onset of infection. qSOFA indicates quick SOFA; MAP, mean arterial pressure.

# Strengths & Weaknesses

- Consistency vs. Complexity
- Prediction vs. Early Recognition
- Practicalities of Coding for Sepsis

# Strengths & Weaknesses

- Consistency
  - Consistency of definitions improved
    - severe sepsis and sepsis were commonly used interchangeably
  - It may be a better predictor of poor outcomes
  - The change may aid in the assessment of new therapies.

# Strengths & Weaknesses

- Complexity
  - SOFA score can be complex
  - SOFA score is not widely used outside critical care units.
  - It makes sepsis a critical care definition
    - Even though most patients with sepsis are not in critical care
  - Early recognition and treatment is a proven strategy in reducing sepsis-related deaths
    - The new definition could lead to delays in diagnosis and in initiation of treatment
  - There is [no prospective data](#) to support its use... yet

# Strengths & Weaknesses

- ▣ Prediction vs. Early Recognition
  - ▣ Although SOFA scores carry predictive value, it is not as valuable in early recognition, which often occurs outside the ICU
- ▣ Early recognition requires Screening for sepsis
  - ▣ Using SIRS criteria
  - ▣ Raised Early Warning scores
  - ▣ Or using qSOFA
    - ▣ Not [prospectively](#) validated... yet

# Strengths & Weaknesses

- Practicalities of Coding for Sepsis
  - The Task Force made recommendations for coding sepsis based on the new definitions and ICD-10 codes
    - This has not yet been translated into [practical](#) instructions for clinical coders
  - Coders are not able to use SOFA scores and infection to code for sepsis
    - Coding for sepsis will still depend on clinicians writing the diagnosis in the notes

# Other considerations

- National incentives to improve sepsis may be affected
  - Some countries may have existing programs and incentives to improve sepsis management
- Achievement of agreed targets may have significant financial implications for hospitals
- Hospitals should ensure that implementation of Sepsis-3 does not jeopardize achievement of their targets
  - This may have a detrimental effect on resources for sepsis management.



# Other considerations

- Change in sepsis population and impact on outcomes
  - Sepsis improvement projects should consider how implementation of the new sepsis definitions may affect their outcomes
  - Changes in outcomes may be related to a change in sepsis population rather than improvements in care.

# Summary

- The new definitions help separate **Simple Infection** from **Sepsis** from **Septic shock**
- The new definitions are designed to pick out patients who fared badly or “really sick patients with infection”.
- The term “severe sepsis” is no longer be used.
- SOFA score is a better predictor of mortality **in** ICU than qSOFA or SIRS
- qSOFA and SIRS are equivalent to SOFA as predictors of mortality **outside** the ICU, and far easier to compute

# Summary

- SOFA score helps define organ dysfunction in a consistent and reproducible manner
- These definitions and qSOFA are not prospectively validated yet
- The definitions are not valid in Pediatric patients yet
- The definitions may affect national incentives related to sepsis improvement projects in terms of comparison of outcomes

# Conclusion

- It is important to maintain the focus on identifying infection early and starting treatment before organ dysfunction occurs
- A **prospectively** validated screening tool that is better than SIRS is not yet available
- The screening and diagnostic tools we use for sepsis must provide valuable information in
  - Resource-poor as well as resource-rich settings
  - Adult as well as Pediatric populations

# Learning Assessment Questions

1. qSOFA is the new definition of sepsis.

- A. True
- B. False

(Answer B is the correct answer because qSOFA is a screening tool not the definition of sepsis.)

2. The new definition for septic shock identifies patients with an in hospital mortality of \_\_\_\_.

- A. >10%
- B. >20%
- C. >30%
- D. >40%

(Answer D is the correct.)



Thank you