Sepsis: Overview and update. Focus on early intervention and improving outcomes.

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Poll Question

In the past 6 months, have you transferred a resident with signs and symptoms of sepsis to the hospital ?

Sepsis Overview:

Definitions
Terminology
Diagnosis
Prognosis

AT LEAST 250,000 AMERICANS
DIE FROM SEPSIS EACH YEAR.

GET AHEAD
OF SEPSIS

Sepsis Overview:

Definition:

Sepsis is a clinical syndrome that has physiologic, biologic and biochemical abnormalities caused by dysregulated inflammatory response to infection. Previously described as:

Known or suspected infection

PLUS

Systemic Inflammatory Response Syndrome (SIRS)

Heart Rate > 90 BPM
Respiratory Rate > 20 per minute
Temperature > 38 or < 36 Celsius
White Blood Cell Count > 12,000 or < 4,000 or > 10% Bands

Sepsis Overview:

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

Journal of the American Medical Association, Feb. 23, 2016

Society of Critical Care Medicine (SCCM) and
European Society of Intensive Care Medicine (ESICM).

New approach and definitions focus on the dysregulation of the inflammatory response AND the organ dysfunction that can accompany this dysregulated response to infection.

The New Sepsis Paradigm

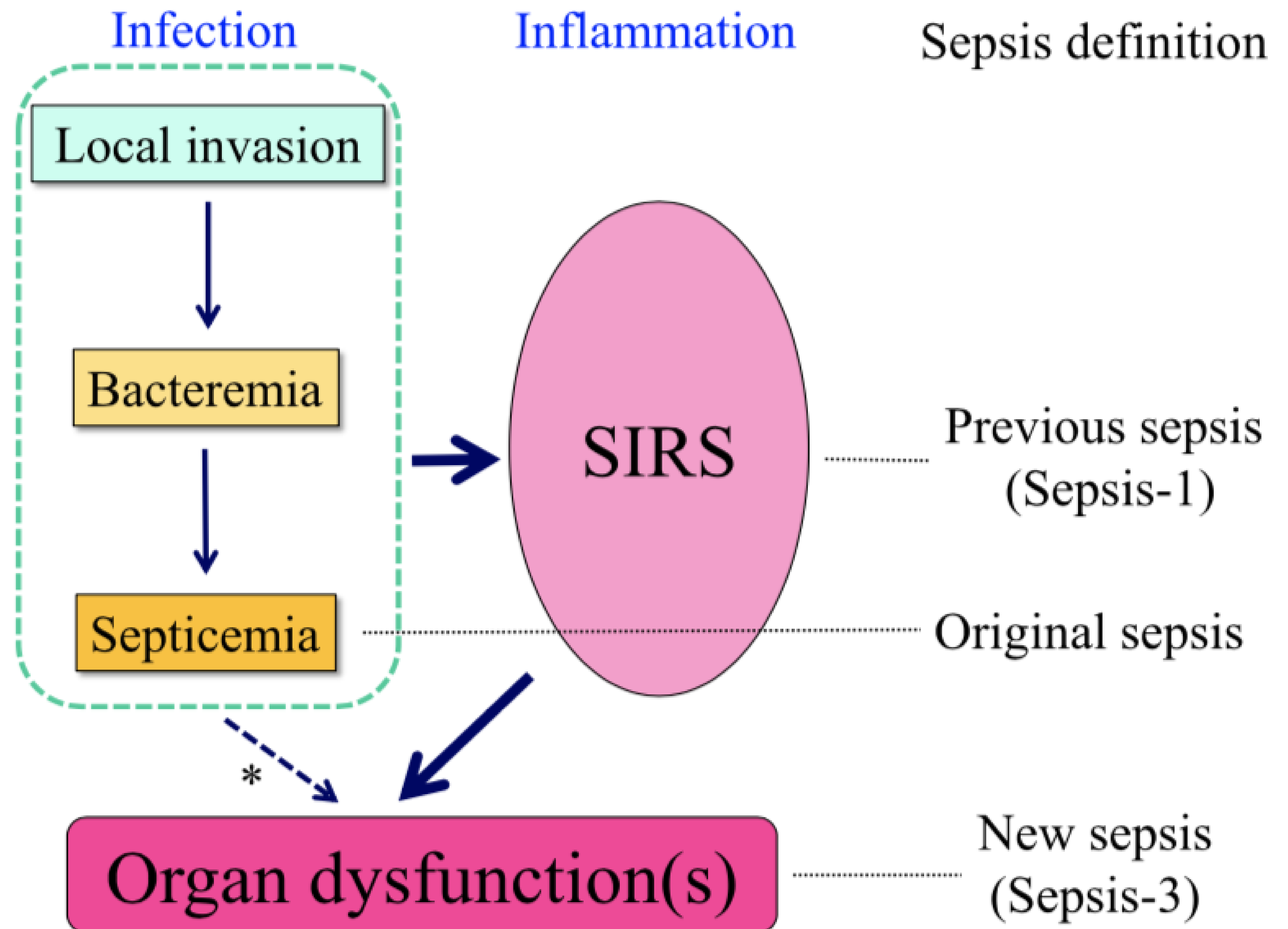


Fig. 1 Schematic diagram showing the previous and new definitions of sepsis. *Asterisk* indicates a small fraction of infected patients develop organ dysfunction without fulfilling the established SIRS criteria. *SIRS* systemic inflammatory response syndrome

Fujishima Inflammation and Regeneration (2016) 36:24 DOI 10.1186/s41232-016-0029-y

Table 1 Organ dysfunction in sepsis

Target organ	Pathophysiology	Clinical features	SOFA score indices (other beneficial indices)	Available treatments
Lung (ARDS)	Vascular hyper-permeability, neutrophil accumulation	Impaired oxygenation	PaO_2/FIO_2 <400 (bilateral infiltration on CXR)	Mechanical ventilation with low tidal volume and PEEP
Liver	Disturbed intracellular and extracellular bile salt transport	Jaundice, cholestasis	Serum bilirubin ≥1.2 mg/dl	Not established
Kidney (AKI)	Tubular epithelial cell injury, dysfunction or adaptive response of tubular epithelial cells	Reduced GFR, reduced urine volume	Serum creatinine ≥1.2 Urine output <500 ml/day	Hemodialysis
Cardiovascular system	Myocardial depression, impaired intracellular calcium homeostasis, disrupted high energy phosphate production.	Ventricular dilatation, reduced ejection fraction, reduced contractility	Mean arterial pressure <70 mmHg	Inotropic agents, beta-blocker
Gastrointestinal tract	Epithelial hyper-permeability, altered microbiome	Mucosal bleeding, paralytic ileus	Not included	Proton pump inhibitor, early enteral nutrition, probiotics, SDD
Central nervous system (SAE)	Direct cellular damage, mitochondrial and endothelial dysfunction, neurotransmission disturbances, calcium dyshomeostasis	Altered mental status	GCS <15	Light sedation, early rehabilitation
Blood coagulation system (DIC)	Intravascular coagulation, microvascular damage, systemic thrombin generation, endothelial injury	Bleeding diathesis, microthrombi and tissue ischemia	Platelets $<150 \times 10^3/\mu l$ (prolonged prothrombin time, increased FDP)	Antithrombin, recombinant thrombomodulin, concentrated platelet preparation

SOFA sequential organ failure assessment, *ARDS* acute respiratory distress syndrome, *CXR* chest X-ray, *PEEP* positive end-expiratory pressure, *AKI* acute kidney injury, *GFR* glomerular filtration ratio, *SDD* selective digestive decontamination, *SAE* sepsis-associated encephalopathy, *GCS* Glasgow coma scale, *DIC* disseminated intravascular coagulation, *FDP* fibrin degradation product

Sepsis Overview: Terminology

Sepsis
is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection.

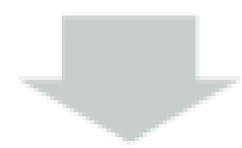
Septic Shock
subset of sepsis in which underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality. There is persisting hypotension requiring vasopressors to maintain an MAP of 65 mmHg and/or having a serum lactate level >2 mmol/L despite adequate volume resuscitation.

Severe Sepsis
no longer utilized

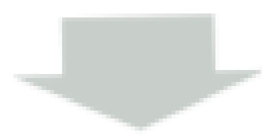
Does this new this new terminology present a problem for Long Term Care facilities?

Ongoing Goals

Recognize & Treat Early & Aggressively



Decrease Cases Progressing to Severe Sepsis



Decrease Morbidity & Mortality

Previous Paradigm

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Society of Critical Care Medicine (SCCM) and
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Sequential (Sepsis Related) Organ Failure Assessment Score (SOFA)
Requires access to laboratory values

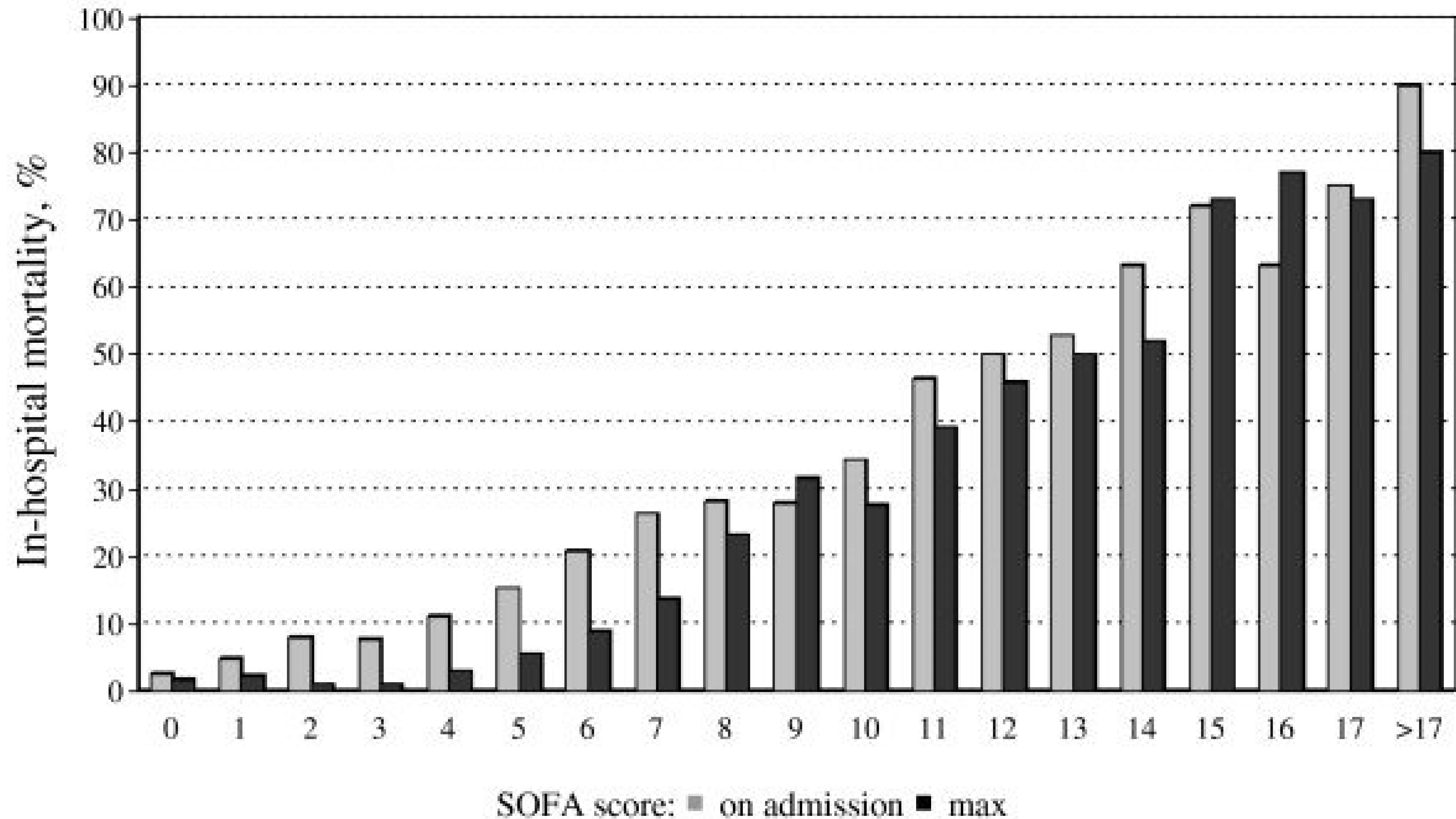
Early Sepsis outside the ICU *Quick SOFA (qSOFA)*
No laboratory data included

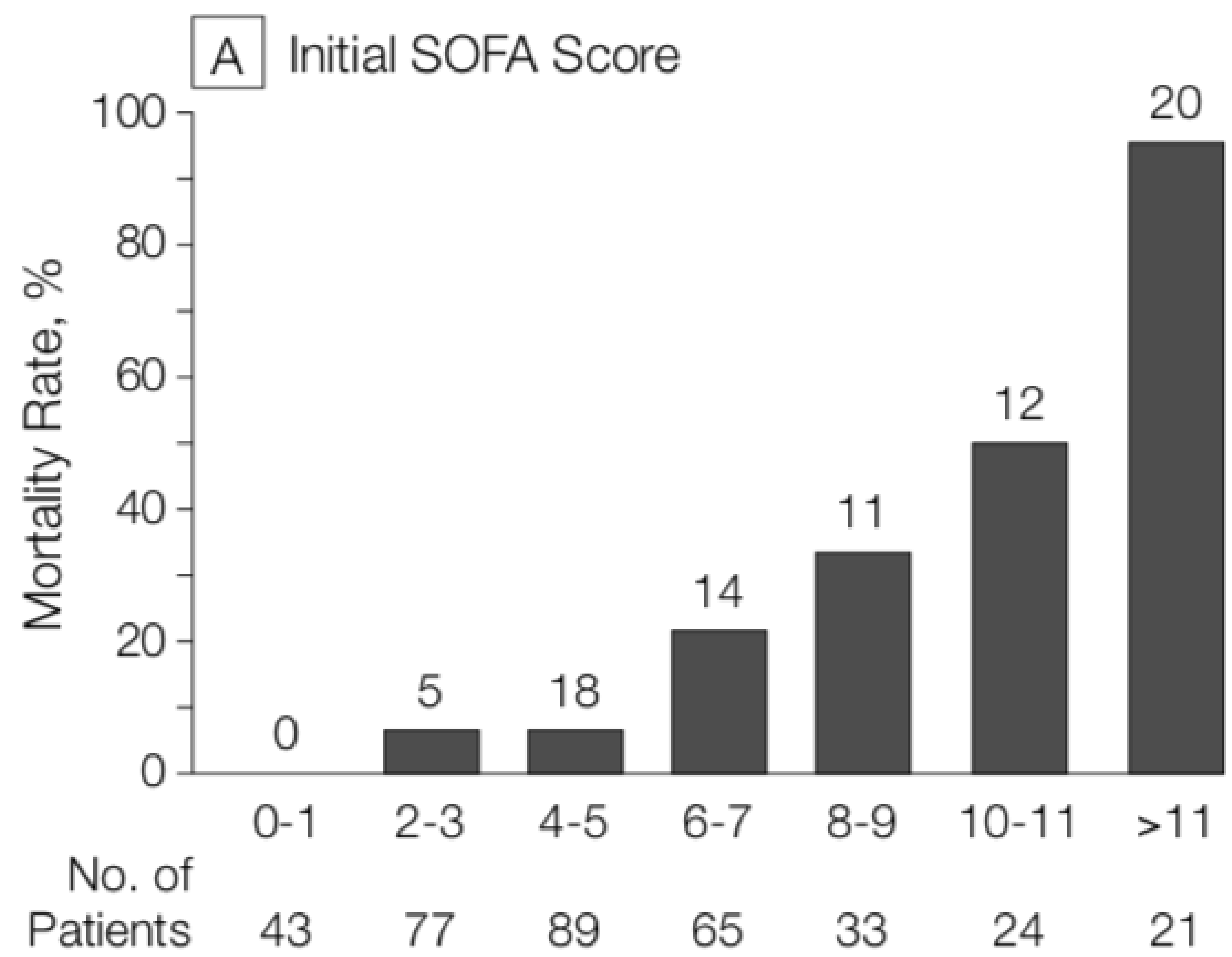
Sequential (Sepsis Related) Organ Failure Assessment Score (SOFA)

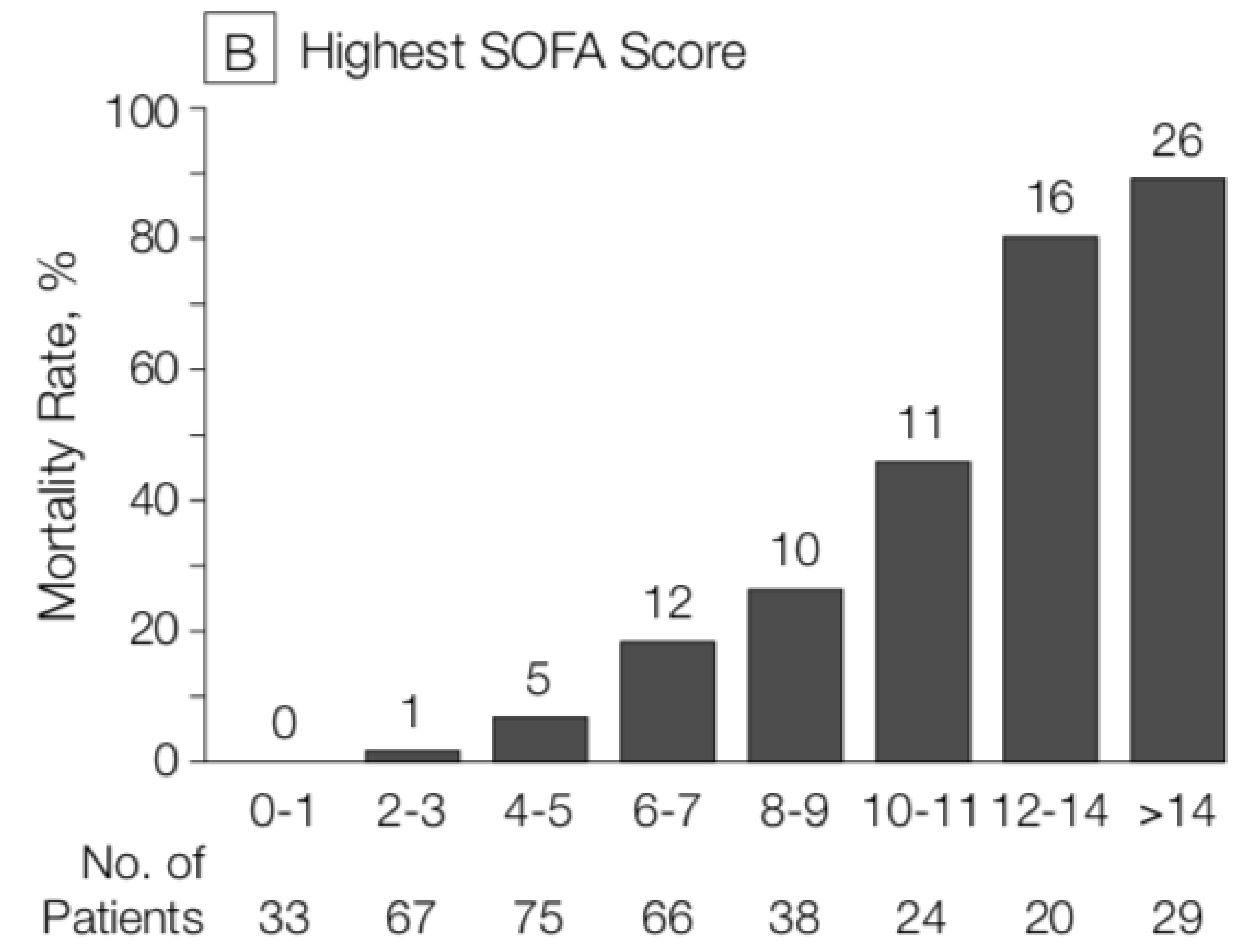
System	Score 0	1	2	3	4
Respiration					
PaO_2/FIO_2, mm Hg (kPa)	≥400 (53.3)	<400 (53.3)	<300 (40)	<200 (26.7) with respiratory support	<100 (13.3) with respiratory support
Coagulation					
Platelets, $\times 10^3/\mu L$	≥150	<150	<100	<50	<20
Liver					
Bilirubin, mg/dL (μmol/L)	<1.2 (20)	1.2-1.9 (20-32)	2.0-5.9 (33-101)	6.0-11.9 (102-204)	>12.0 (204)
Cardiovascular	MAP ≥70 mm Hg	MAP <70 mm Hg	Dopamine <5 or dobutamine (any dose)[b]	Dopamine 5.1-15 or epinephrine ≤0.1 or norepinephrine ≤0.1[b]	Dopamine >15 or epinephrine >0.1 or norepinephrine >0.1[b]
Central nervous system					
Glasgow Coma Scale score[c]	15	13-14	10-12	6-9	<6
Renal					
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

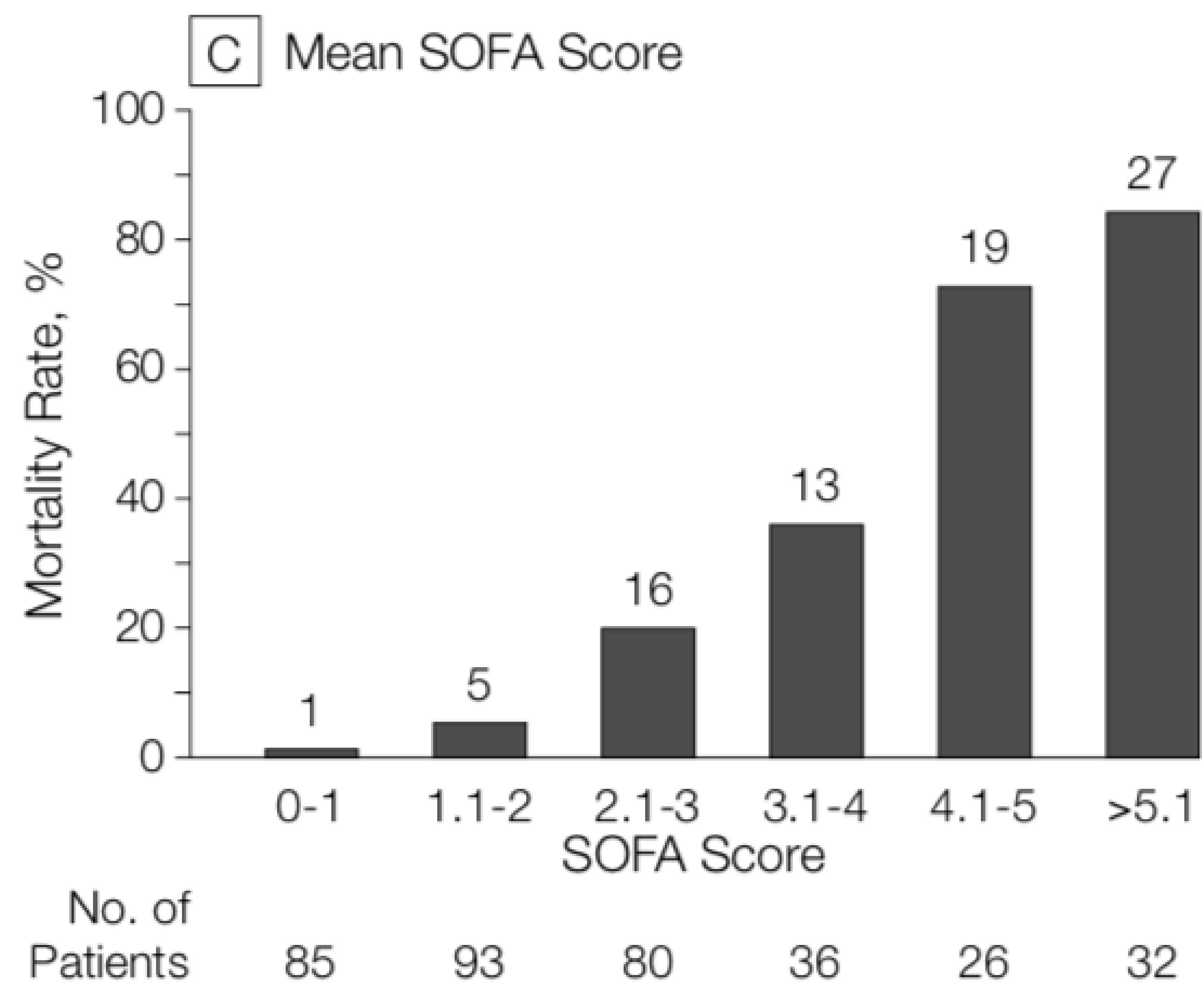
JAMA. 2016;315(8):801-810. doi:10.1001/jama.2016.0287

In Hospital Mortality as a function of SOFA score on admission and Maximum during Hospitalization




A
Initial SOFA Score
Mortality Rate, %
100
80
60
40
20
0
0
5
18
14
11
12
20
0-1
2-3
4-5
6-7
8-9
10-11
>11
No. of
Patients
43
77
89
65
33
24
21


B
Highest SOFA Score
Mortality Rate, %
100
80
60
40
20
0
0
1
5
12
10
11
16
26
0-1
2-3
4-5
6-7
8-9
10-11
12-14
>14
No. of
Patients
33
67
75
66
38
24
20
29


C
Mean SOFA Score
Mortality Rate, %
100
80
60
40
20
0
1
5
16
13
19
27
0-1
1.1-2
2.1-3
3.1-4
4.1-5
>5.1
SOFA Score
No. of
Patients
85
93
80
36
26
32

Score Trend (first 48 hrs)	Mortality
Increasing	> 50%
Unchanged	27 - 35%
Decreasing	< 27%

Serial SOFA scores (48 hours)

Poll Question

Have you been asked by a local hospital on early recognition and intervention for the signs and symptoms of sepsis?

What is qSOFA?

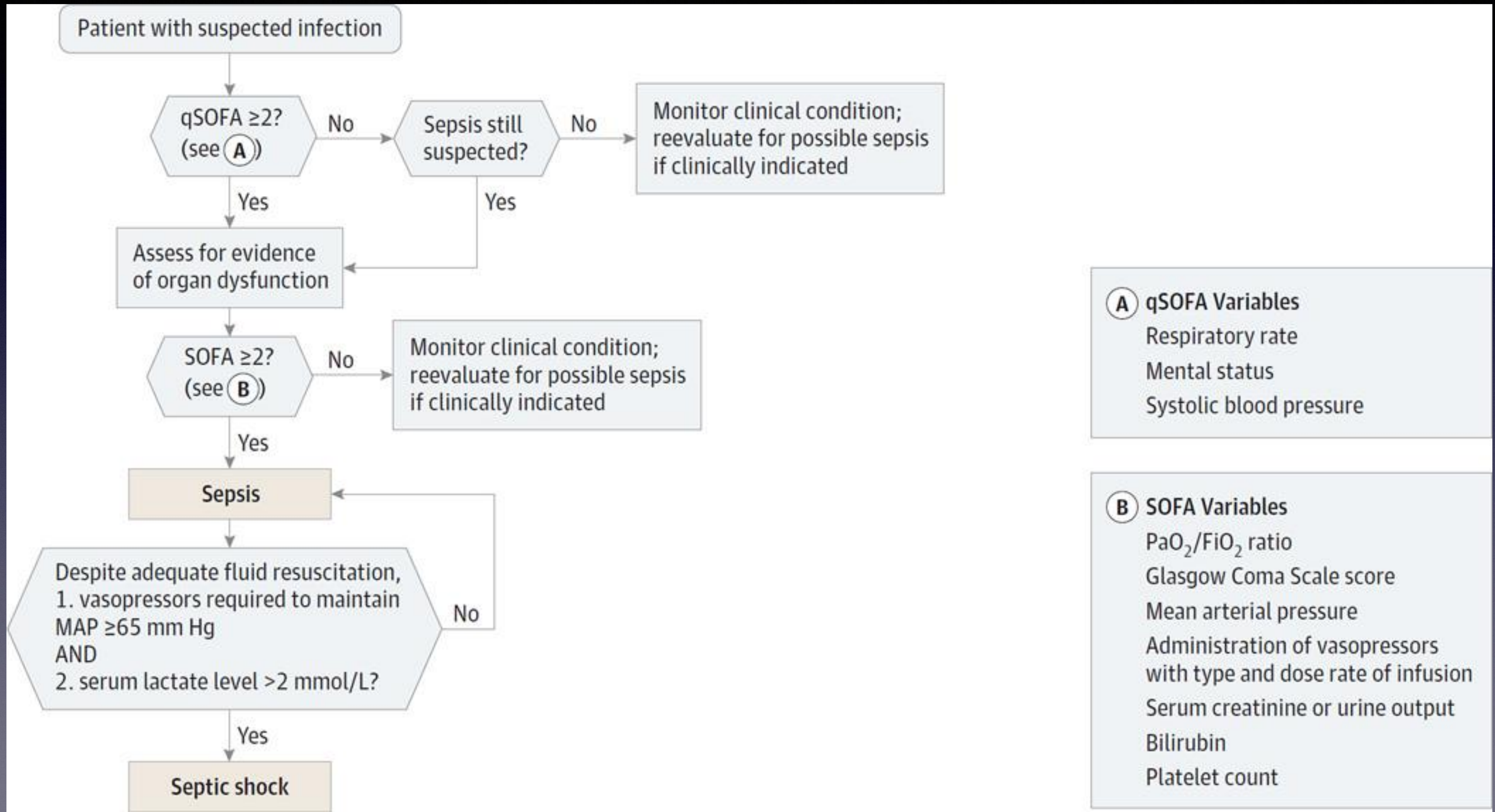
The qSOFA score (also known as quickSOFA) is a bedside prompt that may identify patients with suspected infection who are at greater risk for a poor outcome outside the intensive care unit (ICU). It uses three criteria, assigning one point for low blood pressure (SBP≤100 mmHg), high respiratory rate (≥22 breaths per min), or altered mentation (Glasgow coma scale<15).

What is qSOFA?

Quick Sequential Organ Failure Assessment (SOFA) score

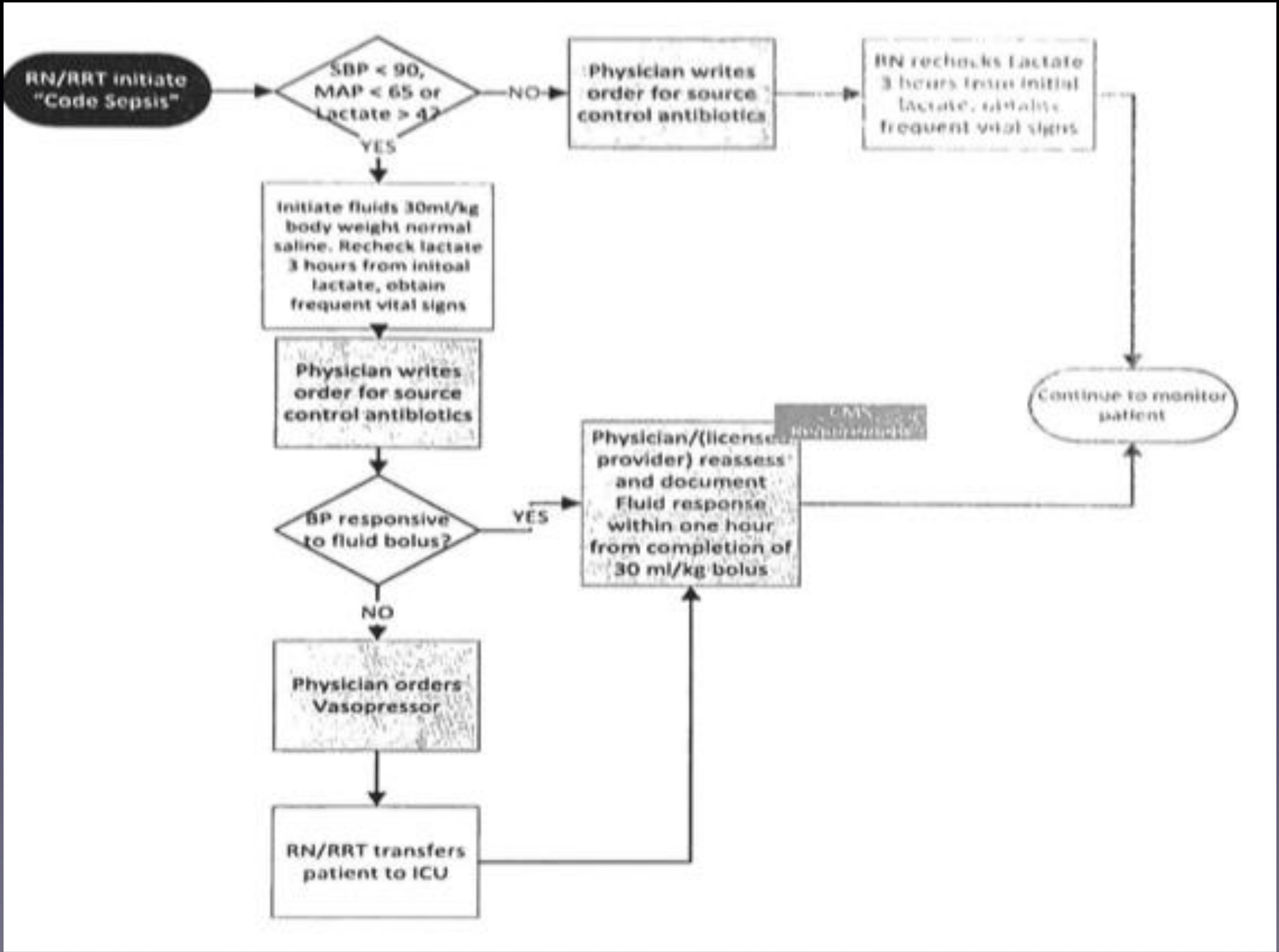
qSOFA (Quick SOFA) Criteria	Points
Respiratory rate $\geq$22/min	1
Change in mental status	1
Systolic blood pressure $\leq$100 mmHg	1

Clinical Criteria Identifying Patients with Sepsis and Septic Shock

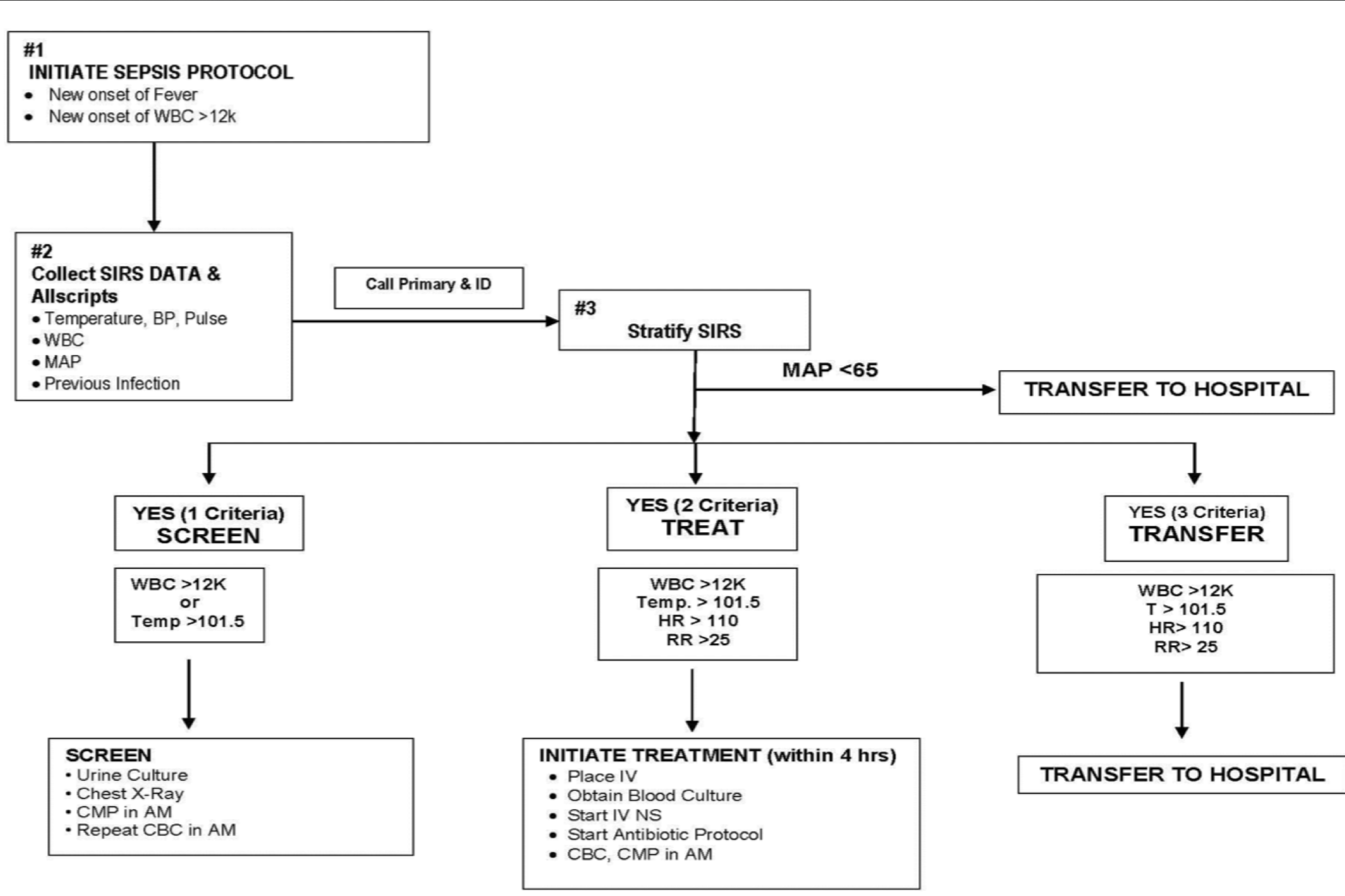


Lactic Acid or Lactate Measurement has become an important part of the equation

Other Chemistry Tests					
Lipase Lvl					39
BHBT				H 1.9	0.1 [2][H]
Lactic Acid Lvl	* H 2.4		* 1.9 [4][H]	* H 3.4 [3][C]	* C 6.1 [2][C]
Ven Lactate POC IStat					H 3.95
Hgb A1c					* H 15.7



Code Sepsis



Code Sepsis

Rapid Response Team

- Respiratory Pattern Changed from baseline or labored
- SpO2 is less than 90% or new requirement for > 50% FiO2
- Respiratory Rate is less than 8 or greater than 25 per minute

- SBP < 90 or > 180 mmHg
- Chest pain of new onset or unrelieved
- Heart Rate < 50 or > 150 BPM
- Change in peripheral pulses from baseline

- Seizures of new onset, repeated or prolonged
- Decrease in level of consciousness
- Limb weakness and/or speech difficulty
- Sensory changes, progressive weakness, acute bowel or bladder dysfunction
- Clinician or Family (legally authorized person) is concerned about patient's condition
- Drug Reaction Suspected
- Decreased Urine Output
- Any significant bleeding

Rapid Response Team

- Respond and Triage to request from Clinicians and Families

- Contact Physician or Clinicians as needed
- Communicate with Nurses and Families
- Coordinate interventions to stabilize clinical status
- Educate and support those involved in patient’s care
- Communicate with clinicians and support transfer to higher level of care if needed

Rapid Response

- Ensure or Obtain IV Access
- IVF (Lactated Ringers now preferred over saline)
- Obtain relevant labs (CBC with differential, CMP, Serum Lactate)
- Blood Cultures
- CXR

- Initiate Antibiotics
- Determine if to be transferred or serially assessed for improvement

- Vancomycin 20-25 mg/kg or Linezolid (600 mg)

Plus

- Beta-Lactam Cefepime (2 g), Piperacillin/Tazobactam (4.5g), Meropenem (1-2g), Aztreonam (2g)

Poll Question

At your facility, which of the following approaches are being utilized in an effort to improve early recognition and intervention for signs and symptoms of sepsis?

- Education for nurses, CNAs, other staff, etc.
- Sepsis Screening tools
- Protocol for patients with suspected early sepsis

Thank You for your attention.

Comments?

Discussion?

Questions?

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