Ορισμοί και Πρωτόκολλα

Καραμουζος Βασίλης
Παθολόγος - Εντατικολόγος

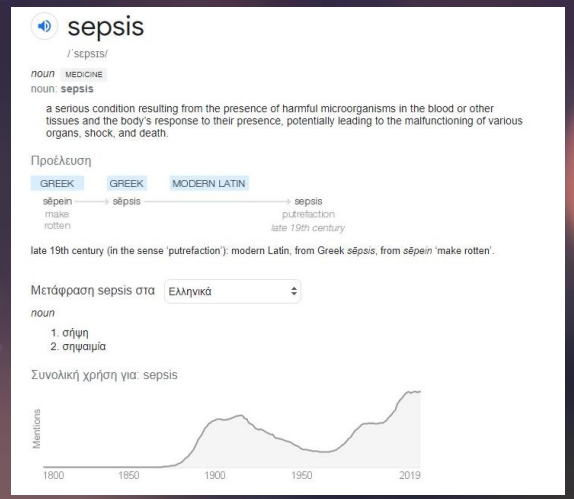
Σήψη

- 1. Η διαδικασία αποσυνθέσεως(φυτικής ή ζωικής) οργανικής ουσίας
- 2. Η νέκρωση των ιστών του σώματος
- 3. (μτφ) η ηθική κατάπτωση, η έκλυση των ηθών

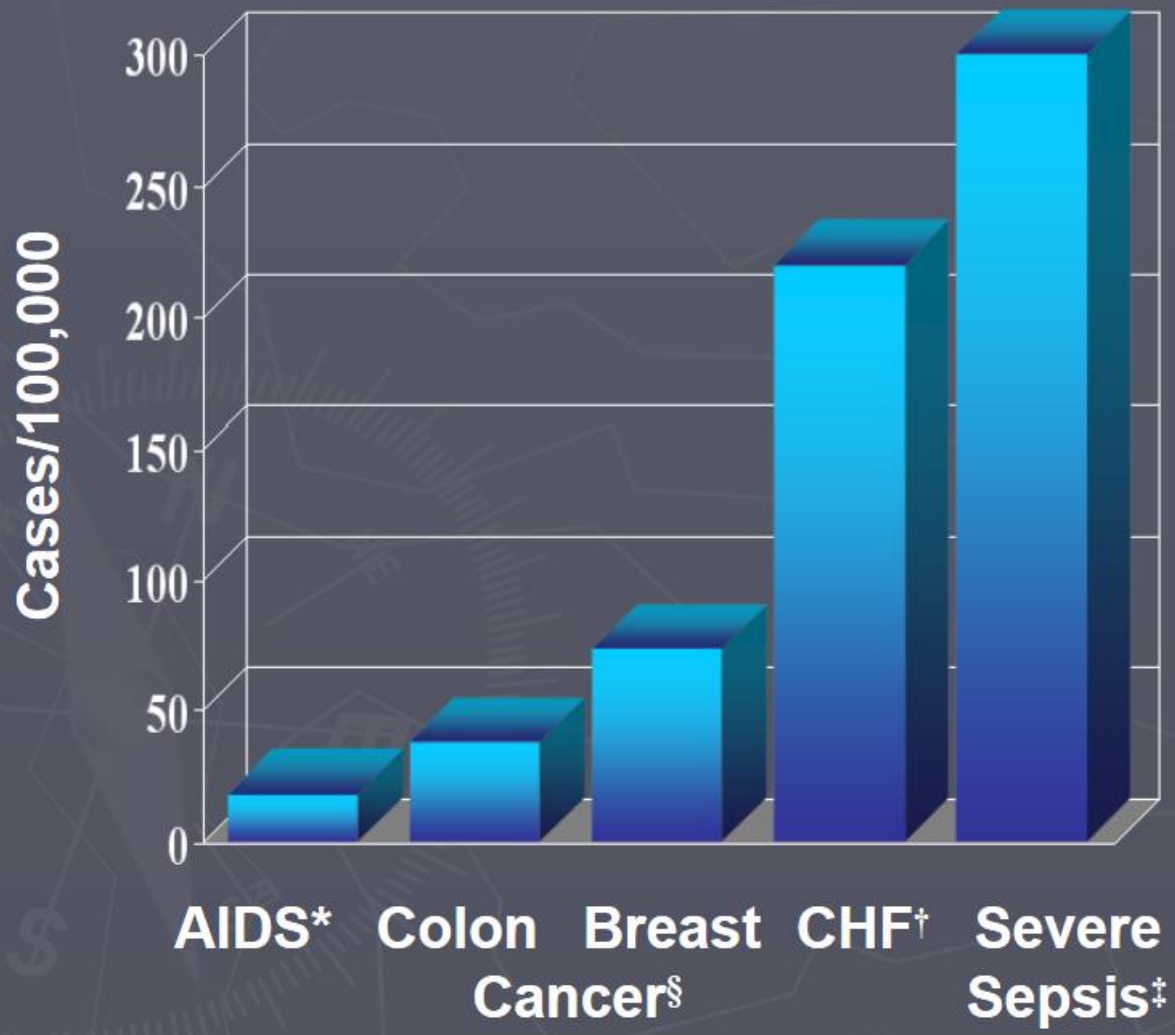
Ορισμός ?

- Ετυμολογία< αρχ. σήψις< σήπομαι< σαπίζω

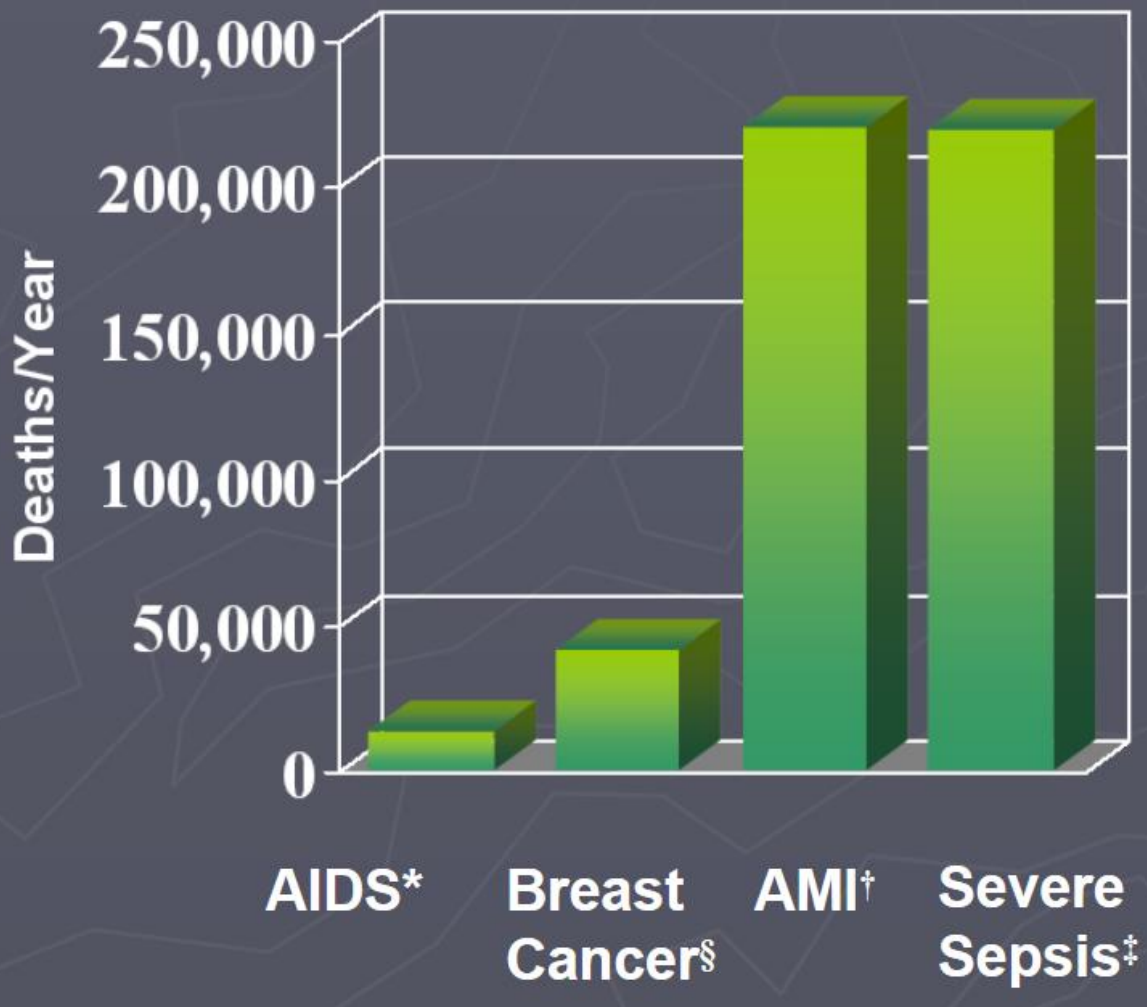
Πηγή: Μπαμπινιώτης (2002) Λεξικό της Νέας Ελληνικής Γλώσσας, Αθήνα



Incidence of Severe Sepsis 1995

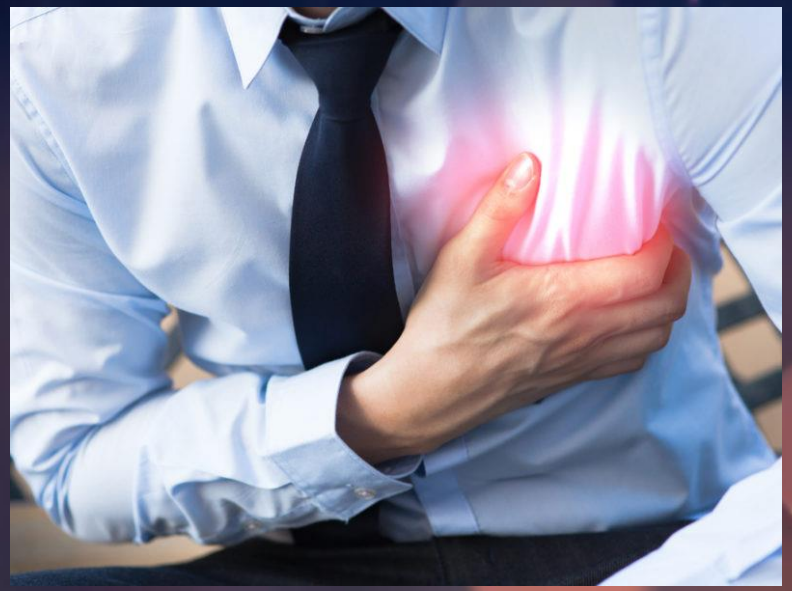


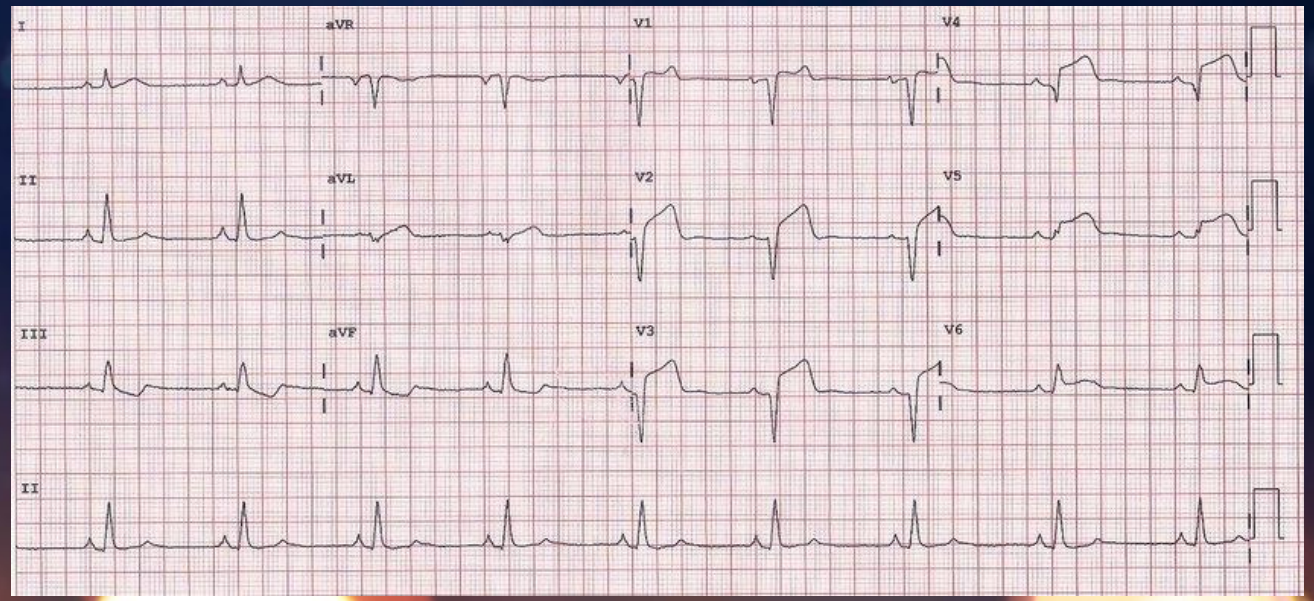
Mortality of Severe Sepsis



†National Center for Health Statistics, 2001. §American Cancer Society, 2001. *American Heart Association. 2000. ‡Angus DC et al. *Crit Care Med*. 2001.

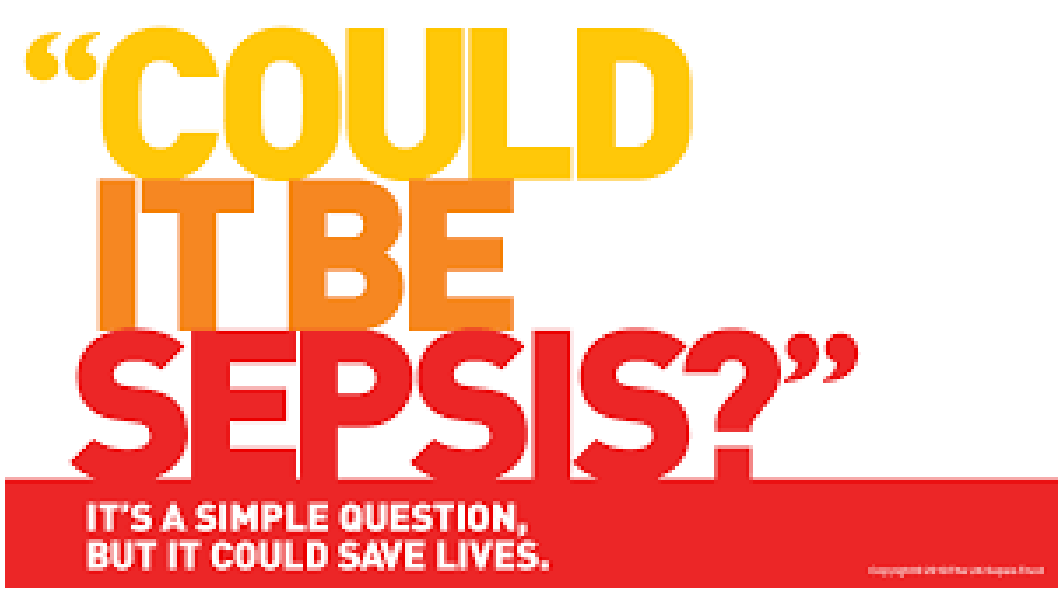
Ποια είναι η διάγνωση ?





Troponin = High

Είναι ο ασθενής σηπτικός ???



Definitions for Sepsis and Organ Failure and Guidelines for the Use of Innovative Therapies in Sepsis

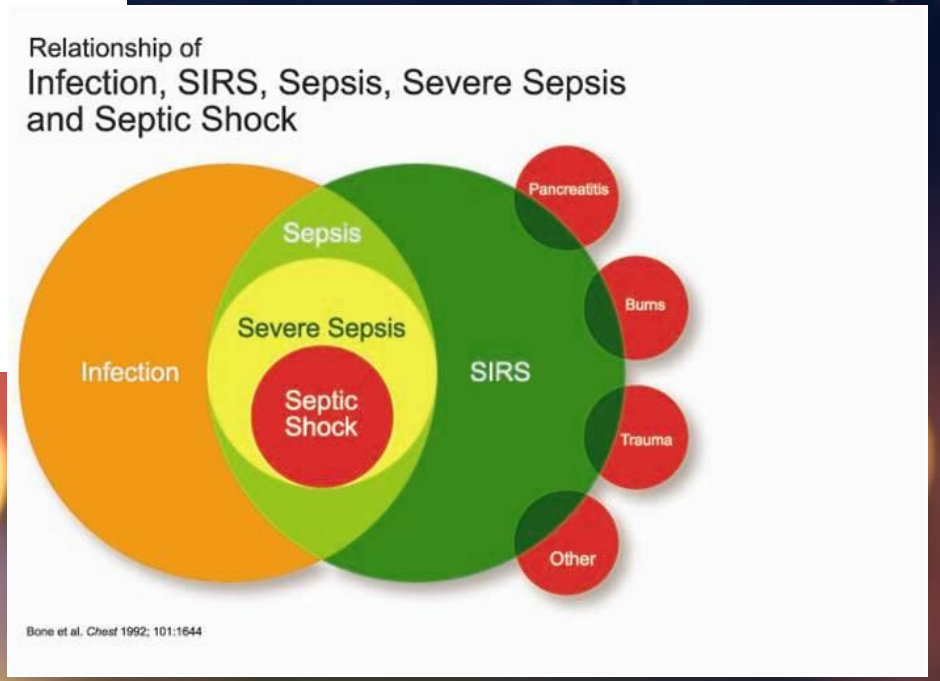
MODS = multiple organ dysfunction syndrome; SIRS = systemic inflammatory response syndrome

accp/sccm consensus conference

Definitions for Sepsis and Organ Failure and Guidelines for the Use of Innovative Therapies in Sepsis

THE ACCP/SCCM CONSENSUS CONFERENCE COMMITTEE:

Roger C. Bone, M.D., F.C.C.P., Chairman
Robert A. Balk, M.D., F.C.C.P.
Frank B. Cerra, M.D.
R. Phillip Dellinger, M.D., F.C.C.P.
Alan M. Fein, M.D., F.C.C.P.
William A. Knaus, M.D.
Roland M. H. Schein, M.D.
William J. Sibbald, M.D., F.C.C.P.



SEPSIS STEPS

SIRS

T: >100.4 F
< 96.8 F
RR: >20
HR: >90
WBC: >12,000
<4,000
>10% bands
PCO2 < 32 mmHg

SEPSIS

2 SIRS

+

Confirmed **or** suspected infection

SEVERE SEPSIS

Sepsis +

Signs of End Organ Damage

Hypotension (SBP <90)

Lactate >4 mmol

SEPTIC SHOCK

Severe Sepsis with persistent:

Signs of End Organ Damage

Hypotension (SBP <90)

Lactate >4 mmol

Slides Courtesy of Curtis Merritt, D.O.

Intensive Care Med. 1996 Jul;22(7):707-10.

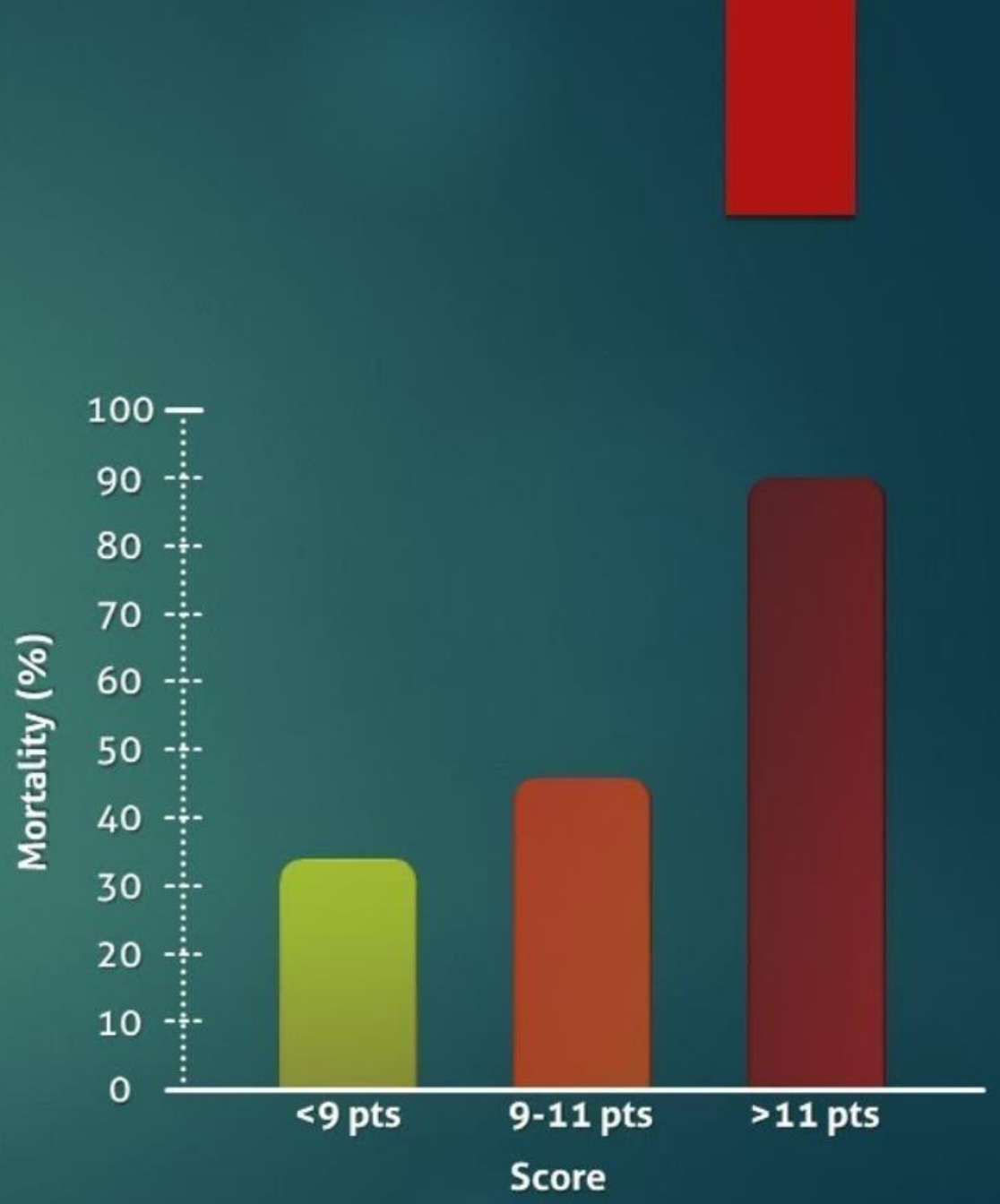
The SOFA (Sepsis-related Organ Failure Assessment) score to describe organ dysfunction/failure. On behalf of the Working Group on Sepsis-Related Problems of the European Society of Intensive Care Medicine.

Vincent JL[1], Moreno R, Takala J, Willatts S, De Mendonça A, Bruining H, Reinhart CK, Suter PM, Thijs LG.

1996 Vincent JL

Sepsis: *SOFA Score*

	0	1	2	3	4
Cardiovascular System *(Blood Pressure)*	No hypotension	MAP <70 mmHg	Vasopressors[A]	Vasopressors[B]	Vasopressors[C]
Central Nervous System *(Glasgow Coma Scale)*	15	13-14	10-12	6-9	<6
Respiratory System *(PaO_2/FiO_2)*	>400	301 - 400	≤300	101–200+VS[D]	≤100+VS[D]
Coagulation *(Platelets x103/mm3)*	>150	101 - 150	51 - 100	21 - 50	≤20
Liver *(Bilirubin mcmol/L)*	<20	20 - 32	33 - 101	102 - 204	>204
Kidney *(Creatinine mcmol/L)*	110	110 - 170	171 - 299	300 - 440[E]	>440[F]

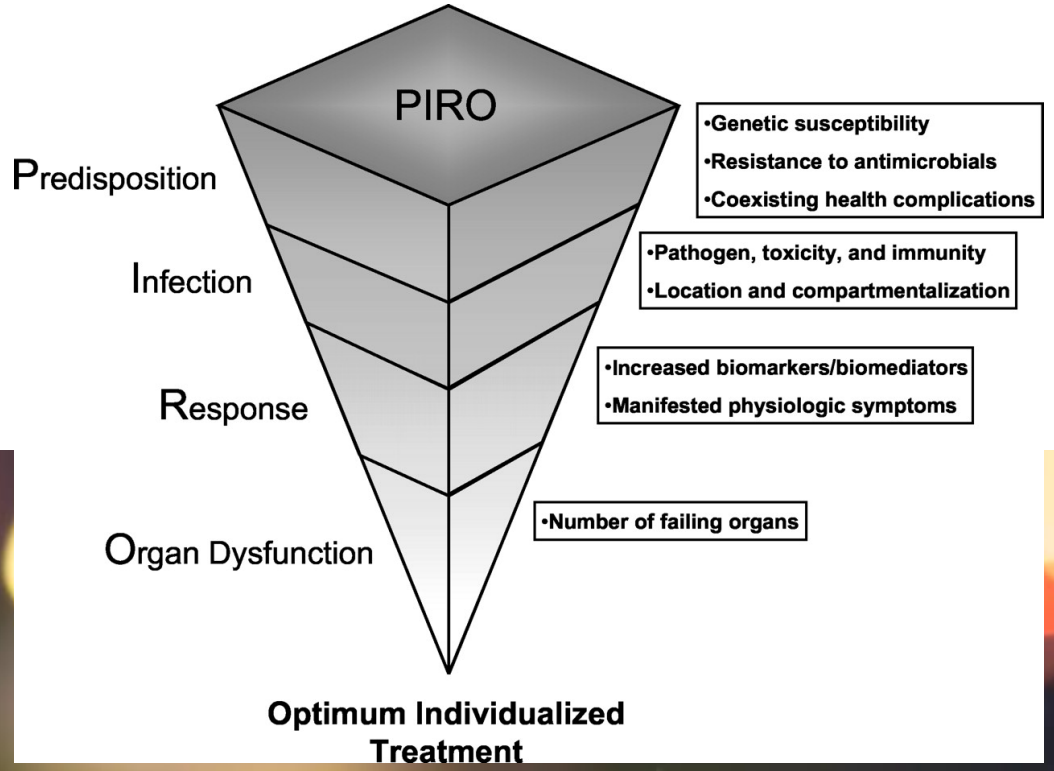


Intensive Care Med (2003) 29:530–538
DOI 10.1007/s00134-003-1662-x

EXPERT PANEL

Mitchell M. Levy
Mitchell P. Fink
John C. Marshall
Edward Abraham
Derek Angus
Deborah Cook
Jonathan Cohen
Steven M. Opal
Jean-Louis Vincent
Graham Ramsay
for the International Sepsis Definitions Conference

2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference



The NEW ENGLAND JOURNAL of MEDICINE

Early Goal-Directed Therapy in the Treatment of Severe Sepsis and Septic Shock

Emanuel Rivers, M.D., M.P.H., Bryant Nguyen, M.D., Suzanne Havstad, M.A., Julie Ressler, B.S., Alexandria Muzzin, B.S., Bernhard Knoblich, M.D., Edward Peterson, Ph.D., and Michael Tomlanovich, M.D. for the Early Goal-Directed Therapy Collaborative Group*

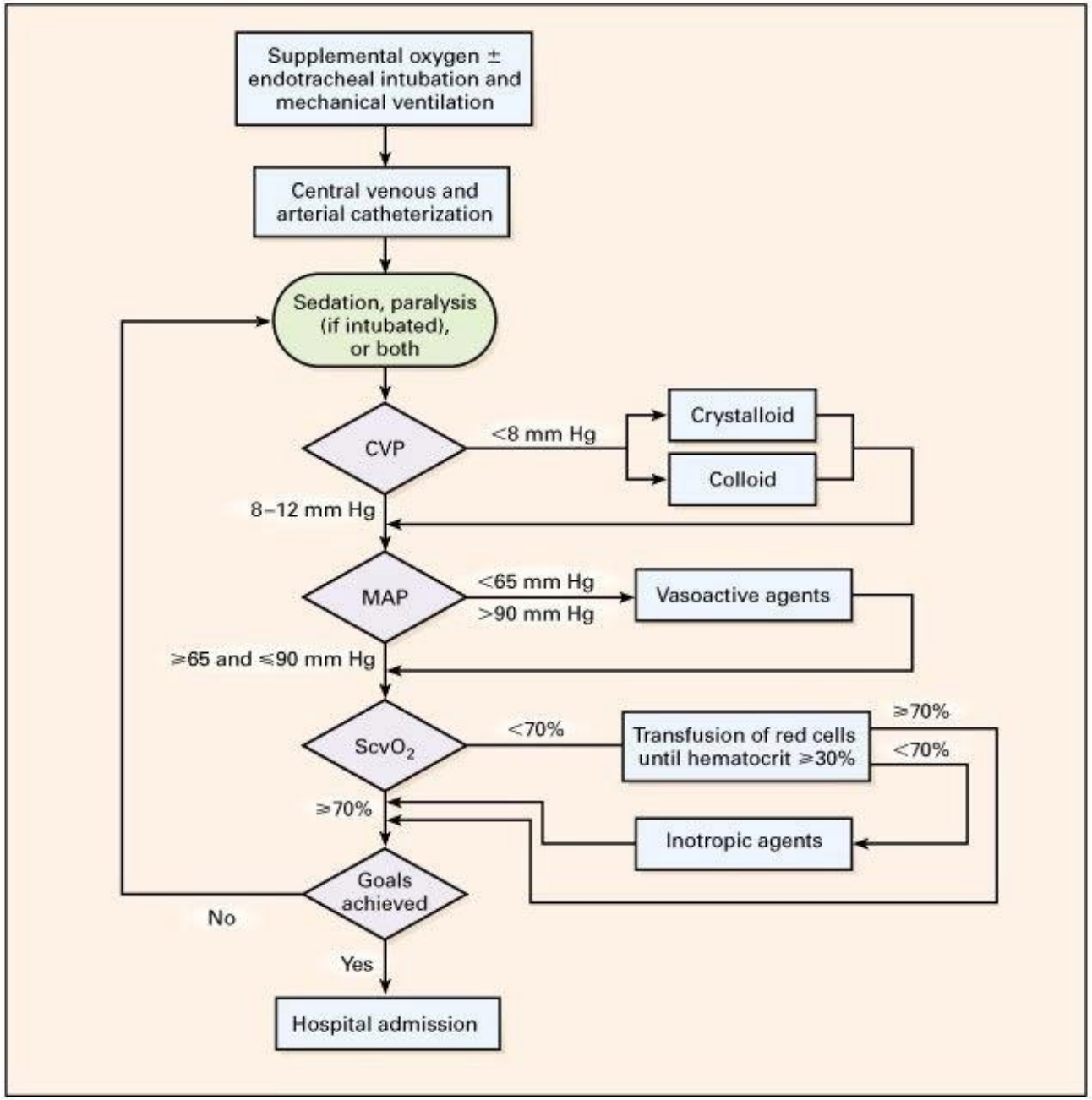
CONCLUSIONS

Early goal-directed therapy provides significant benefits with respect to outcome in patients with severe sepsis and septic shock.

November 8, 2001

N Engl J Med 2001; 345:1368-1377

DOI: 10.1056/NEJMoa010307

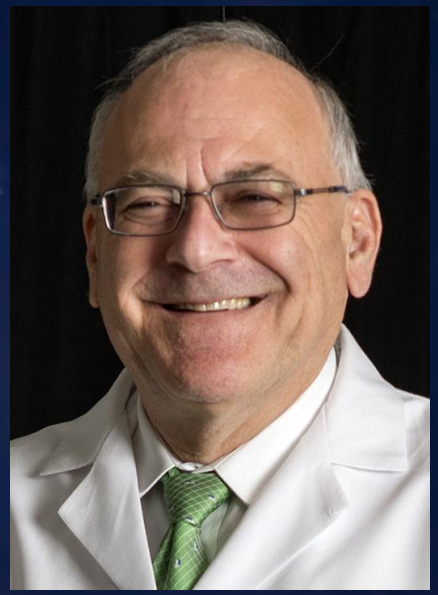

Supplemental oxygen ± endotracheal intubation and mechanical ventilation
Central venous and arterial catheterization
Sedation, paralysis (if intubated), or both
CVP
<8 mm Hg
Crystalloid
Colloid
8–12 mm Hg
MAP
<65 mm Hg
>90 mm Hg
Vasoactive agents
≥65 and ≤90 mm Hg
ScvO2
<70%
Transfusion of red cells until hematocrit ≥30%
≥70%
<70%
≥70%
Inotropic agents
Goals achieved
No
Yes
Hospital admission

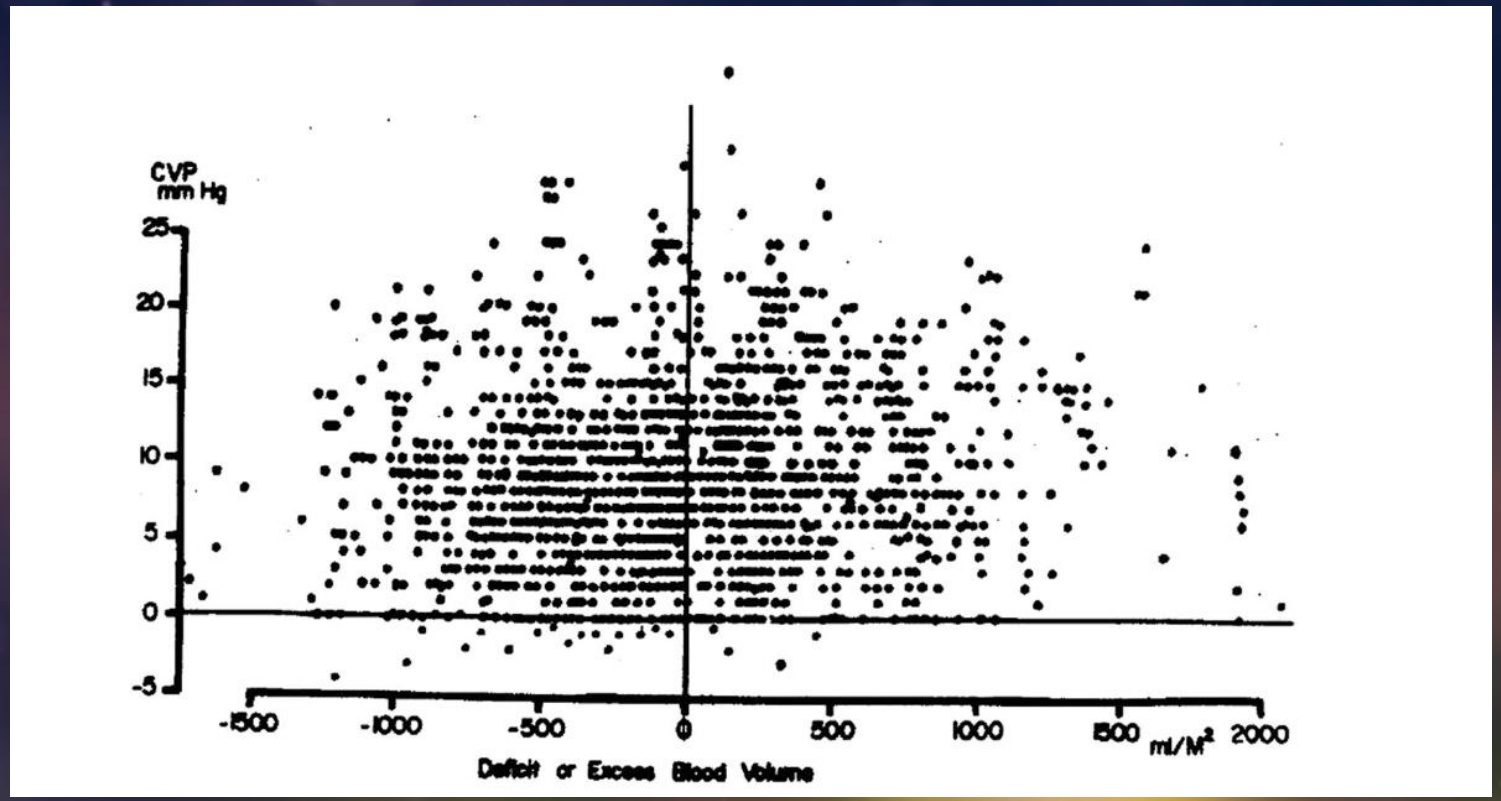
CHEST Special Feature

Does Central Venous Pressure Predict Fluid Responsiveness?*

A Systematic Review of the Literature and the Tale of Seven Mares

Paul E. Marik, MD, FCCP; Michael Baram, MD, FCCP; and Bobbak Vahid, MD



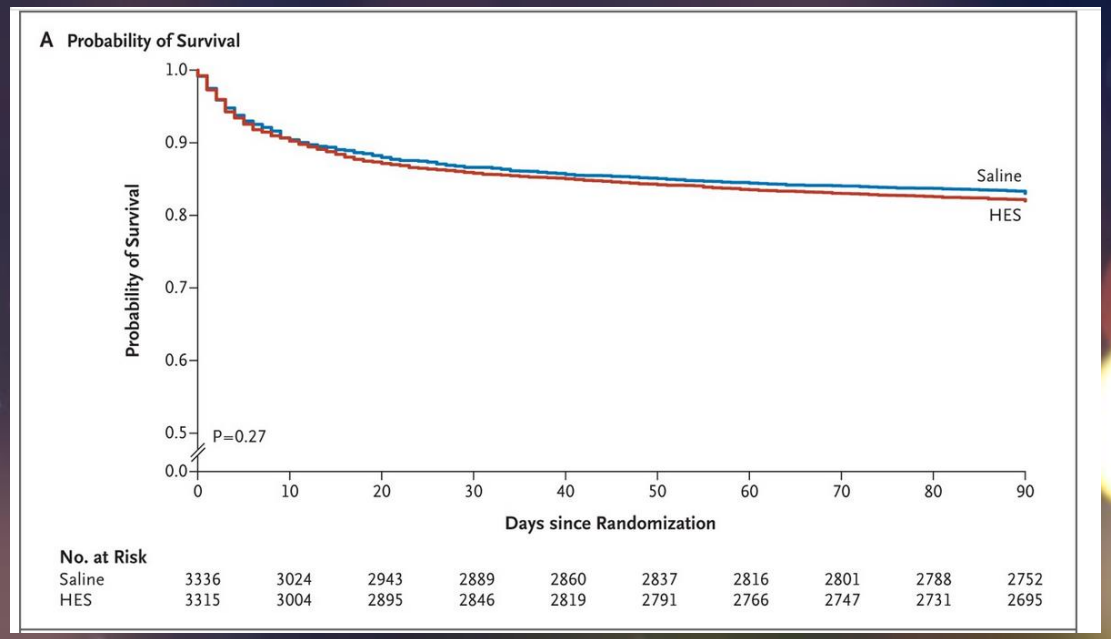


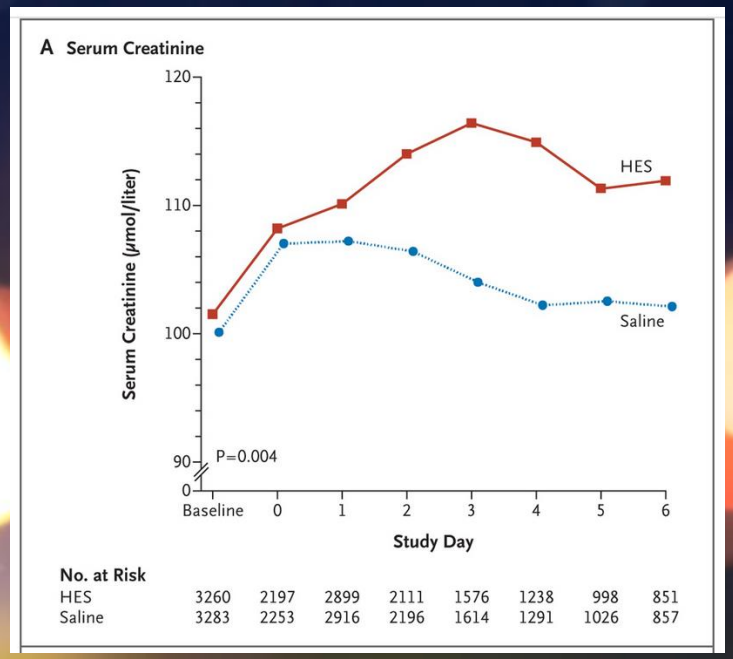
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Hydroxyethyl Starch or Saline for Fluid Resuscitation in Intensive Care

John A. Myburgh, M.D., Ph.D., Simon Finfer, M.D., Rinaldo Bellomo, M.D., Laurent Billot, M.Sc., Alan Cass, M.D., Ph.D., David Gattas, M.D., Parisa Glass, Ph.D., Jeffrey Lipman, M.D., Bette Liu, Ph.D., Colin McArthur, M.D., Shay McGuinness, M.D., Dorrilyn Rajbhandari, R.N., et al., for the CHEST Investigators and the Australian and New Zealand Intensive Care Society Clinical Trials Group*



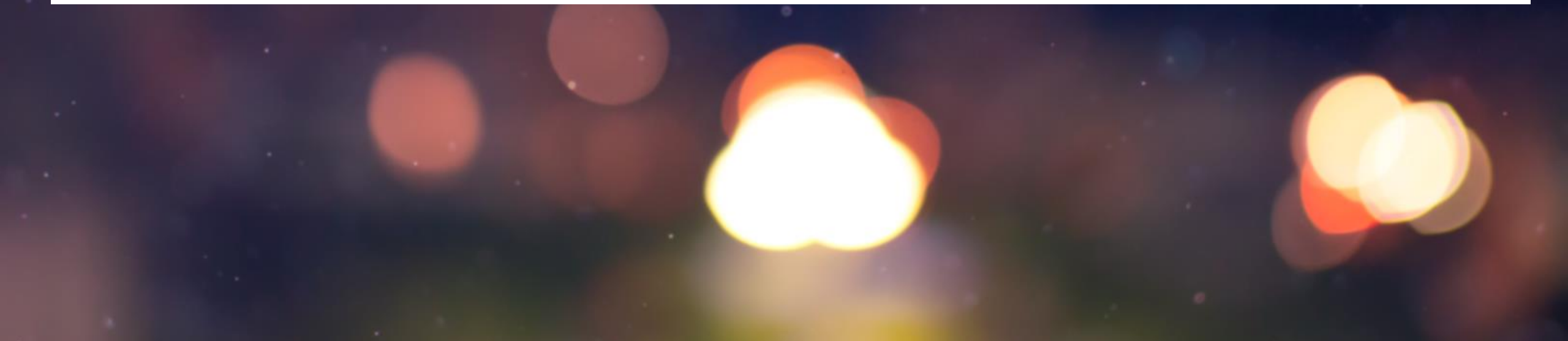


Clinical Review & Education

Special Communication | CARING FOR THE CRITICALLY ILL PATIENT

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

Mervyn Singer, MD, FRCP; Clifford S. Deutschman, MD, MS; Christopher Warren Seymour, MD, MSc; Manu Shankar-Hari, MSc, MD, FFICM; Djillali Annane, MD, PhD; Michael Bauer, MD; Rinaldo Bellomo, MD; Gordon R. Bernard, MD; Jean-Daniel Chiche, MD, PhD; Craig M. Coopersmith, MD; Richard S. Hotchkiss, MD; Mitchell M. Levy, MD; John C. Marshall, MD; Greg S. Martin, MD, MSc; Steven M. Opal, MD; Gordon D. Rubenfeld, MD, MS; Tom van der Poll, MD, PhD; Jean-Louis Vincent, MD, PhD; Derek C. Angus, MD, MPH

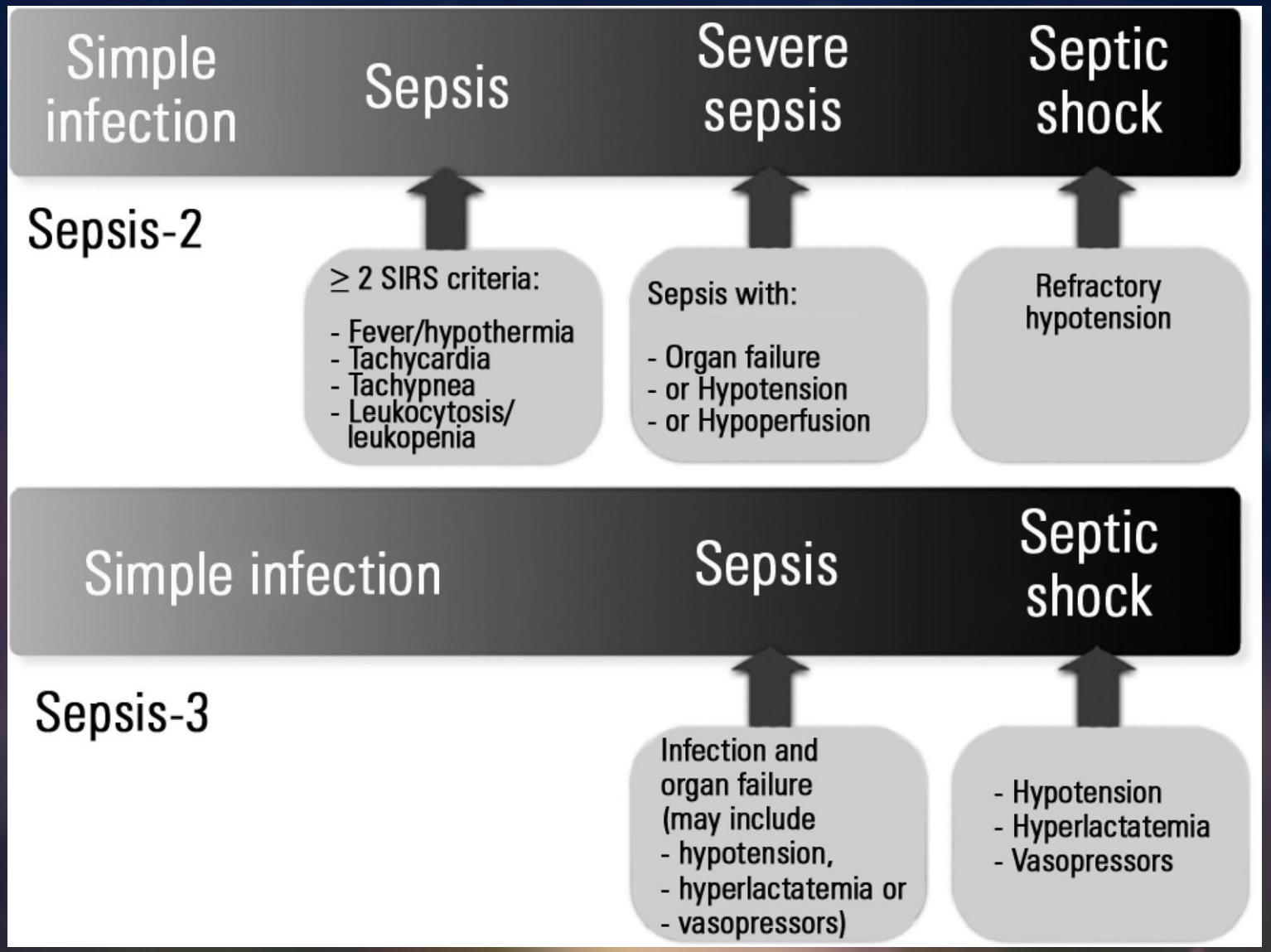


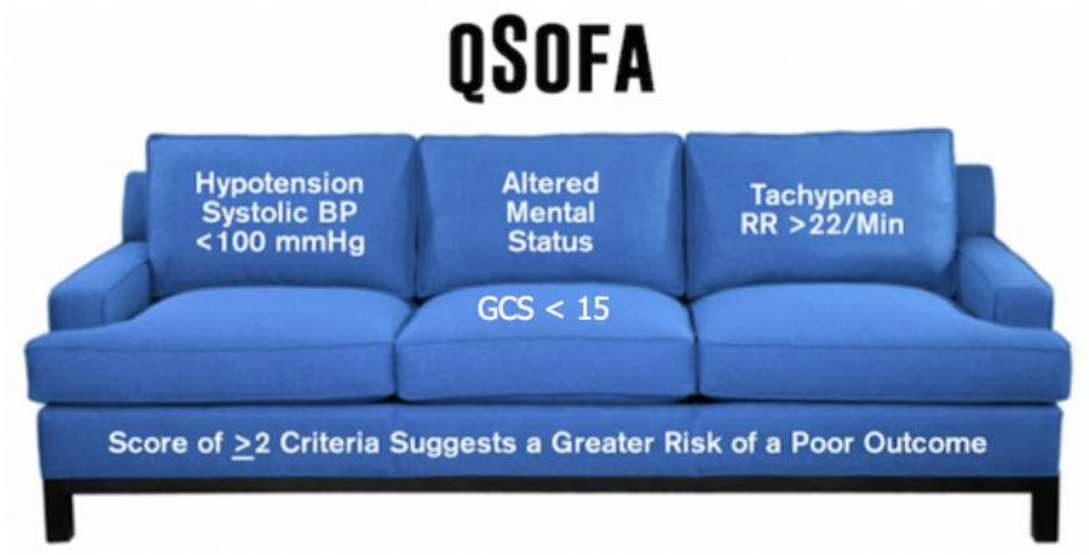
Box 3. New Terms and Definitions

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

- Septic shock is a subset of sepsis in which underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality.

Sepsis 2 vs Sepsis 3





Box 4. qSOFA (Quick SOFA) Criteria

Respiratory rate ≥22/min

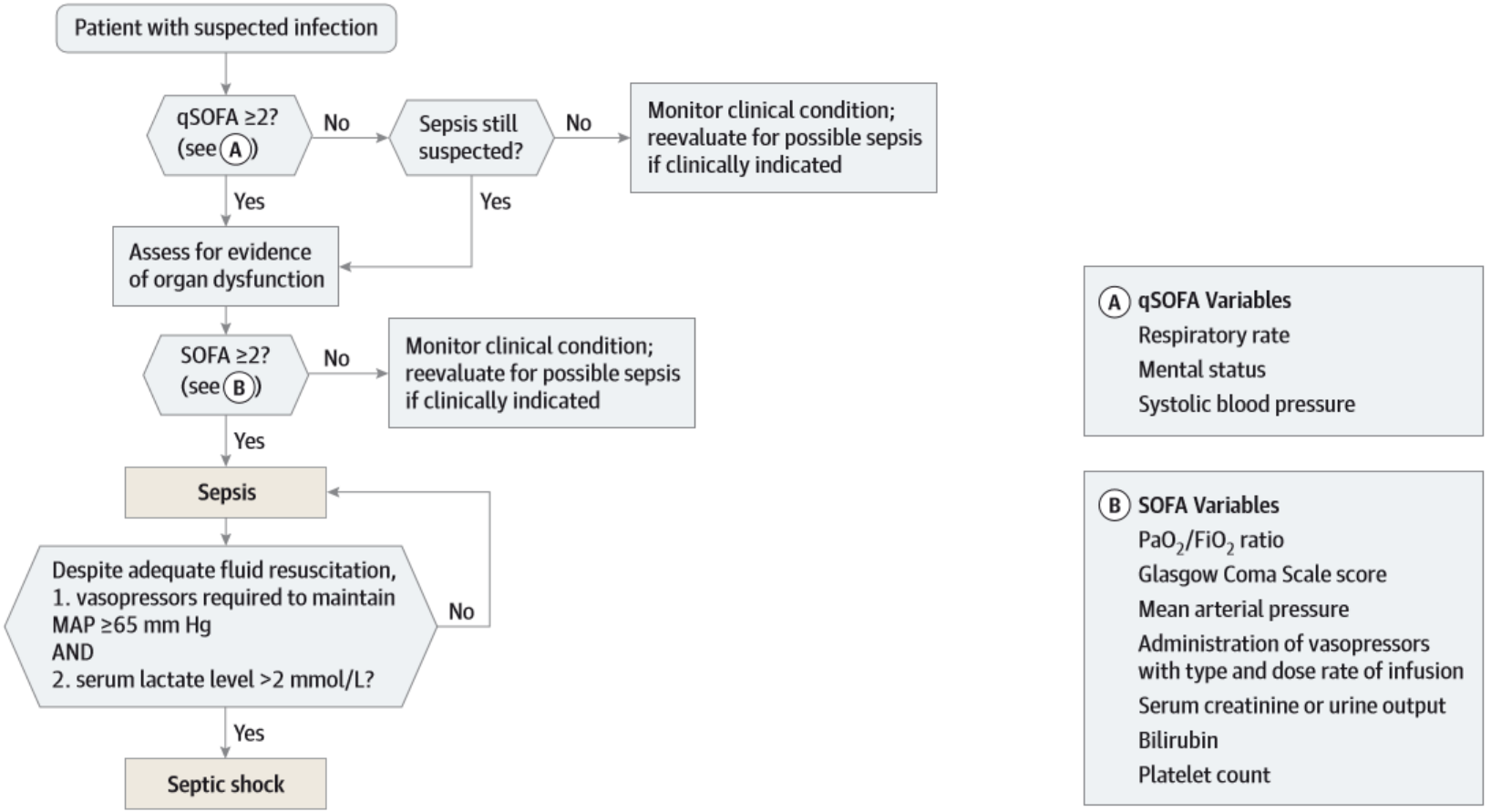
Altered mentation

Systolic blood pressure ≤100 mm Hg

Box 3. New Terms and Definitions

- Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection.
- Organ dysfunction can be identified as an acute change in total SOFA score ≥2 points consequent to the infection.
  - The baseline SOFA score can be assumed to be zero in patients not known to have preexisting organ dysfunction.
  - A SOFA score ≥2 reflects an overall mortality risk of approximately 10% in a general hospital population with suspected infection. Even patients presenting with modest dysfunction can deteriorate further, emphasizing the seriousness of this condition and the need for prompt and appropriate intervention, if not already being instituted.
- In lay terms, sepsis is a life-threatening condition that arises when the body's response to an infection injures its own tissues and organs.
- Patients with suspected infection who are likely to have a prolonged ICU stay or to die in the hospital can be promptly identified at the bedside with qSOFA, ie, alteration in mental status, systolic blood pressure ≤100 mm Hg, or respiratory rate ≥22/min.
- Septic shock is a subset of sepsis in which underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality.

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.

Intensive Care Medicine
pp 1–74

Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016

Authors | Authors and affiliations

Andrew Rhodes ✉, Laura E. Evans, Waleed Alhazzani, Mitchell M. Levy, Massimo Antonelli, Ricard Ferrer, Anand Kumar, Jonathan E. Sevransky, Charles L. Sprung, Mark E. Nunnally, Bram Rochwerg, Gordon D. Rubenfeld, Derek C. Angus, Djillali Annane, Richard J. Beale, show 44 more

Conference Reports and Expert Panel

First Online: 18 January 2017

DOI: 10.1007/s00134-017-4683-6

Cite this article as:
Rhodes, A., Evans, L.E., Alhazzani, W. et al. Intensive Care Med (2017). doi:10.1007/s00134-017-4683-6

Definitions

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

Septic shock is a subset of sepsis with circulatory and cellular/metabolic dysfunction associated with a higher risk of mortality

Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system

	2016 Descriptor	2012 Descriptor
Strength	Strong	1
	Weak	2
Quality	High	A
	Moderate	B
	Low	C
	Very Low	D
Ungraded strong recommendation	Best Practice Statement	Ungraded

A. INITIAL RESUSCITATION

1. Sepsis and septic shock are medical emergencies, and we recommend that treatment and resuscitation begin immediately (BPS).

2. We recommend that, in the resuscitation from sepsis-induced hypoperfusion, at least 30 mL/kg of IV crystalloid fluid be given within the first 3 h (strong recommendation, low quality of evidence).

3. We recommend that, following initial fluid resuscitation, additional fluids be guided by frequent reassessment of hemodynamic status (BPS).

iSepsis – A 30ml/kg bolus: Yes or No -The Results

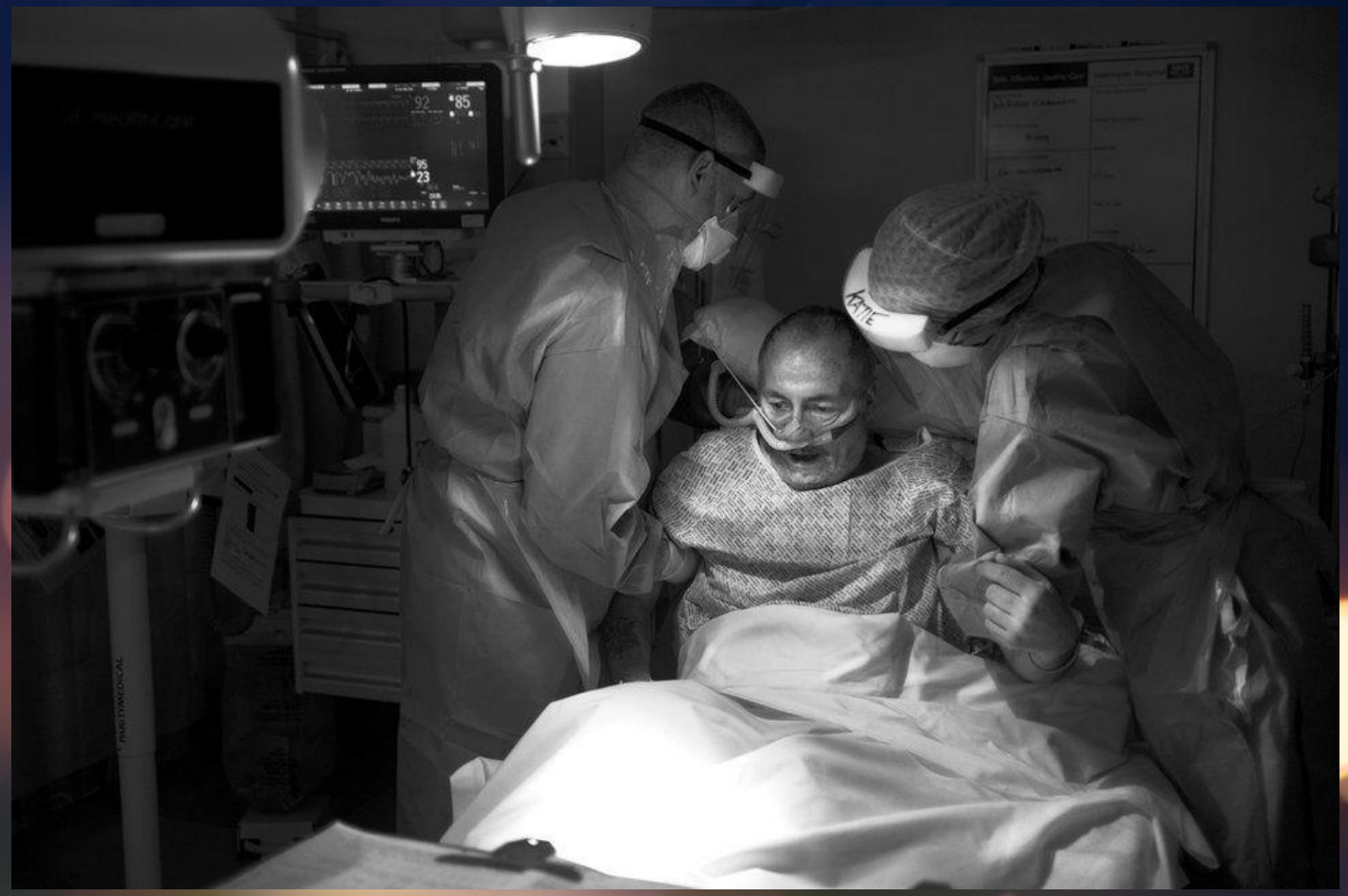
November 26, 2017 by **Paul Marik** — **4 Comments**

Petition to retire the surviving sepsis campaign guidelines

May 2, 2018 by **Josh Farkas** — **21 Comments**

ONLINE SPECIAL ARTICLE

Surviving Sepsis Campaign Guidelines on the Management of Adults With Coronavirus Disease 2019 (COVID-19) in the ICU: First Update



COVID-19 Resources

Summary of recommendations of the COVID-19 guidelines therapeutic update

Severe COVID-19	Critical COVID-19
☑ **DO:** Systemic corticosteroids	
⚠ **CONSIDER:** Dexamethasone over other corticosteroids	
☑ **DO:** Pharmacologic VTE prophylaxis	
⚠ **CONSIDER:** Remdesivir	⚠ **CONSIDER avoiding:** Remdesivir
⚠ **CONSIDER avoiding:** Convalescent plasma outside of clinical trials	
⚠ **CONSIDER avoiding:** Full anticoagulation in patients without VTE outside of clinical trials	
⛔ **DON'T DO:** Hydroxychloroquine	
? **UNCERTAIN:** Awake proning	

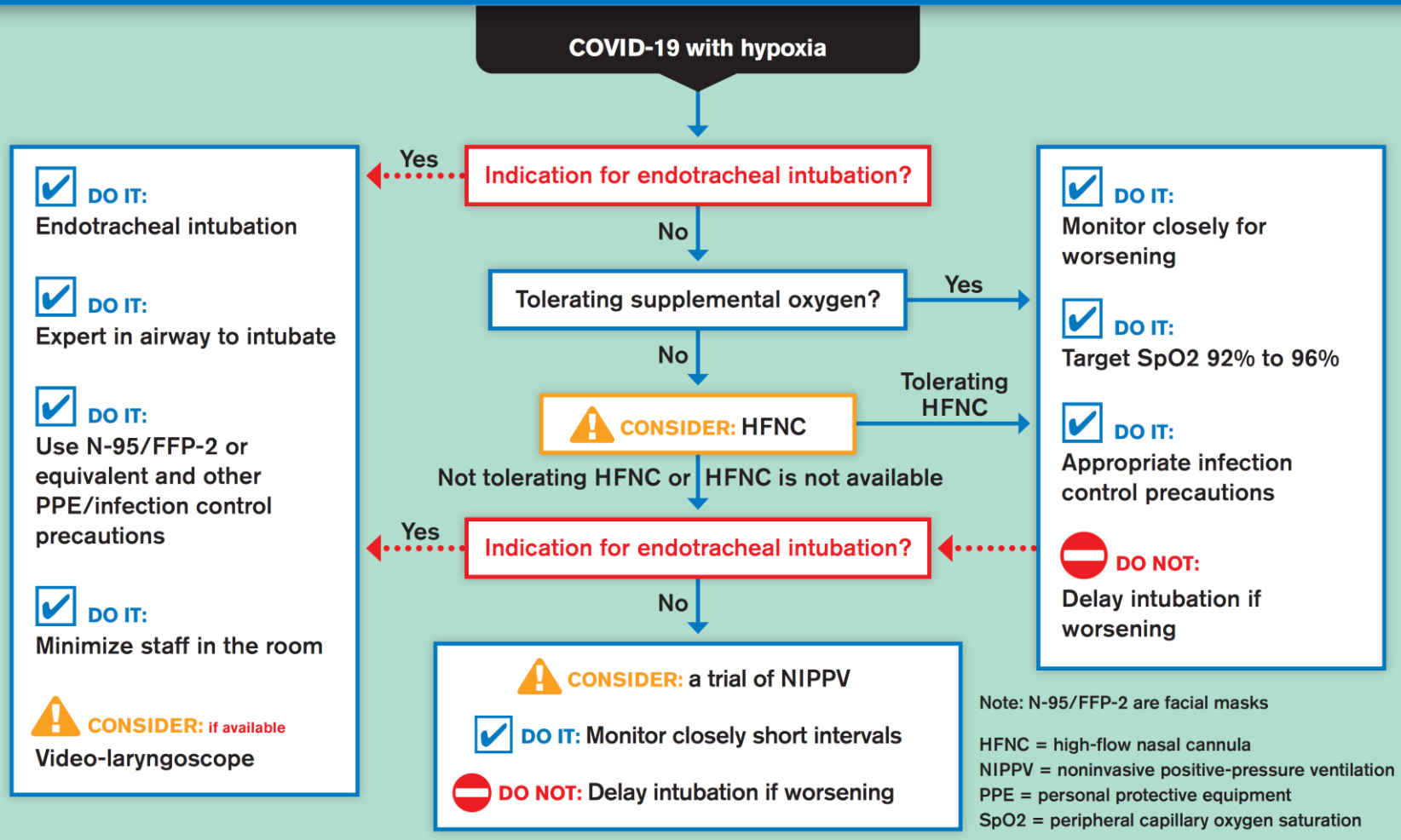
Society of Critical Care Medicine
The Intensive Care Professionals

Surviving Sepsis Campaign

ESICM

COVID-19 Resources

Summary of recommendations on the initial management of hypoxic COVID-19 patients



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COVID-19 Resources

Summary of recommendations on the management of patients with COVID-19 and ARDS

COVID-19 with mild ARDS

DO:
Vt 4-8 ml/kg and P_{plat} <30 cm H_2O

DO:
Investigate for bacterial infection

DO:
Target SpO2 92% - 96%

CONSIDER:
Conservative fluid strategy

CONSIDER:
Empiric antibiotics

COVID-19 with mod to severe ARDS

CONSIDER:
Higher PEEP
PEEP should be tailored to individual response

CONSIDER:
NMBA boluses to facilitate ventilation targets

CONSIDER:
if PEEP responsive
Traditional recruitment maneuvers

CONSIDER:
Prone ventilation 12 -16 h

CONSIDER:
if proning, high P_{plt} asynchrony
NMBA infusion for 24 h

DON'T DO:
Staircase recruitment maneuvers

Rescue/adjunctive therapy

CONSIDER:
if proning, high P_{plt} asynchrony
NMBA infusion for 24 h

CONSIDER:
Prone ventilation 12 -16 h

CONSIDER:
A trial of inhaled nitric oxide
STOP if no quick response

CONSIDER:
V-V ECMO or referral to ECMO center
follow local criteria for ECMO

Mod = moderate
ARDS = adult respiratory distress syndrome
P_{plat} = plateau pressure
SpO2 = peripheral capillary oxygen saturation
PEEP = positive end-expiratory pressure
NMBA = neuromuscular blocking agents
ECMO = extracorporeal membrane oxygenation

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Surviving Sepsis Campaign

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Springer Link

Guidelines | Published: 02 October 2021

Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021

Laura Evans, Andrew Rhodes, [...] Mitchell Levy

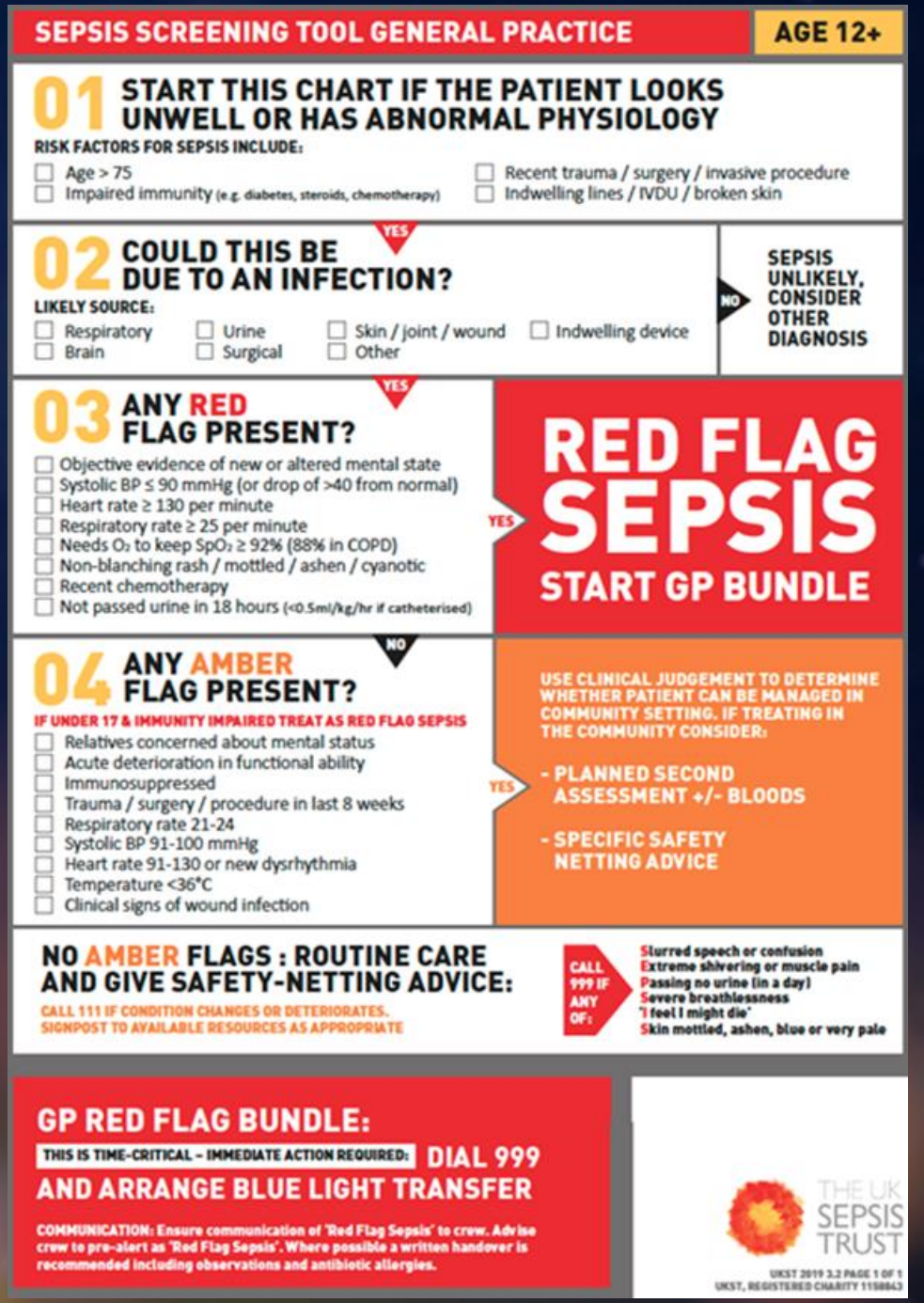
Intensive Care Medicine **47**, 1181–1247 (2021) | Cite this article

Screening and early treatment

Recommendation

1. For hospitals and health systems, we **recommend** using a performance improvement program for sepsis, including sepsis screening for acutely ill, high-risk patients and standard operating procedures for treatment.

Strong recommendation, moderate quality of evidence for screening.
Strong recommendation, very low-quality evidence for standard operating procedures.



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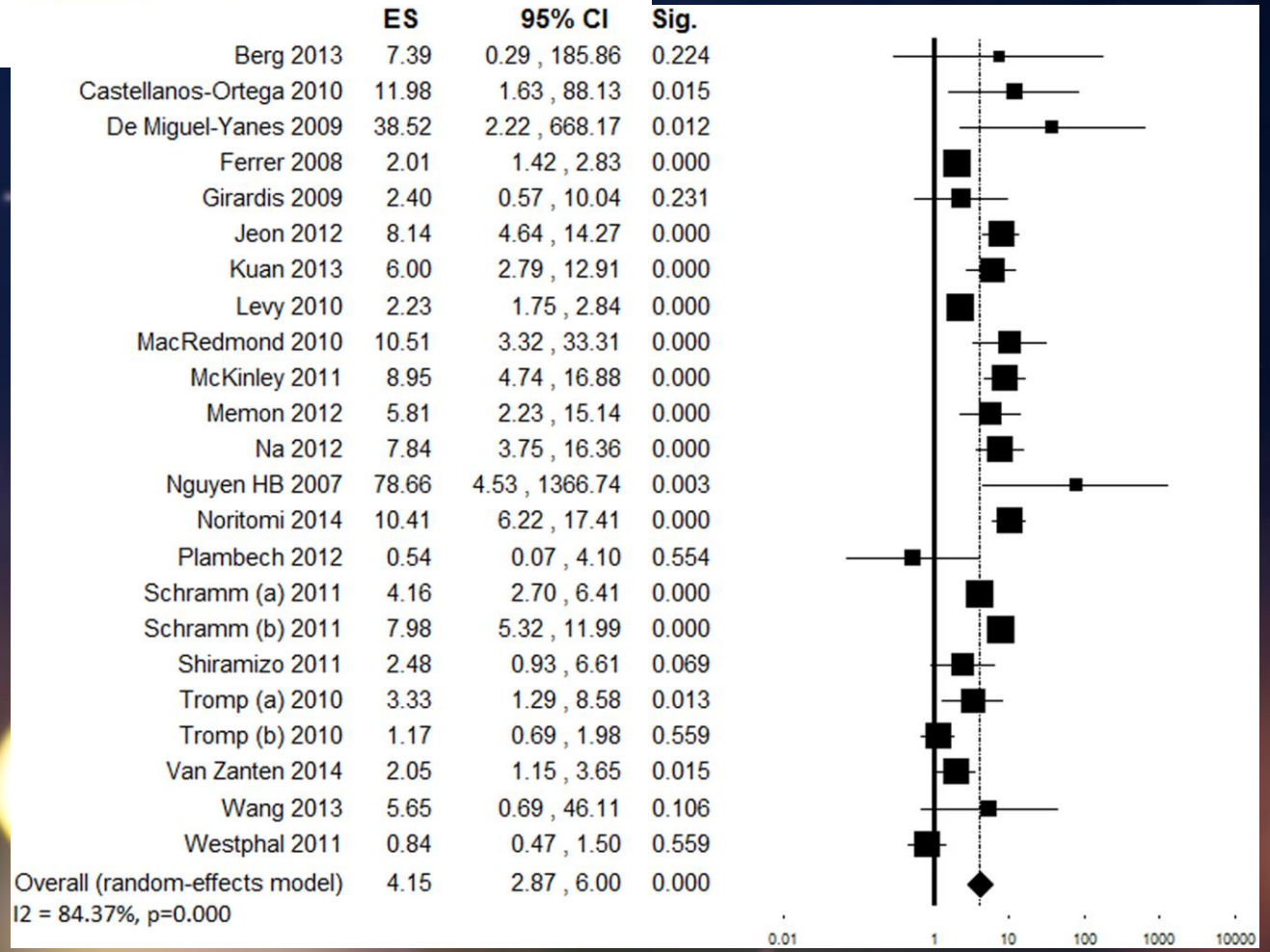
RESEARCH ARTICLE

Effect of Performance Improvement Programs on Compliance with Sepsis Bundles and Mortality: A Systematic Review and Meta-Analysis of Observational Studies

Elisa Damiani, Abele Donati, Giulia Serafini, Laura Rinaldi, Erica Adrario, Paolo Pelaia, Stefano Busani, Massimo Girardis

Published: May 6, 2015 • https://doi.org/10.1371/journal.pone.0125827

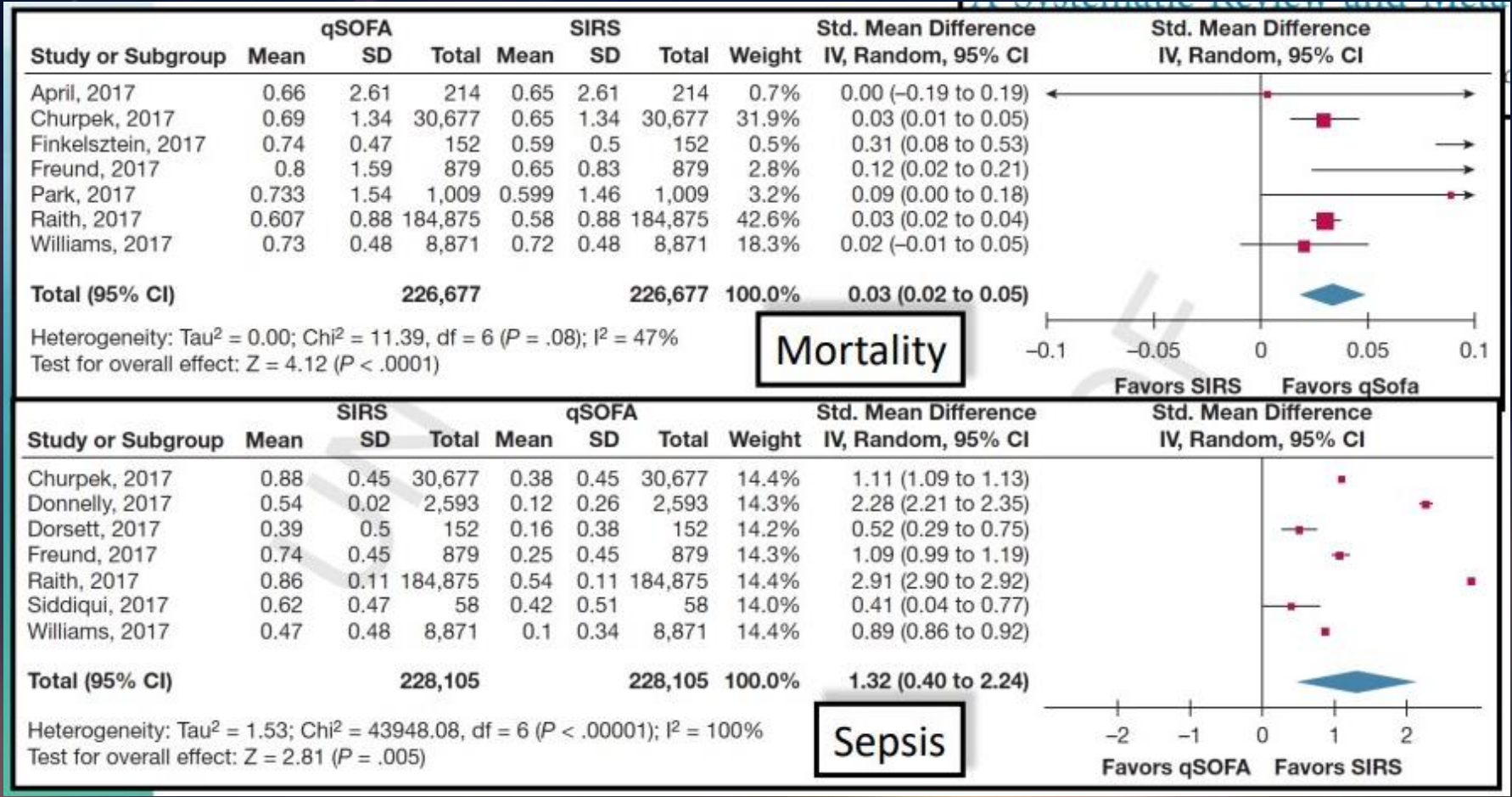
Forest plot showing individual and overall ES of studies that evaluated changes in compliance with the complete 6-hour bundle following the implementation of the performance improvement program (k = 25).



Recommendation

2. We **recommend against** using qSOFA compared with SIRS, NEWS, or MEWS as a single screening tool for sepsis or septic shock.

Strong recommendation, moderate-quality evidence.



Study or Subgroup	qSOFA Mean	qSOFA SD	qSOFA Total	SIRS Mean	SIRS SD	SIRS Total	Weight	Std. Mean Difference IV, Random, 95% CI
April, 2017	0.66	2.61	214	0.65	2.61	214	0.7%	0.00 (–0.19 to 0.19)
Churpek, 2017	0.69	1.34	30,677	0.65	1.34	30,677	31.9%	0.03 (0.01 to 0.05)
Finkelsztein, 2017	0.74	0.47	152	0.59	0.5	152	0.5%	0.31 (0.08 to 0.53)
Freund, 2017	0.8	1.59	879	0.65	0.83	879	2.8%	0.12 (0.02 to 0.21)
Park, 2017	0.733	1.54	1,009	0.599	1.46	1,009	3.2%	0.09 (0.00 to 0.18)
Raith, 2017	0.607	0.88	184,875	0.58	0.88	184,875	42.6%	0.03 (0.02 to 0.04)
Williams, 2017	0.73	0.48	8,871	0.72	0.48	8,871	18.3%	0.02 (–0.01 to 0.05)
Total (95% CI)			**226,677**			**226,677**	**100.0%**	**0.03 (0.02 to 0.05)**

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 11.39$, df = 6 ($P = .08$); $I^2 = 47\%$
Test for overall effect: $Z = 4.12$ ($P < .0001$)

Mortality

Std. Mean Difference IV, Random, 95% CI

–0.1 –0.05 0 0.05 0.1

Favors SIRS Favors qSofa

Study or Subgroup	SIRS Mean	SIRS SD	SIRS Total	qSOFA Mean	qSOFA SD	qSOFA Total	Weight	Std. Mean Difference IV, Random, 95% CI
Churpek, 2017	0.88	0.45	30,677	0.38	0.45	30,677	14.4%	1.11 (1.09 to 1.13)
Donnelly, 2017	0.54	0.02	2,593	0.12	0.26	2,593	14.3%	2.28 (2.21 to 2.35)
Dorsett, 2017	0.39	0.5	152	0.16	0.38	152	14.2%	0.52 (0.29 to 0.75)
Freund, 2017	0.74	0.45	879	0.25	0.45	879	14.3%	1.09 (0.99 to 1.19)
Raith, 2017	0.86	0.11	184,875	0.54	0.11	184,875	14.4%	2.91 (2.90 to 2.92)
Siddiqui, 2017	0.62	0.47	58	0.42	0.51	58	14.0%	0.41 (0.04 to 0.77)
Williams, 2017	0.47	0.48	8,871	0.1	0.34	8,871	14.4%	0.89 (0.86 to 0.92)
Total (95% CI)			**228,105**			**228,105**	**100.0%**	**1.32 (0.40 to 2.24)**

Heterogeneity: $Tau^2 = 1.53$; $Chi^2 = 43948.08$, df = 6 ($P < .00001$); $I^2 = 100\%$
Test for overall effect: $Z = 2.81$ ($P = .005$)

Sepsis

Std. Mean Difference IV, Random, 95% CI

–2 –1 0 1 2

Favors qSOFA Favors SIRS

Recommendation

3. For adults suspected of having sepsis, we **suggest** measuring blood lactate.

Weak recommendation, low-quality evidence.

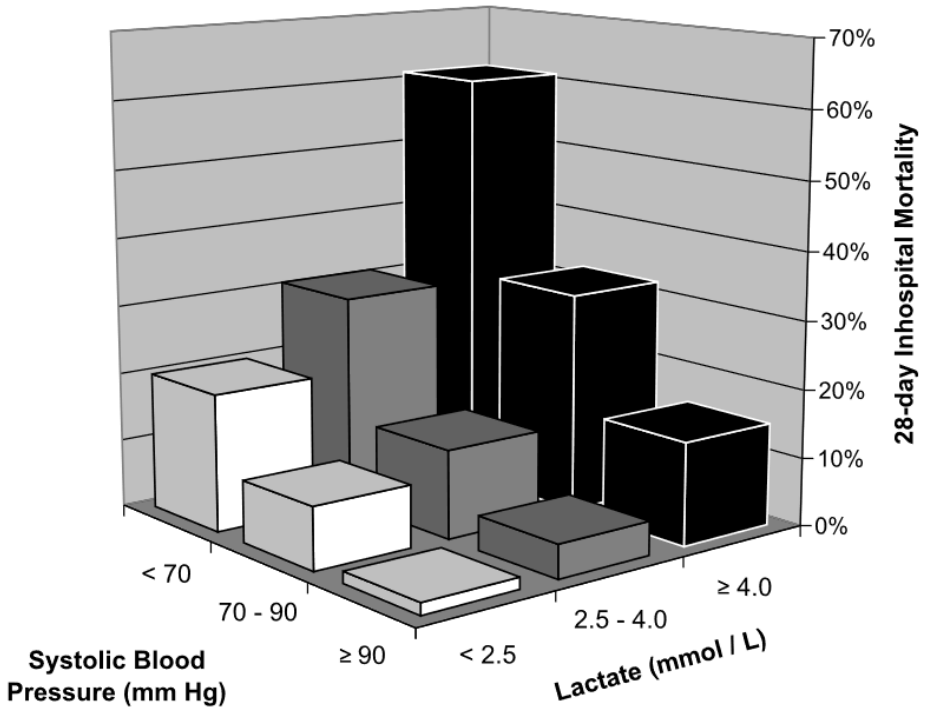


Fig. 1 28-day in-hospital mortality risk stratified by blood pressure and serum lactate level

Number of Patients In Each Lactate/Blood Pressure Group

Lactate (mmol / L)	Systolic Blood Pressure (mm Hg) < 70	70 - 90	≥ 90
< 2.5	20	99	819
2.5 - 4.0	13	31	202
≥ 4.0	18	25	60

Intensive Care Med (2007) 33:1892–1899
DOI 10.1007/s00134-007-0680-5

ORIGINAL

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Occult hypoperfusion and mortality in patients with suspected infection

Initial resuscitation

Recommendations
4. Sepsis and septic shock are medical emergencies, and we **recommend** that treatment and resuscitation begin immediately. *Best practice statement.*
5. For patients with sepsis induced hypoperfusion or septic shock we **suggest** that at least 30 mL/kg of IV crystalloid fluid should be given within the first 3 hours of resuscitation. *Weak recommendation, low-quality evidence.*

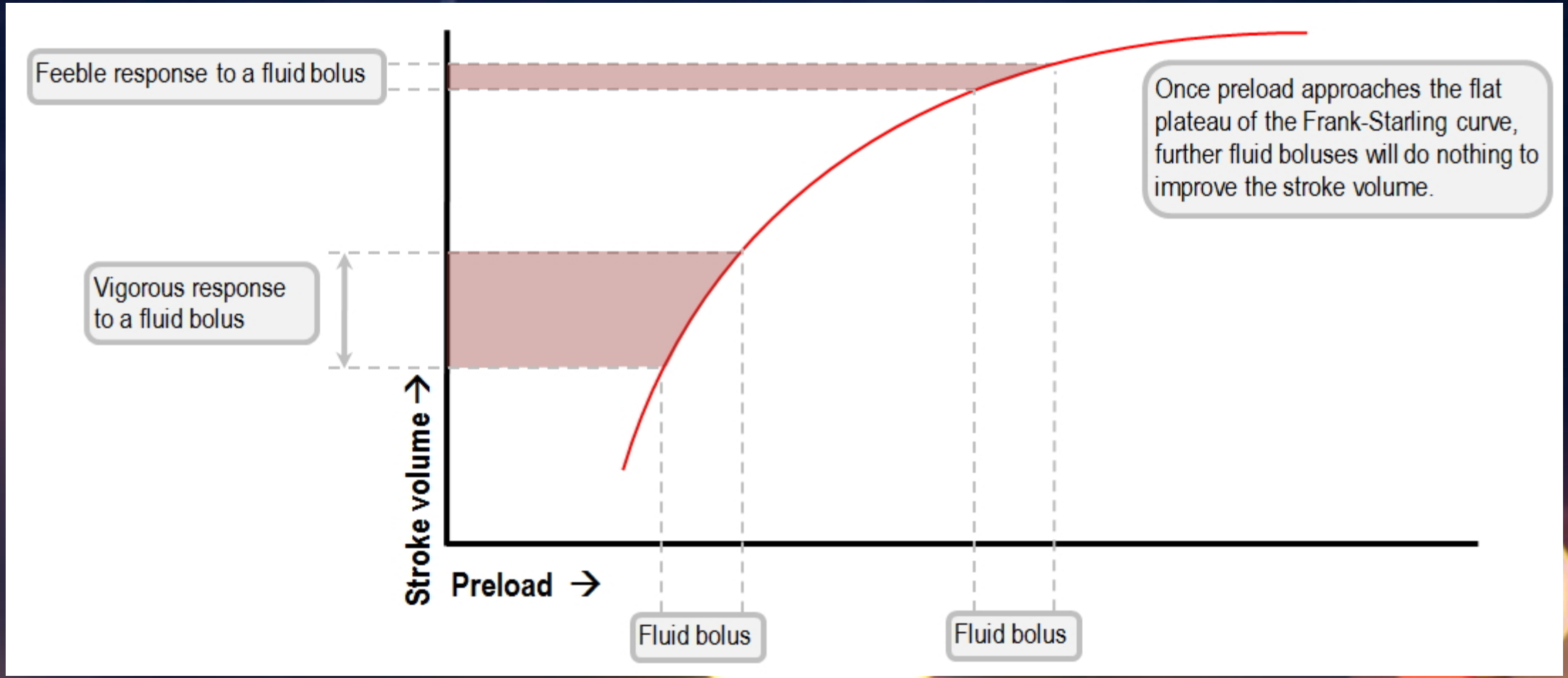
6. For adults with sepsis or septic shock, we **suggest** using dynamic measures to guide fluid resuscitation over physical examination or static parameters alone.

Weak recommendation, very low-quality evidence.

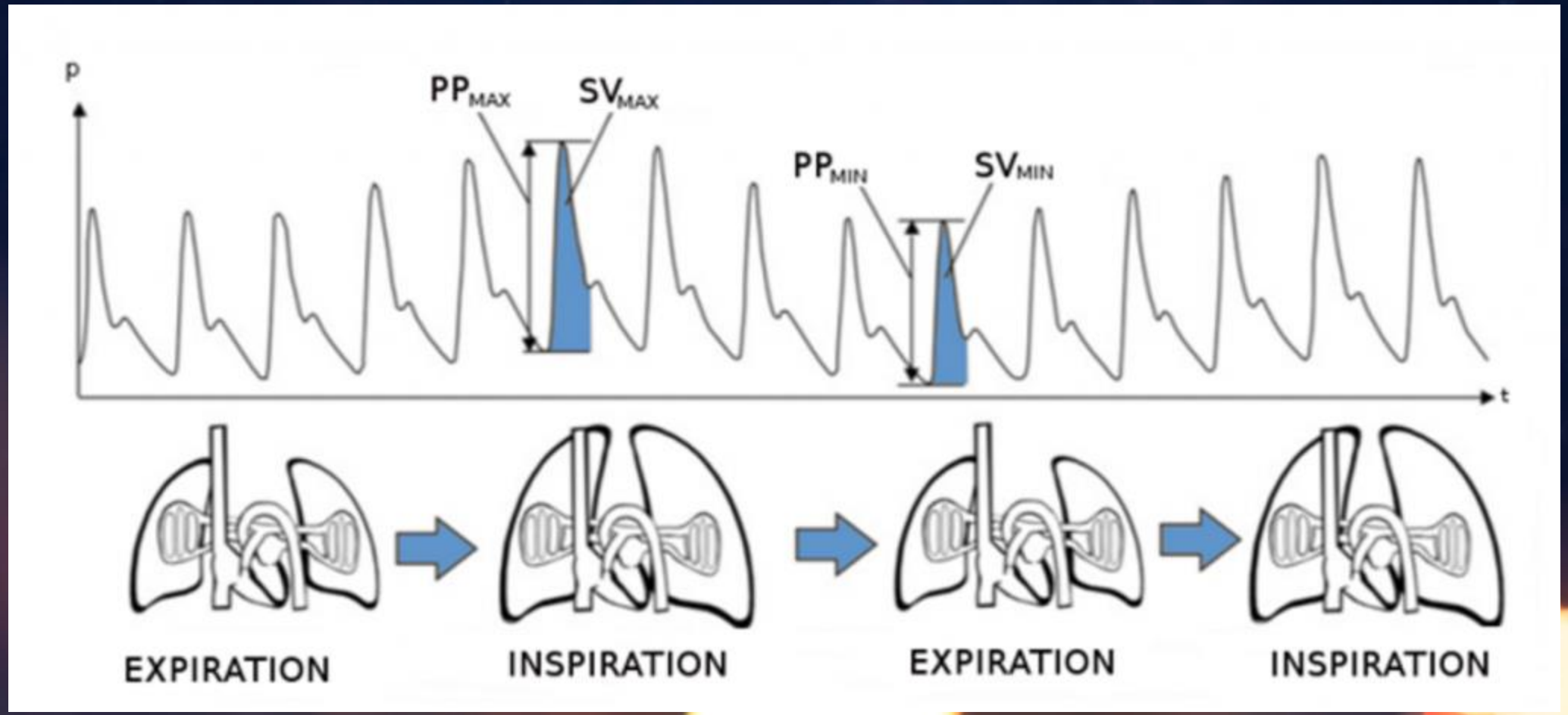
Remarks:

Dynamic parameters include response to a passive leg raise or a fluid bolus, using stroke volume (SV), stroke volume variation (SVV), pulse pressure variation (PPV), or echocardiography, where available.

Fluid resuscitation and assessment of fluid responsiveness

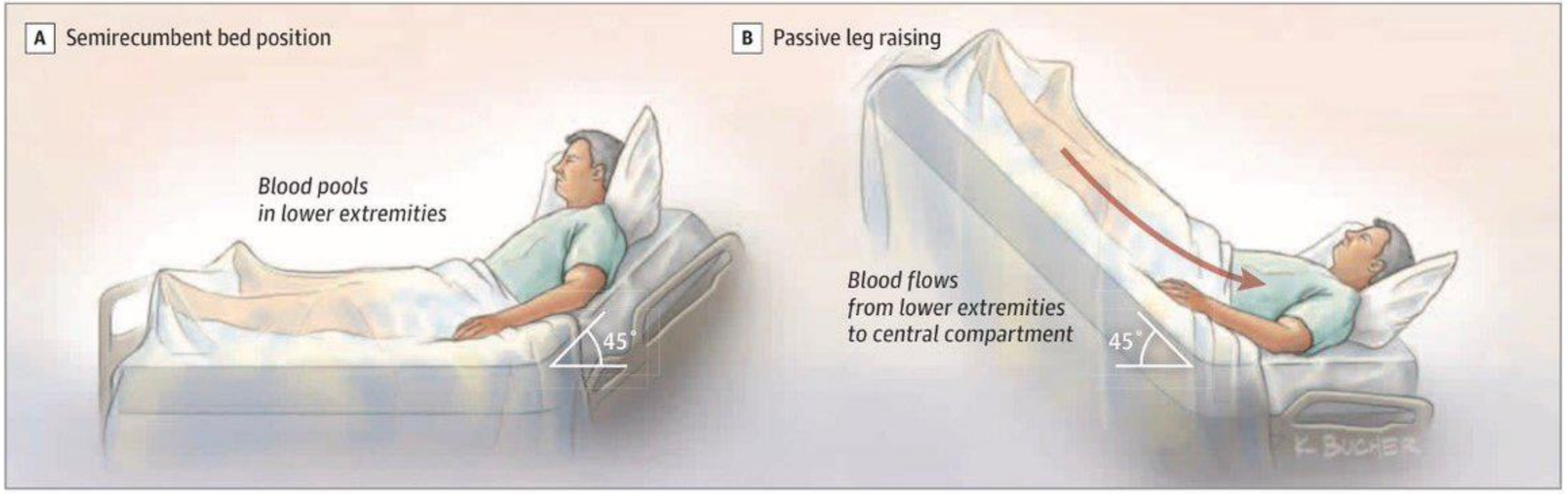


Pulse pressure variation



Passive Leg raise Test

Figure 2. Performance of a Passive Leg-Raising Test



7. For adults with sepsis or septic shock, we **suggest** guiding resuscitation to decrease serum lactate in patients with elevated lactate level, over not using serum lactate.

Weak recommendation, low-quality evidence.

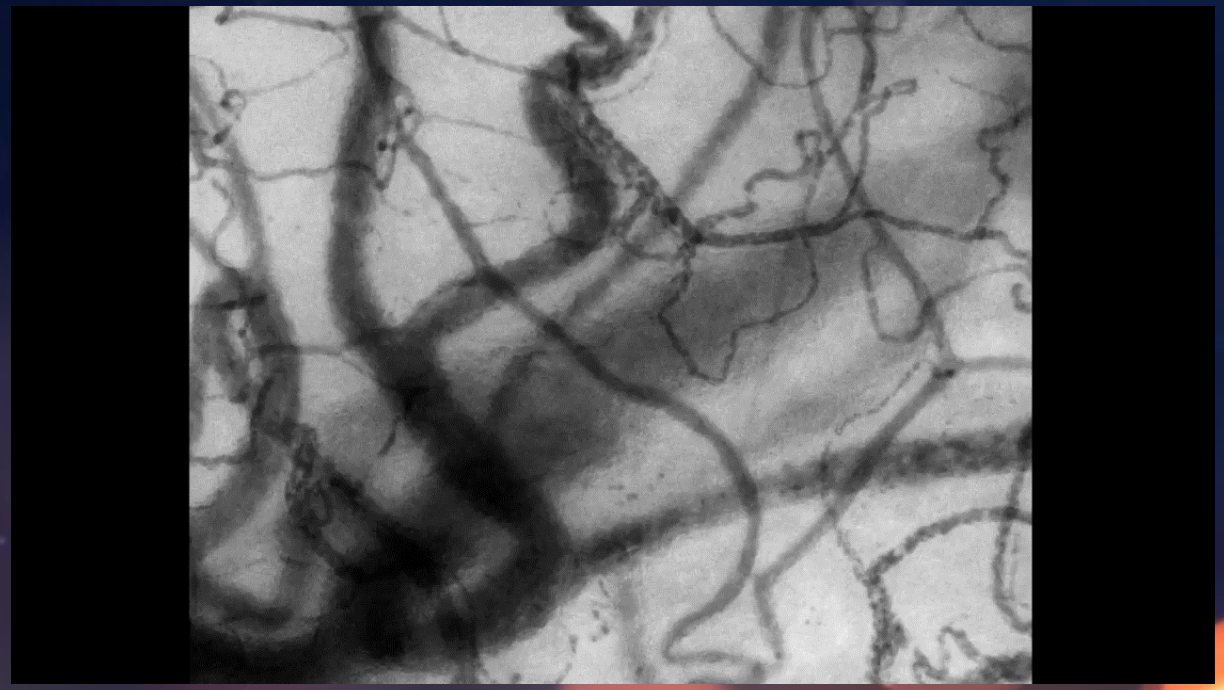
Remarks:

During acute resuscitation, serum lactate level should be interpreted considering the clinical context and other causes of elevated lactate.

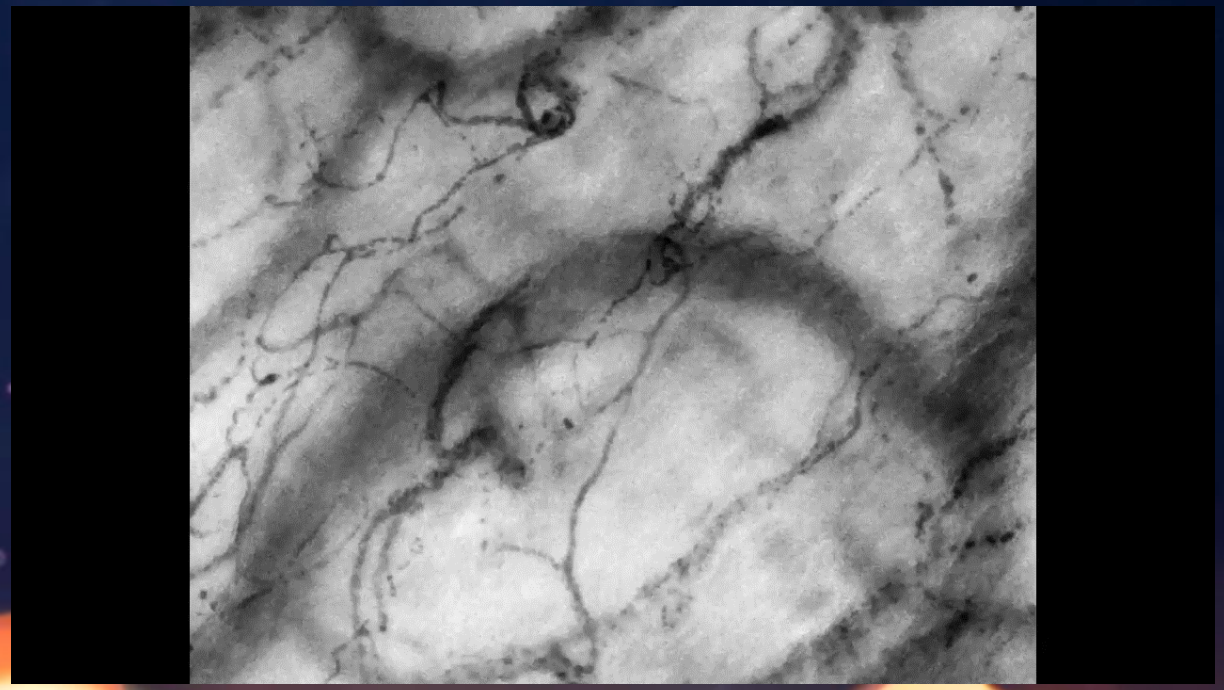
8. For adults with septic shock, we **suggest** using capillary refill time to guide resuscitation as an adjunct to other measures of perfusion.

Weak recommendation, low-quality evidence.

Micro-Circulation



Normal



Sepsis

Recommendation
9. For adults with septic shock on vasopressors, we **recommend** an initial target mean arterial pressure (MAP) of 65 mm Hg over higher MAP targets. *Strong recommendation, moderate-quality evidence.*

Recommendation
10. For adults with sepsis or septic shock who require ICU admission, we **suggest** admitting the patients to the ICU within 6 hours. *Weak recommendation, low-quality evidence.*

Infection

Recommendation
11. For adults with suspected sepsis or septic shock but unconfirmed infection, we **recommend** continuously re-evaluating and searching for alternative diagnoses and discontinuing empiric antimicrobials if an alternative cause of illness is demonstrated or strongly suspected. *Best practice statement.*

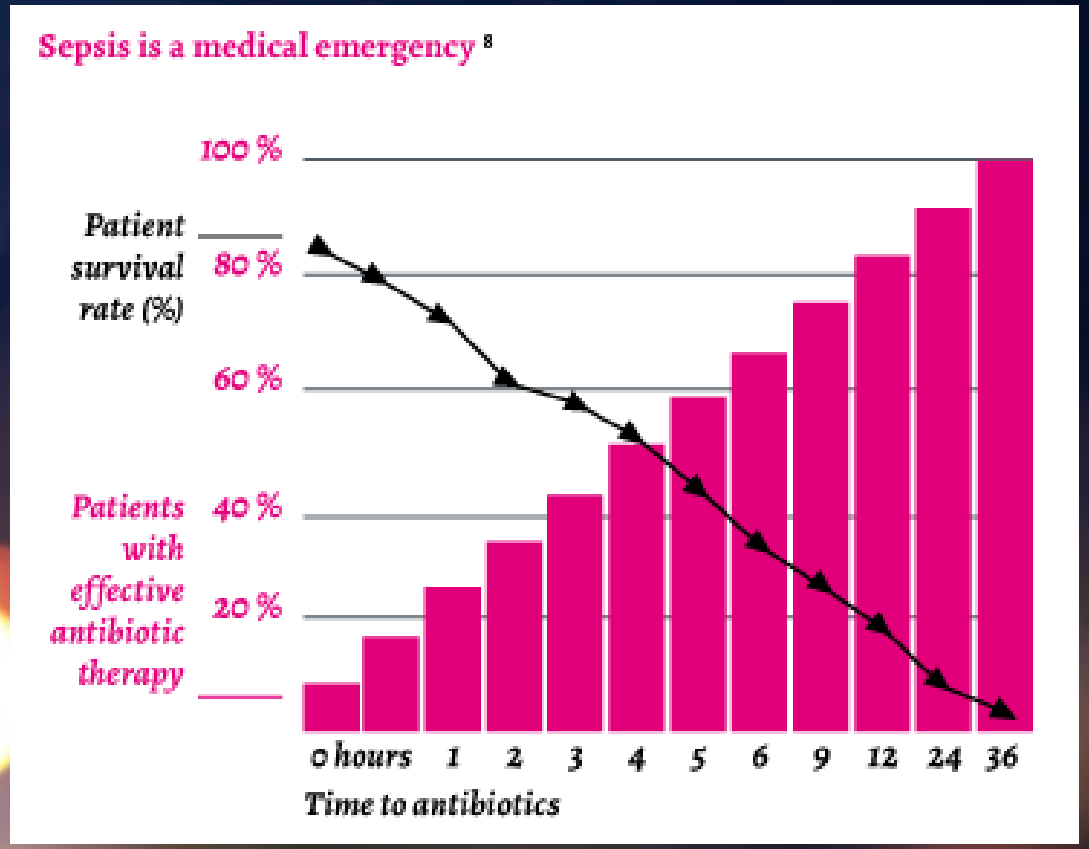
Infection

Recommendations

12. For adults with possible septic shock or a high likelihood for sepsis, we **recommend** administering antimicrobials immediately, ideally within one hour of recognition.

Strong recommendation, low quality of evidence (septic shock)

Strong recommendation, very low quality of evidence (sepsis without shock)



Infection

13. For adults with possible sepsis without shock, we **recommend** rapid assessment of the likelihood of infectious versus non-infectious causes of acute illness.

Best practice statement.

Remarks:

Rapid assessment includes history and clinical examination, tests for both infectious and non-infectious causes of acute illness and immediate treatment for acute conditions that can mimic sepsis. Whenever possible this should be completed within 3 hours of presentation so that a decision can be made as to the likelihood of an infectious cause of the patient's presentation and timely antimicrobial therapy provided if the likelihood of sepsis is thought to be high.

Infection

14. For adults with possible sepsis without shock, we suggest a time-limited course of rapid investigation and if concern for infection persists, the administration of antimicrobials within 3 hours from the time when sepsis was first recognized.

Weak recommendation, very low quality of evidence.

15. For adults with a low likelihood of infection and without shock, we suggest deferring antimicrobials while continuing to closely monitor the patient.

Weak recommendation, very low quality of evidence.

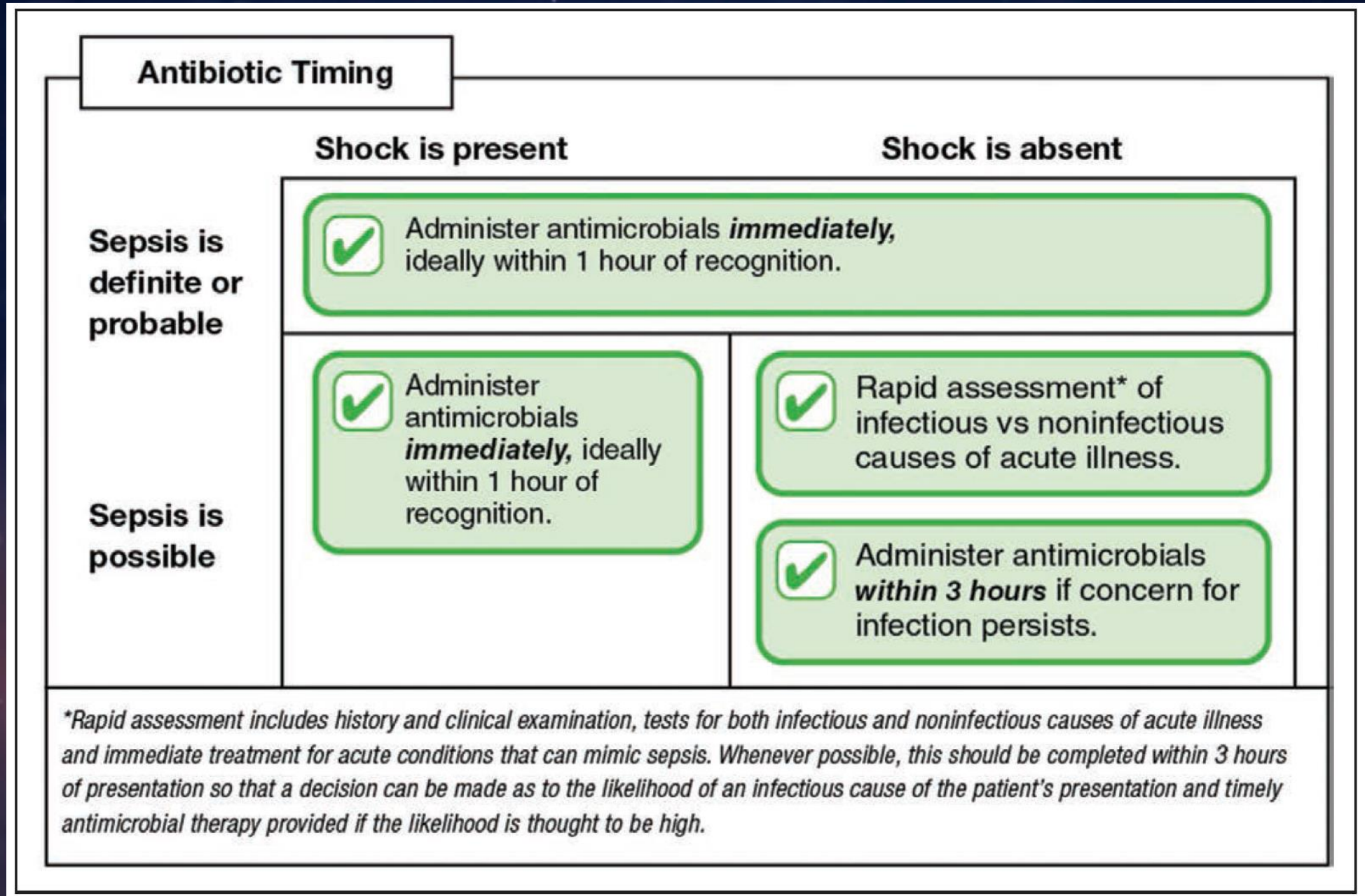


Figure 1. Recommendations on timing of antibiotic administration.

Infection

Biomarkers to Start Antibiotics

Recommendation
16. For adults with suspected sepsis or septic shock, we **suggest against** using procalcitonin plus clinical evaluation to decide when to start antimicrobials, as compared to clinical evaluation alone. *Weak recommendation, very low quality of evidence.*

Infection

Antimicrobial Choice

Recommendations
17. For adults with sepsis or septic shock at high risk of methicillin-resistant Staphylococcus aureus (MRSA), we **recommend** using empiric antimicrobials with MRSA coverage over using antimicrobials without MRSA coverage. *Best practice statement.*
18. For adults with sepsis or septic shock at low risk of MRSA, we **suggest against** using empiric antimicrobials with MRSA coverage, as compared with using antimicrobials without MRSA coverage. *Weak recommendation, low quality of evidence.*

Infection

Recommendations

19. For adults with sepsis or septic shock and high risk for multidrug resistant (MDR) organisms, we **suggest** using two antimicrobials with gram-negative coverage for empiric treatment over one gram-negative agent.

Weak recommendation, very low quality of evidence.

20. For adults with sepsis or septic shock and low risk for MDR organisms, we **suggest against** using two gram-negative agents for empiric treatment, compared with one gram-negative agent.

Weak recommendation, very low quality of evidence.

21. For adults with sepsis or septic shock, we **suggest against** using double gram-negative coverage once the causative pathogen and the susceptibilities are known.

Weak recommendation, very low quality of evidence.

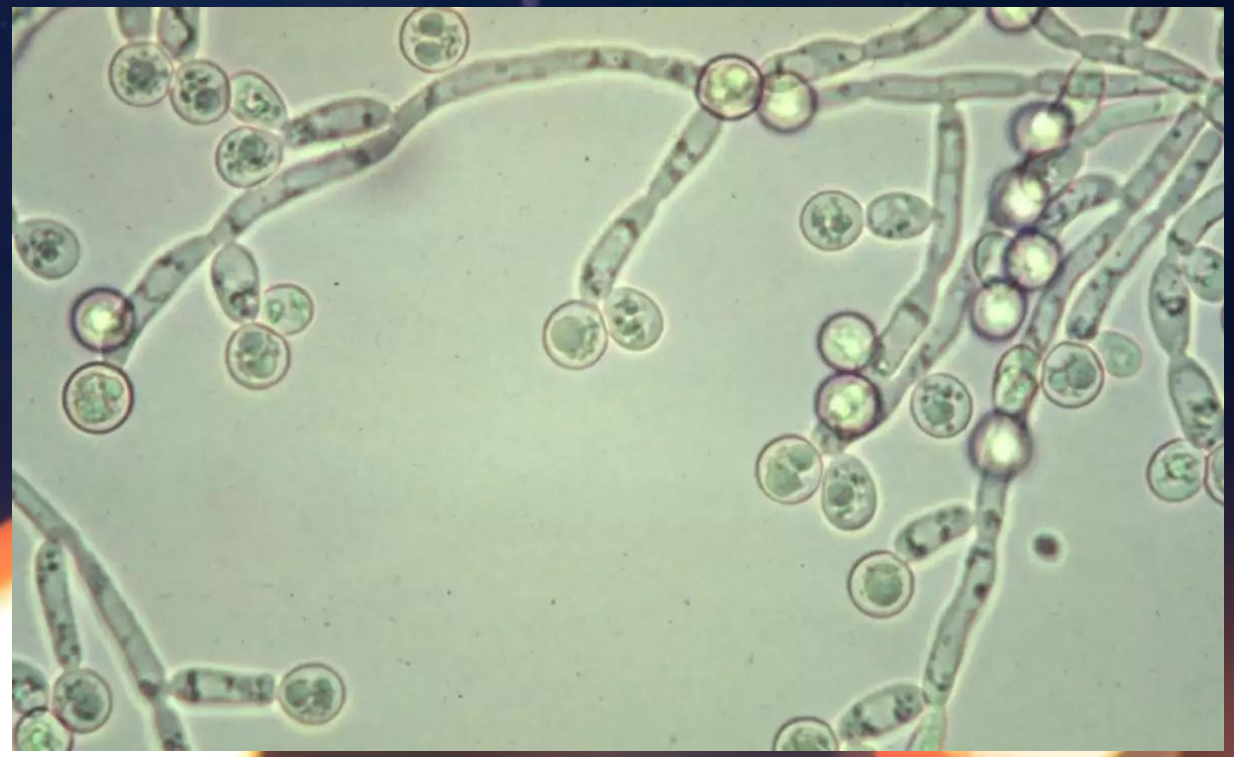
Infection

Antifungal Therapy

Recommendations
22. For adults with sepsis or septic shock at high risk of fungal infection, we **suggest** using empiric antifungal therapy over no antifungal therapy. *Weak recommendation, low quality of evidence.*
23. For adults with sepsis or septic shock at low risk of fungal infection, we **suggest against** empiric use of antifungal therapy. *Weak recommendation, low quality of evidence.*

Infection

Risk Factors for Candida Sepsis
Candida Colonization at Multiple Sites (177–179)
Surrogate Markers Such as Serum Beta-D-Glucan Assay (177)
Neutropenia (180, 181)
Immunosuppression (173, 180, 181)
Severity of Illness (High APACHE score) (182, 183)
Longer ICU Length of Stay (183)
Central Venous Catheters and Other Intravascular Devices (168, 180, 181, 184)
Persons Who Inject Drugs (185)
Total Parenteral Nutrition (186)
Broad Spectrum Antibiotics (178, 187)
Gastrointestinal Tract Perforations and Anastomotic Leaks (186, 188–190)
Emergency Gastrointestinal or Hepatobiliary Surgery (190)
Acute Renal Failure and Hemodialysis (186, 188)
Severe Thermal Injury (191–193)
Prior Surgery (186)



Infection

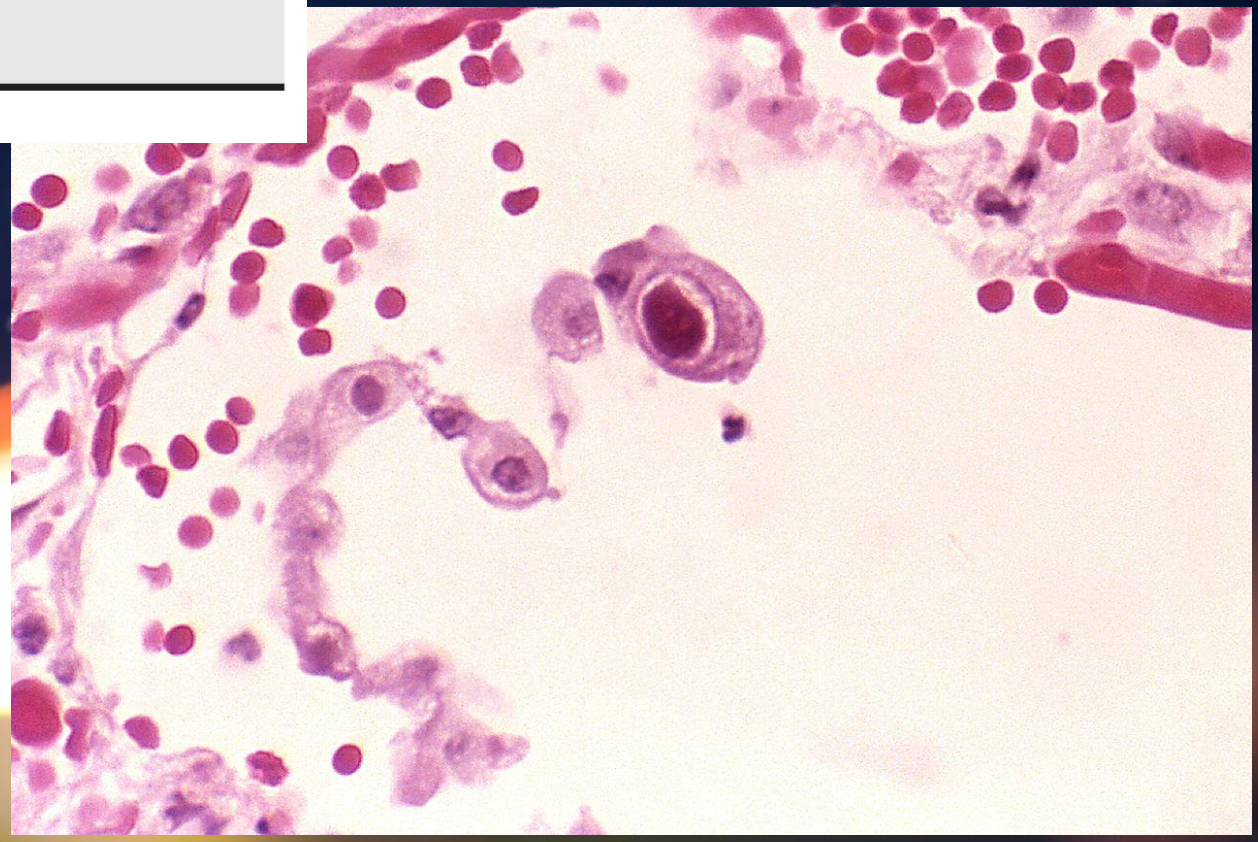
Risk Factors for Endemic Yeast (Cryptococcus, Histoplasma, Blastomyces, Coccidioidomycosis)
Antigen Markers Such as Cryptococcal, Histoplasma or Blastomyces assays (194–196)
HIV Infection (197–200)
Solid Organ Transplantation (199, 201–203)
High Dose Corticosteroid Therapy (199)
Hematopoietic Stem Cell Transplantation (204)
Certain Biologic Response Modifiers (205, 206)
Diabetes Mellitus (207)

Risk Factor for Invasive Mold Infection
Neutropenia (204, 208)
Surrogate Markers Such as Serum or Bronchoalveolar Lavage Galactomannan Assay (209–211)
Hematopoietic Stem Cell Transplantation (204, 208, 212)
Solid Organ Transplantation (202, 212–214)
High Dose Corticosteroid Therapy (215, 216)
Certain Biologic Response Modifiers (206, 217, 218)

Infection

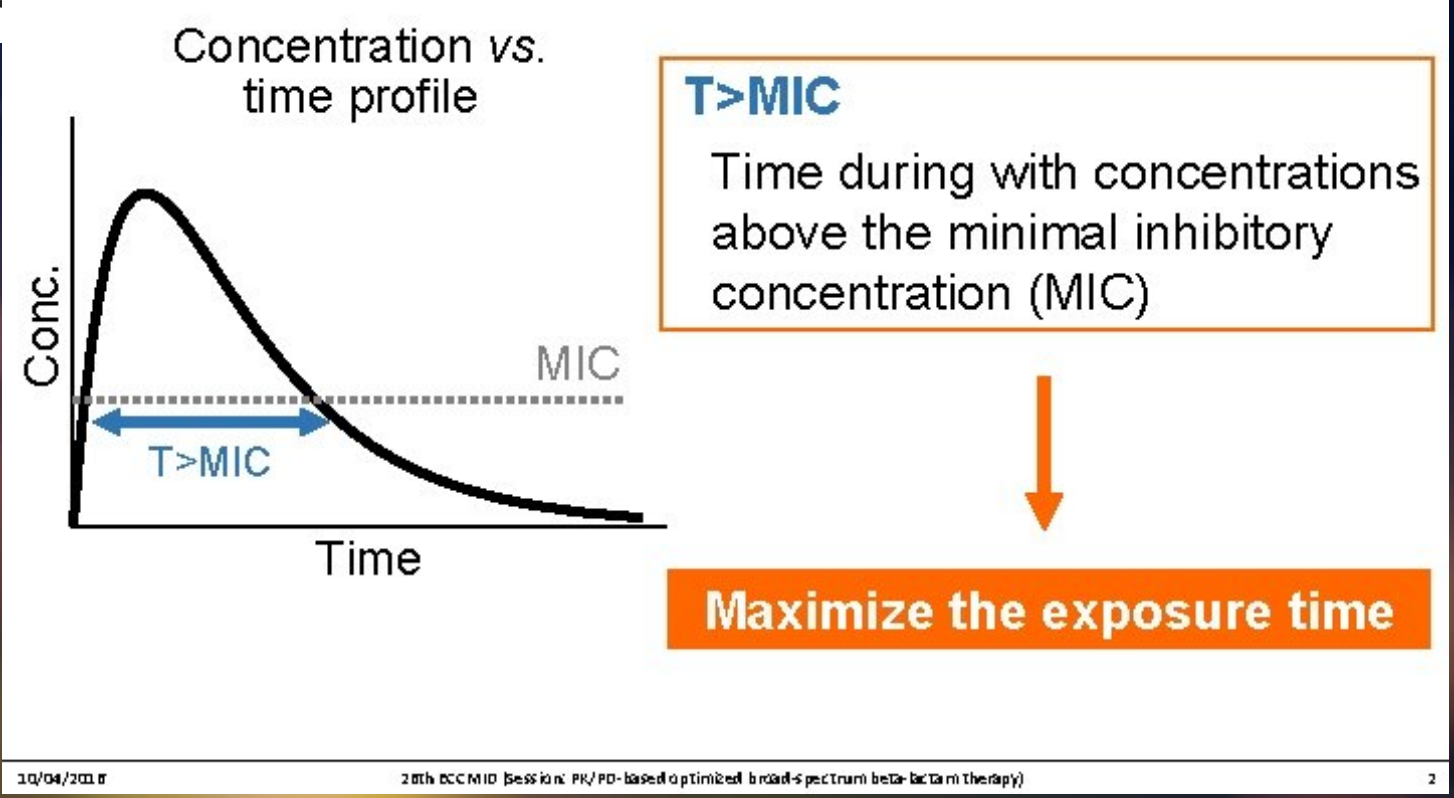
Antiviral Therapy

Recommendation
24. We make no recommendation on the use of antiviral agents.



Infection

Recommendation
25. For adults with sepsis or septic shock, we **suggest** using prolonged infusion of beta-lactams for maintenance (after an initial bolus) over conventional bolus infusion.
Weak recommendation, moderate quality of evidence.



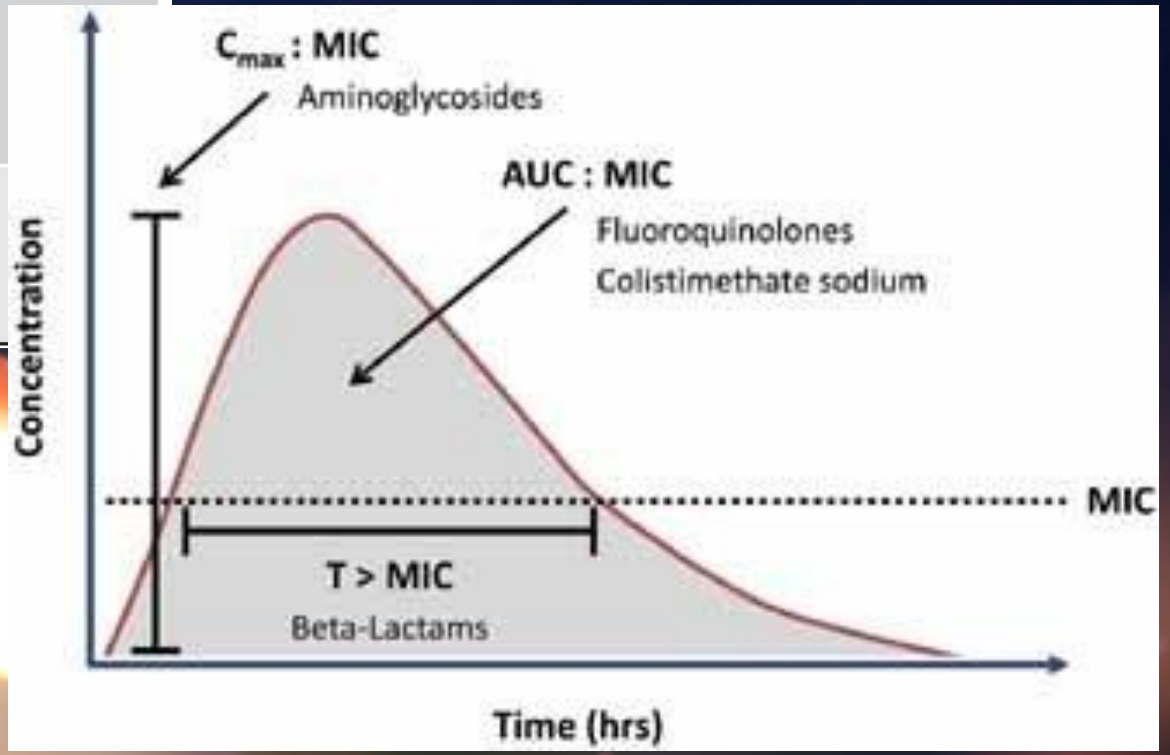
Infection

Recommendation
26. For adults with sepsis or septic shock, we **recommend** optimizing dosing strategies of antimicrobials based on accepted pharmacokinetic/pharmacodynamic (PK/PD) principles and specific drug properties.
Best practice statement.

Infection

TABLE 3.
Guidance for PK/PD-Based Dosing for Specific Drug Classes

Drug or Drug Class	PK/PD Index Associated With Bacterial Killing or Efficacy	Drug Concentration Target	Considerations for Optimized Dosing*	Reference Number
Antibacterials				
Aminoglycosides	AUC_{0-24}/MIC; C_{max}/MIC	AUC 70–100 C_{max}/MIC 8–10	Use extended interval dosing with patient weight and kidney function	237
Beta-lactams	$fT_{>MIC}$	C_{min} > MIC	Use prolonged infusions, consider patient weight and kidney function	253
Colistin	AUC_{0-24}/MIC	Unspecified	Use patient weight and kidney function	
Daptomycin	AUC_{0-24}/MIC; C_{max}/MIC	AUC_{0-24}/MIC > 200	Use patient weight and kidney function	
Fluoroquinolones	AUC_{0-24}/MIC; C_{max}/MIC	AUC_{0-24}/MIC 80–125	Use kidney function	
Vancomycin	AUC_{0-24}/MIC	AUC_{0-24}/MIC 400	Use patient weight and kidney function	
Antifungals				
Fluconazole	AUC_{0-24}/MIC	AUC_{0-24}/MIC 100	Use patient weight and kidney function	
Posaconazole	AUC_{0-24}/MIC	C_{min} 1–4 mg/L	Use formulation-specific dose	
Voriconazole	AUC_{0-24}/MIC	C_{min} 2–6 mg/L	Use patient weight	



Infection

Source Control

Recommendation
27. For adults with sepsis or septic shock, we **recommend** rapidly identifying or excluding a specific anatomical diagnosis of infection that requires emergent source control and implementing any required source control intervention as soon as medically and logistically practical. *Best practice statement.*

Recommendation
28. For adults with sepsis or septic shock, we **recommend** prompt removal of intravascular access devices that are a possible source of sepsis or septic shock after other vascular access has been established. *Best practice statement.*

Infection

De-escalation of Antibiotics

Recommendation
29. For adults with sepsis or septic shock, we **suggest** daily assessment for de-escalation of antimicrobials over using fixed durations of therapy without daily re-assessment for de-escalation. *Weak recommendation, very low quality of evidence.*

Recommendation
30. For adults with an initial diagnosis of sepsis or septic shock and adequate source control, we **suggest** using shorter over longer duration of antimicrobial therapy. *Weak recommendation, very low quality of evidence.*

Infection

TABLE 4.
Planned Duration of Empirical Antimicrobial Therapy in RCTs of Shorter vs Longer Duration of Therapy According to Clinical Syndrome

Population/Syndrome	RCT/Systemic Review (Data Extracted From)	Shorter Duration	Longer Duration	Outcomes
Pneumonia	Capellier 2012 (301)	8 days	15 days	No difference
	Chastre 2003 (301, 302)	8 days	15 days	No difference
	El Moussaoui 2006 (302)	3 days	8 days	No difference
	Fekih Hassen 2009 (301–303)	7 days	10 days	No difference
	File 2007 (302, 303)	5 days	7 days	No difference
	Kollef 2012 (302, 303)	7 days	10 days	No difference
	Leophonte 2002 (302, 303)	5 days	10 days	No difference
	Medina 2007 (301)	8 days	12 days	No difference
	Siegel 1999 (302, 303)	7 days	10 days	No difference
	Tellier 2004 (302, 303)	5 days	7 days	No difference
Bacteremia	Chaudhry 2000 (302)	5 days	10 days	No difference
	Runyon 1991 (302)	5 days	10 days	No difference
	Yahav 2018 (304)	7 days	14 days	No difference
Intra-abdominal infection	Montravers 2018 (305)	8 days	15 days	No difference
	Sawyer 2015 (293)	Max. 5 days	Max. 10 days	No difference
Urinary tract infection	Peterson 2008 (290)	5 days	10 days	No difference

Haemodynamic management

Recommendations
32. For adults with sepsis or septic shock, we **recommend** using crystalloids as first-line fluid for resuscitation. *Strong recommendation, moderate quality of evidence.*
33. For adults with sepsis or septic shock, we **suggest** using balanced crystalloids instead of normal saline for resuscitation. *Weak recommendation, low quality of evidence.*
34. For adults with sepsis or septic shock, we **suggest** using albumin in patients who received large volumes of crystalloids over using crystalloids alone. *Weak recommendation, moderate quality of evidence.*

Haemodynamic management

35. For adults with sepsis or septic shock, we **recommend against** using starches for resuscitation.

Strong recommendation, high quality of evidence.

36. For adults with sepsis and septic shock, we **suggest against** using gelatin for resuscitation.

Weak recommendation, moderate quality.

Haemodynamic management

Recommendations

37. For adults with septic shock, we **recommend** using norepinephrine as the first-line agent over other vasopressors. *Strong recommendation*

Dopamine. *High quality evidence*
Vasopressin. *Moderate-quality evidence*
Epinephrine. *Low-quality evidence*
Selepressin. *Low-quality evidence*
Angiotensin II. *Very low-quality evidence*

Remark:

In settings where norepinephrine is not available, epinephrine or dopamine can be used as an alternative, but we encourage efforts to improve the availability of norepinephrine. Special attention should be given to patients at risk for arrhythmias when using dopamine and epinephrine.

Haemodynamic management

38. For adults with septic shock on norepinephrine with inadequate MAP levels, we **suggest** adding vasopressin instead of escalating the dose of norepinephrine.

Weak recommendation, moderate-quality evidence.

Remark:

In our practice, vasopressin is usually started when the dose of norepinephrine is in the range of 0.25—0.5 μg/kg/min.

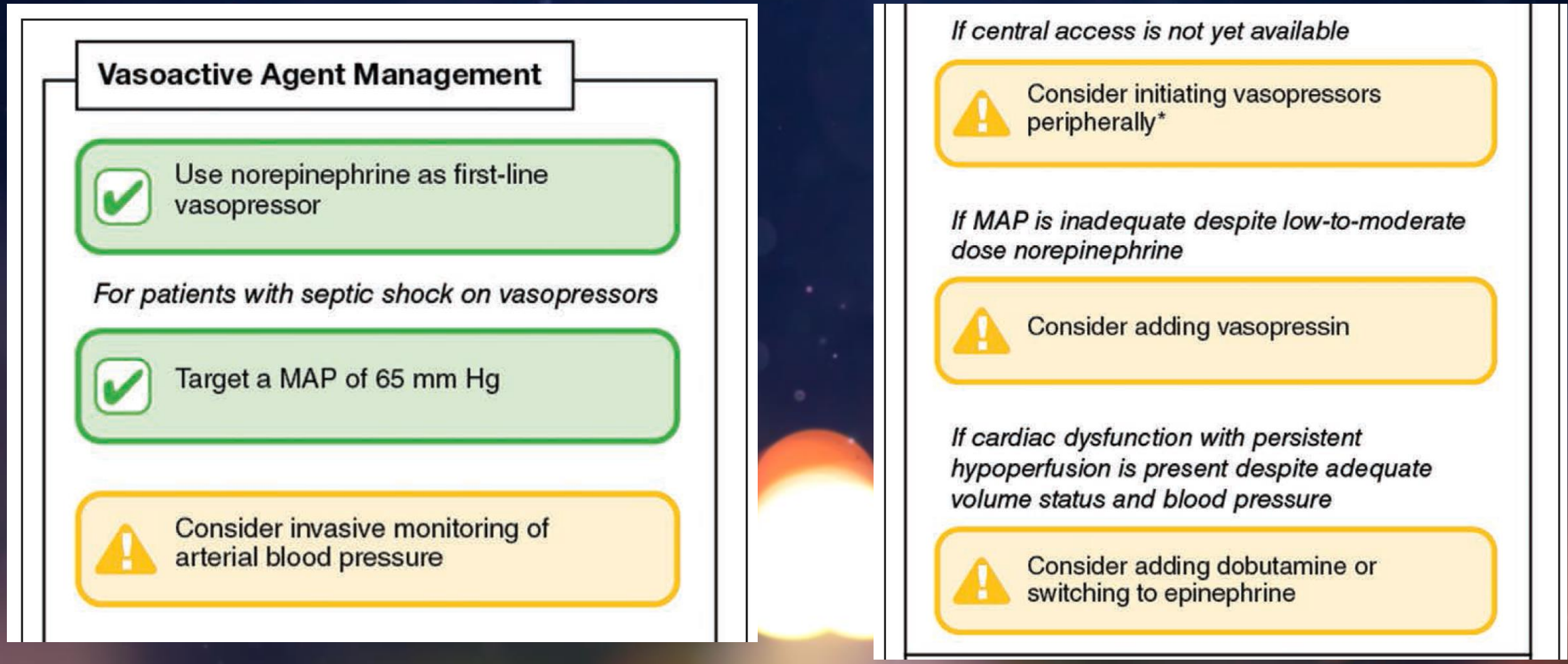
39. For adults with septic shock and inadequate MAP levels despite norepinephrine and vasopressin, we **suggest** adding epinephrine.

Weak recommendation, low-quality evidence.

40. For adults with septic shock, we **suggest against** using terlipressin.

Weak recommendation, low quality of evidence.

Haemodynamic management



Haemodynamic management

Inotropes

Recommendations
41. For adults with septic shock and cardiac dysfunction with persistent hypoperfusion despite adequate volume status and arterial blood pressure, we **suggest** either adding dobutamine to norepinephrine or using epinephrine alone. *Weak recommendation, low quality of evidence.*
42. For adults with septic shock and cardiac dysfunction with persistent hypoperfusion despite adequate volume status and arterial blood pressure, we **suggest against** using levosimendan. *Weak recommendation, low quality of evidence.*

Haemodynamic management

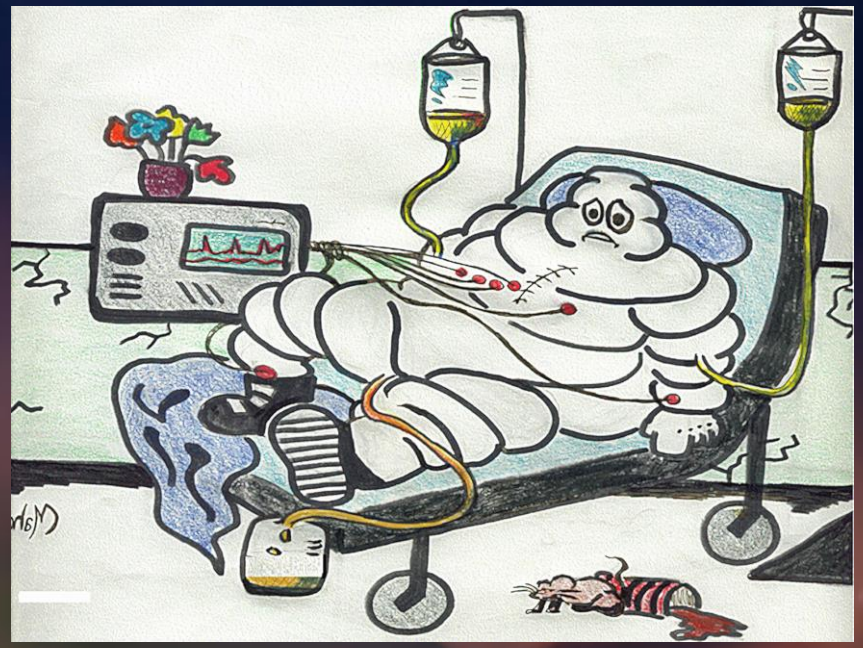
Monitoring and Intravenous Access

Recommendations
43. For adults with septic shock, we **suggest** using invasive monitoring of arterial blood pressure over noninvasive monitoring, as soon as practical and if resources are available. *Weak recommendation, very low quality of evidence.*
44. For adults with septic shock, we **suggest** starting vasopressors peripherally to restore MAP rather than delaying initiation until a central venous access is secured. *Weak recommendation, very low quality of evidence.* **Remark:** When using vasopressors peripherally, they should be administered only for a short period of time and in a vein in or proximal to the antecubital fossa.

Haemodynamic management

Fluid Balance

Recommendation
45. There is insufficient evidence to make a recommendation on the use of restrictive versus liberal fluid strategies in the first 24 hours of resuscitation in patients with sepsis and septic shock who still have signs of hypoperfusion and volume depletion after initial resuscitation.
Remark: Fluid resuscitation should be given only if patients present with signs of hypoperfusion.



VENTILATION

Recommendation
46. There is insufficient evidence to make a recommendation on the use of conservative oxygen targets in adults with sepsis-induced hypoxemic respiratory failure.

Recommendation
47. For adults with sepsis-induced hypoxemic respiratory failure, we **suggest** the use of high flow nasal oxygen over noninvasive ventilation. *Weak recommendation, low quality of evidence.*

Recommendation
48. There is insufficient evidence to make a recommendation on the use of noninvasive ventilation in comparison to invasive ventilation for adults with sepsis-induced hypoxemic respiratory failure.

Haemodynamic management

Extracorporeal Membrane Oxygenation

Recommendation
57. For adults with sepsis-induced severe ARDS, we **suggest** using venovenous (VV) ECMO when conventional mechanical ventilation fails in experienced centers with the infrastructure in place to support its use. *Weak recommendation, low quality of evidence.*

ADDITIONAL THERAPIES

Recommendation
58. For adults with septic shock and an ongoing requirement for vasopressor therapy we **suggest** using IV corticosteroids.
Weak recommendation; moderate quality of evidence.
Remarks:
The typical corticosteroid used in adults with septic shock is IV hydrocortisone at a dose of 200 mg/d given as 50 mg intravenously every 6 hours or as a continuous infusion. It is suggested that this is commenced at a dose of norepinephrine or epinephrine ≥ 0.25 mcg/kg/min at least 4 hours after initiation.

ADDITIONAL THERAPIES

Blood Purification

Recommendations
59. For adults with sepsis or septic shock, we **suggest against** using polymyxin B hemoperfusion. *Weak recommendation; low quality of evidence.*
60. There is insufficient evidence to make a recommendation on the use of other blood purification techniques.

ADDITIONAL THERAPIES

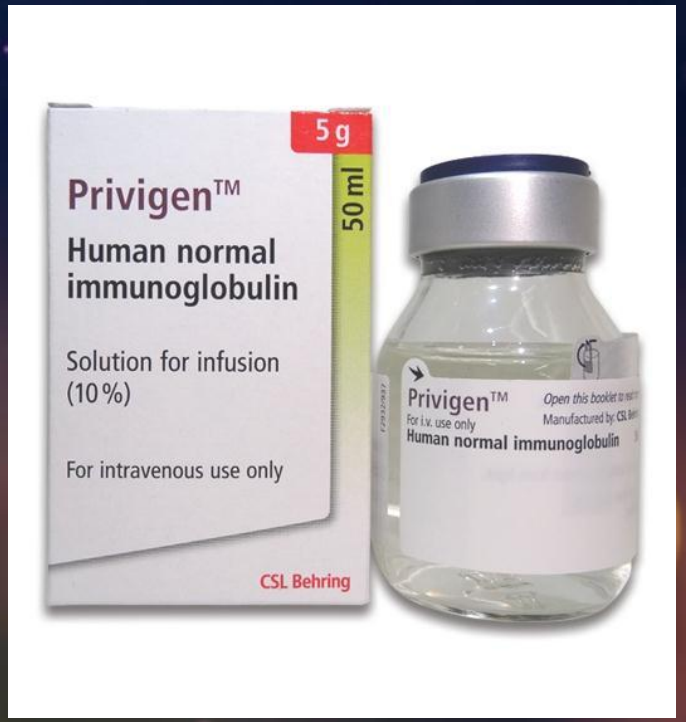
Red Blood Cell (RBC) Transfusion Targets

Recommendation
61. For adults with sepsis or septic shock, we **recommend** using a restrictive (over liberal) transfusion strategy. *Strong recommendation; moderate quality of evidence.* **Remarks:** A restrictive transfusion strategy typically includes a hemoglobin concentration transfusion trigger of 70 g/L; however, RBC transfusion should not be guided by hemoglobin concentration alone. Assessment of a patient's overall clinical status and consideration of extenuating circumstances such as acute myocardial ischemia, severe hypoxemia or acute hemorrhage is required.

ADDITIONAL THERAPIES

Immunoglobulins

Recommendation
62. For adults with sepsis or septic shock, we **suggest against** using intravenous immunoglobulins *Weak recommendation, low quality of evidence.*



ADDITIONAL THERAPIES

Stress Ulcer Prophylaxis

Recommendation
63. For adults with sepsis or septic shock, and who have risk factors for gastrointestinal (GI) bleeding, we **suggest** using stress ulcer prophylaxis. *Weak recommendation, moderate quality of evidence.*

ADDITIONAL THERAPIES

Venous Thromboembolism (VTE) Prophylaxis

Recommendations
64. For adults with sepsis or septic shock, we **recommend** using pharmacologic VTE prophylaxis unless a contraindication to such therapy exists. *Strong recommendation, moderate quality of evidence.*
65. For adults with sepsis or septic shock, we **recommend** using low molecular weight heparin (LMWH) over unfractionated heparin (UFH) for VTE prophylaxis. *Strong recommendation, moderate quality of evidence.*
66. For adults with sepsis or septic shock, we **suggest against** using mechanical VTE prophylaxis in addition to pharmacological prophylaxis, over pharmacologic prophylaxis alone. *Weak recommendation, low quality of evidence.*

ADDITIONAL THERAPIES

Renal Replacement Therapy

Recommendations
67. In adults with sepsis or septic shock and AKI who require renal replacement therapy, we **suggest** using either continuous or intermittent renal replacement therapy. *Weak recommendation, low quality of evidence.*
68. In adults with sepsis or septic shock and AKI, with no definitive indications for renal replacement therapy, we **suggest against** using renal replacement therapy. *Weak recommendation, moderate quality of evidence.*

ADDITIONAL THERAPIES

Glucose Control

Recommendation
69. For adults with sepsis or septic shock, we **recommend** initiating insulin therapy at a glucose level of ≥ 180 mg/dL (10 mmol/L).
Strong recommendation; moderate quality of evidence.
Remark:
Following initiation of an insulin therapy, a typical target blood glucose range is 144–180 mg/dL (8–10 mmol/L).

ADDITIONAL THERAPIES

Vitamin C

Recommendation
70. For adults with sepsis or septic shock, we **suggest against** using IV vitamin C.
Weak recommendation, low quality of evidence.

ADDITIONAL THERAPIES

Bicarbonate Therapy

Recommendations
71. For adults with septic shock and hypoperfusion-induced lactic acidemia, we **suggest against** using sodium bicarbonate therapy to improve hemodynamics or to reduce vasopressor requirements. *Weak recommendation, low quality of evidence.*
72. For adults with septic shock, severe metabolic acidemia (pH ≤ 7.2) and AKI (AKIN score 2 or 3), we **suggest** using sodium bicarbonate therapy. *Weak recommendation, low quality of evidence.*

ADDITIONAL THERAPIES

Nutrition

Recommendation
73. For adult patients with sepsis or septic shock who can be fed enterally, we **suggest** early (within 72 hours) initiation of enteral nutrition.
Weak recommendation; very low quality of evidence.

Long-Term Outcomes and Goals of Care

Recommendations
74. For adults with sepsis or septic shock, we **recommend** discussing goals of care and prognosis with patients and families over no such discussion. *Best practice statement.*
75. For adults with sepsis or septic shock, we **suggest** addressing goals of care early (within 72 hours) over late (72 hours or later). *Weak recommendation, low-quality evidence.*
76. There is insufficient evidence to make a recommendation for any specific standardized criterion to trigger goals of care discussion.

Long-Term Outcomes and Goals of Care

Palliative Care

Recommendations
77. For adults with sepsis or septic shock, we **recommend** integrating principles of palliative care (which may include palliative care consultation based on clinician judgement) into the treatment plan, when appropriate, to address patient and family symptoms and suffering. *Best practice statement.*
78. For adults with sepsis or septic shock, we **suggest against** routine formal palliative care consultation for all patients over palliative care consultation based on clinician judgement. *Weak recommendation, low-quality evidence.*

Long-Term Outcomes and Goals of Care

Peer Support Groups

Recommendation
79. For adult survivors of sepsis or septic shock and their families, we **suggest** referral to peer support groups over no such referral.
Weak recommendation, very low quality of evidence.

Long-Term Outcomes and Goals of Care

Recommendations
80. For adults with sepsis or septic shock, we **suggest** using a handoff process of critically important information at transitions of care, over no such handoff process. *Weak recommendation, very low-quality evidence.*
81. There is insufficient evidence to make a recommendation for the use of any specific structured handoff tool over usual handoff processes.

Long-Term Outcomes and Goals of Care

Recommendation
82. For adults with sepsis or septic shock and their families, we **recommend** screening for economic and social support (including housing, nutritional, financial, and spiritual support), and make referrals where available to meet these needs.
Best practice statement.

Recommendation
83. For adults with sepsis or septic shock and their families, we **suggest** offering written and verbal sepsis education (diagnosis, treatment, and post-ICU/post-sepsis syndrome) prior to hospital discharge and in the follow-up setting.
Weak recommendation, very low-quality evidence.

Thank You


stop sepsis save lives
WORLD SEPSIS DAY INFOGRAPHICS
A GLOBAL HEALTH CRISIS
47 000 000 - 50 000 000 cases per year
At least 11 000 000 die - 1 death every 2.8 seconds
RIP
Survivors may face lifelong consequences
1 in every 5 deaths worldwide is associated with sepsis
Infographic 2/21
Global Sepsis Alliance
www.worldsepsisday.org
www.global-sepsis-alliance.org
September 13 2020
World Sepsis Day