Sepsis

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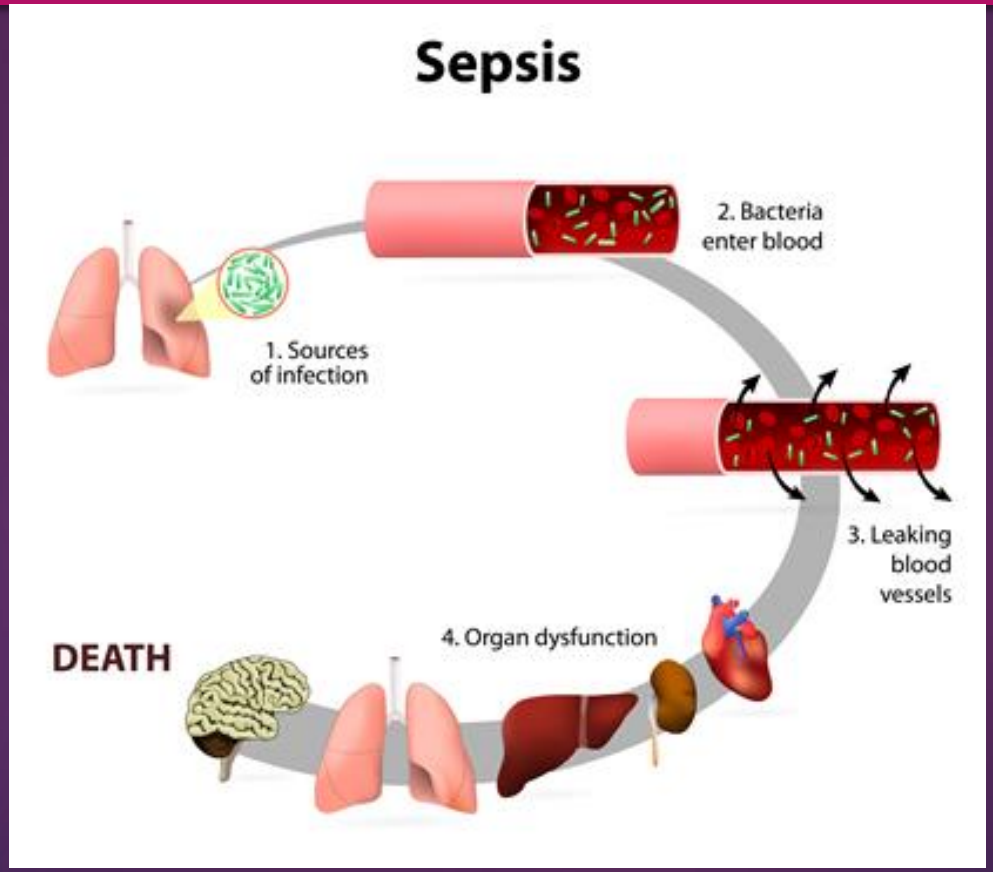
ΓΝΑ «Ο Ευαγγελισμός»

SEPSIS

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



Singer M, Deutschman CS, Seymour CW, et al: The third international consensus definitions for sepsis and septic shock (Sepsis-3). JAMA 2016; 315:801–810

Septic shock

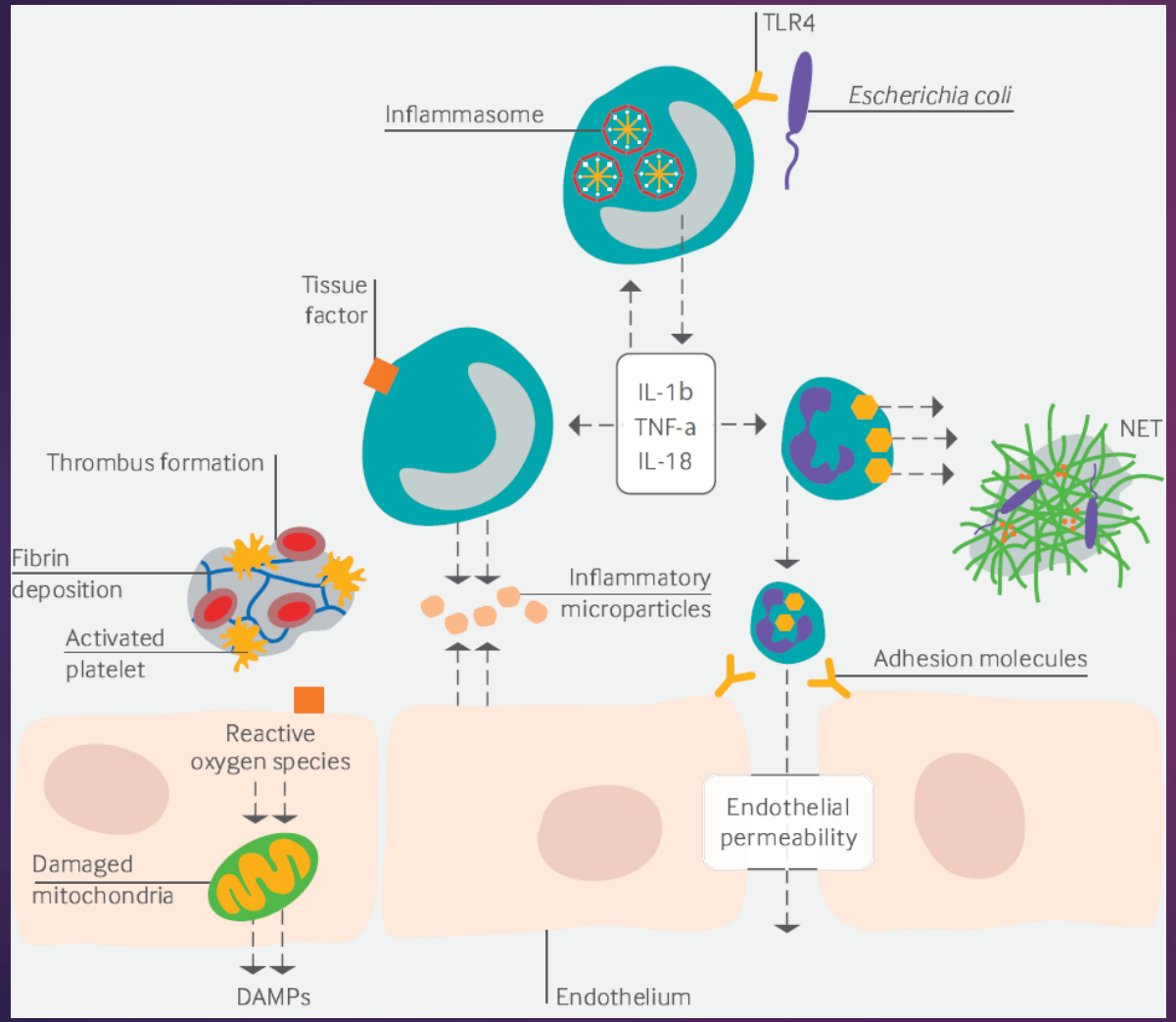
Septic shock should be defined as a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone.

Patients with septic shock can be clinically identified by a vasopressor requirement to maintain a mean arterial pressure of 65 mm Hg or greater and serum lactate level greater than 2 mmol/L (>18 mg/dL) in the absence of hypovolemia.

Sepsis-3 AMA. 2016;315(8):801-810. doi:10.1001/jama.2016.0287

Sepsis and septic shock are major healthcare problems, impacting millions of people around the world each year and killing between one in three and one in six of those it affects

Pathophysiology

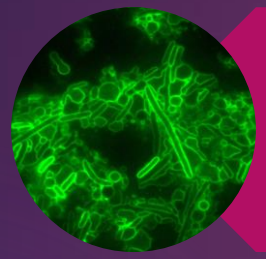


The self reinforcing pathophysiologic processes involved in sepsis.
Endothelial injury results in activation of monocytes and granulocytes, endothelial barrier breakdown, immunothrombosis, and disseminated intravascular coagulation.

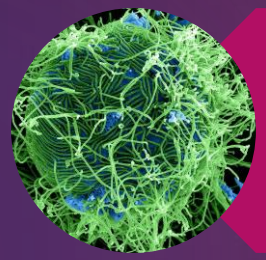
DAMPs= damage associated molecular patterns; IL= interleukin; TLR3= Toll-like receptor 3; TNF-4=tumor necrosis factor 4

BMJ 2016; 353 doi: https://doi.org/10.1136/bmj.i1585

Pathogens

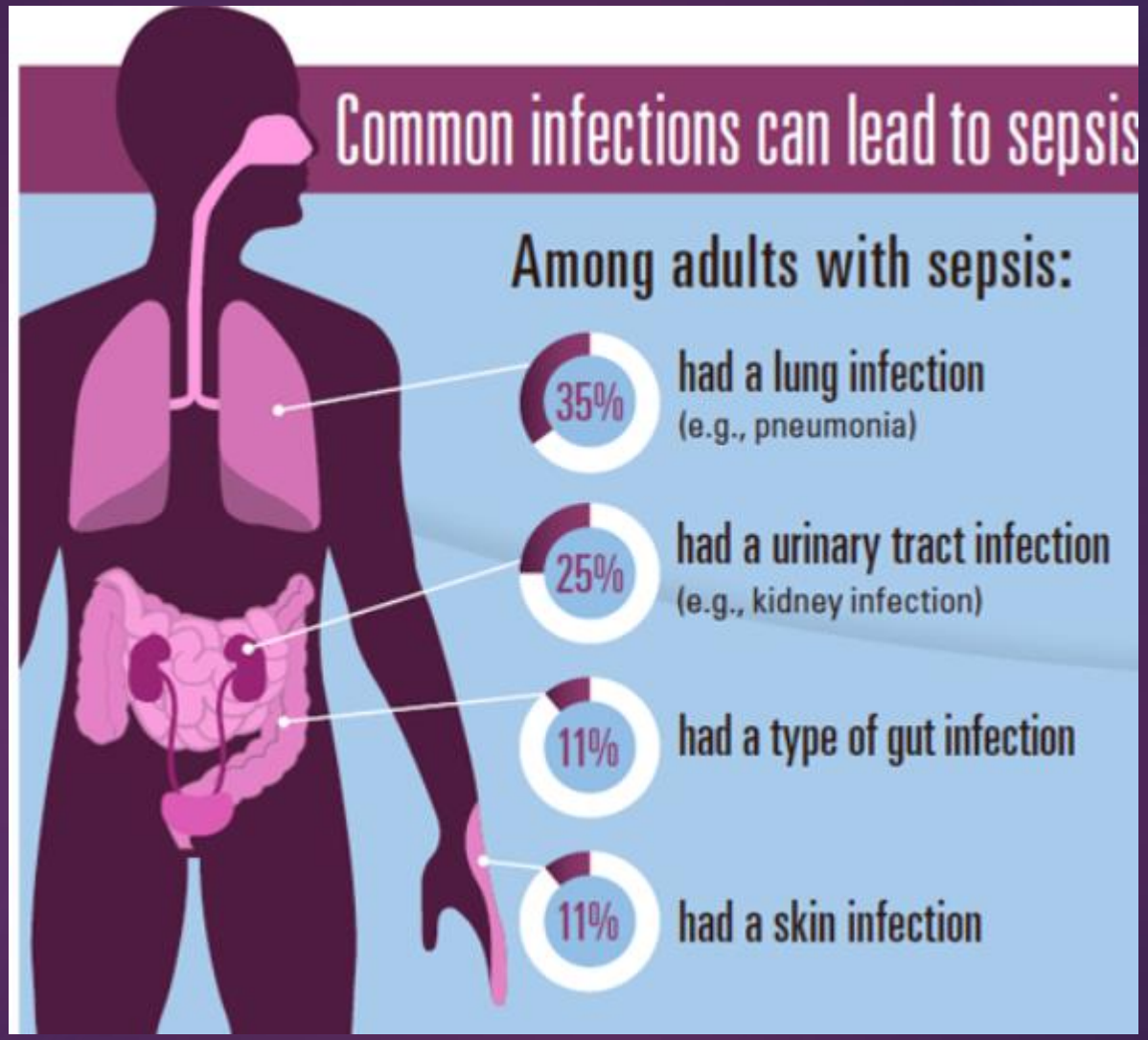


Bacteria have been shown to be the predominant pathogen of sepsis among patients with pathogens detected.



Sepsis caused by viruses is underdiagnosed worldwide

The incidence of fungal sepsis has increased over the past decade, but remains lower than bacterial sepsis



https://www.cdc.gov/vitalsigns/sepsis/index.html

Patient groups at higher risk of developing sepsis

Certain groups of people are more susceptible to developing sepsis:

- ✔ the very young (under 1 year) and older people (over 75 years) or people who are very frail
- people who have impaired immune systems because of illness or drugs, including:
  - people being treated for cancer with chemotherapy
  - people who have impaired immune function (for example, people with diabetes, people who have had a splenectomy, or people with sickle cell disease)
  - people taking long-term steroids
  - people taking immunosuppressant drugs to treat non-malignant disorders such as rheumatoid arthritis
- people who have had surgery, or other invasive procedures, in the past 6 weeks
- people with any breach of skin integrity (for example, cuts, burns, blisters or skin infections)
- people who misuse drugs intravenously
- people with indwelling lines or catheters.

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

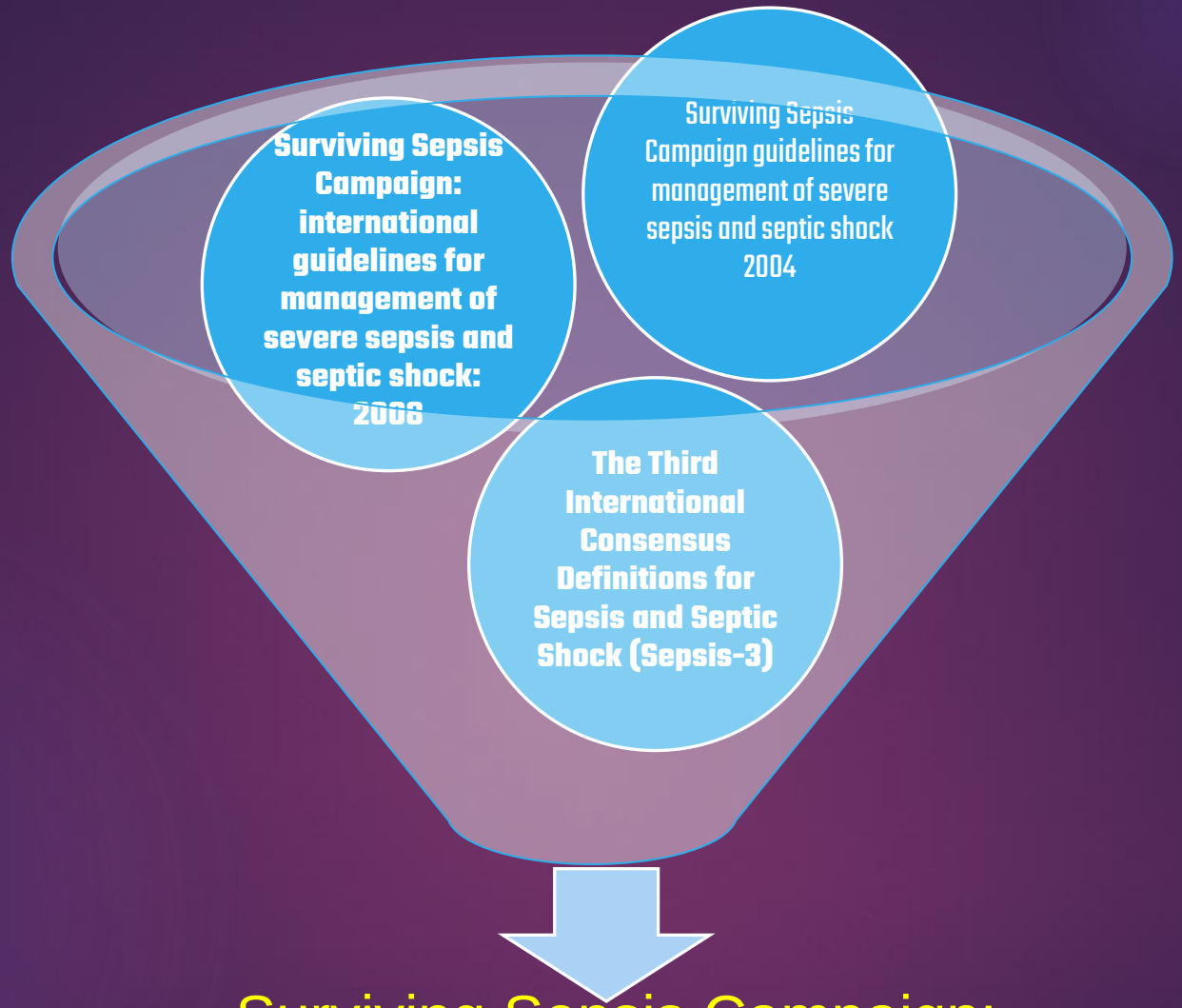
Severe Sepsis with persistent:

Signs of End Organ Damage

Hypotension (SBP <90)

Lactate >4 mmol

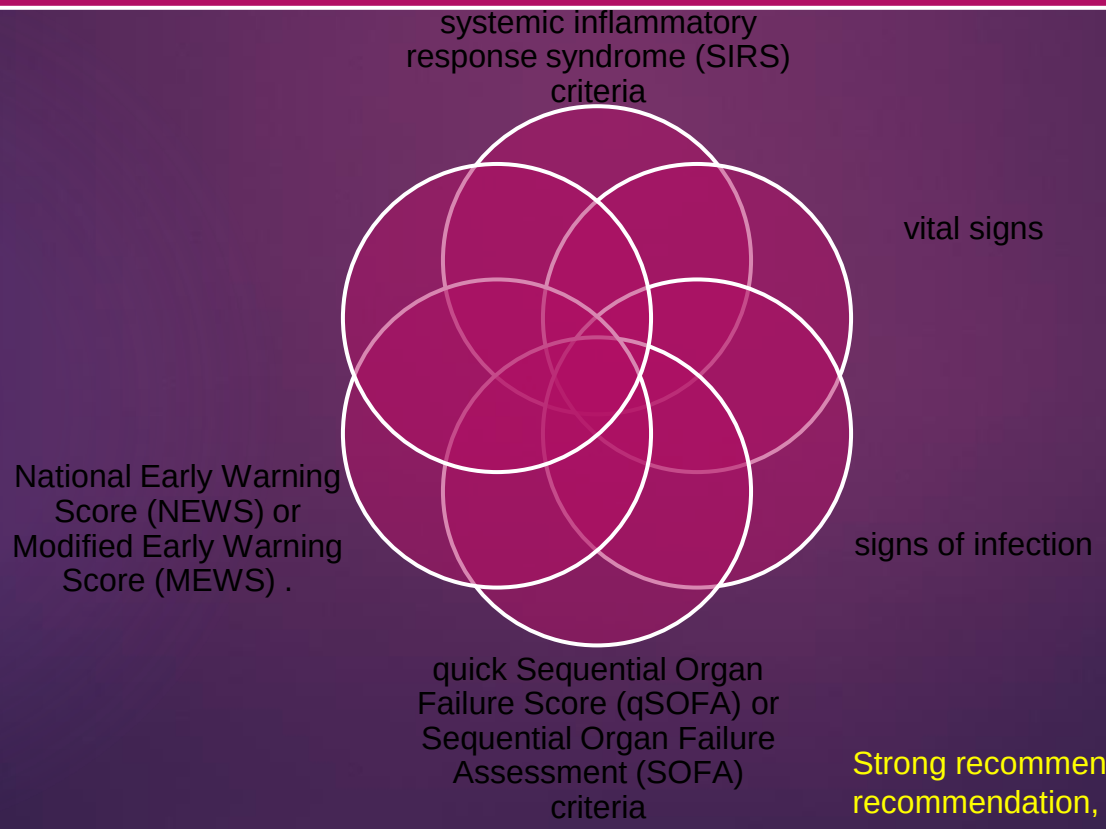
Slides Courtesy of Curtis Merritt, D.O.



Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2021

Screening for Patients With Sepsis and Septic Shock

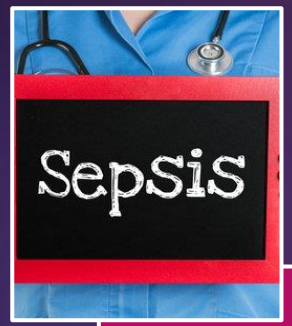
For hospitals and health systems, we recommend using a performance improvement program for sepsis, including sepsis screening for acutely ill, high-risk patients and standard operating procedures for treatment.



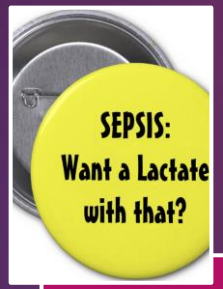
Strong recommendation, moderate quality of evidence for screening. Strong recommendation, very low-quality evidence for standard operating procedures

Screening

Standard operating procedures for Sepsis, initially specified as Early Goal Directed Therapy have evolved to
"usual care" which includes a standard approach with components of the sepsis bundle



early identification



lactate

cultures

antibiotics

fluids

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

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.

qSOFA

uses three variables to predict death and prolonged ICU stay in patients with known or suspected sepsis:

- a Glasgow Coma Score < 15,
- a respiratory rate ≥ 22 breaths/min and
- a systolic blood pressure ≤ 100 mm Hg.

When any two of these variables are present simultaneously, the patient is considered qSOFA positive

SIRS (Systemic Inflammatory Response Syndrome)

- ✔ Two or more of:
  - ✔ Temperature >38°C or <36°C
  - ✔ Heart rate >90/min
  - ✔ Respiratory rate >20/min or $PaCO_2$ <32 mm Hg (4.3 kPa)
  - ✔ White blood cell count >12 000/mm^3 or <4000/mm^3 or >10% immature bands

Bone RC, Balk RA, Cerra FB, et al. American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference: definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. *Crit Care Med*. 1992;20(6):864-874.

National Early Warning Score (NEWS) 2

Physiological parameter	Score 3	2	1	0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO_2 Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO_2 Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

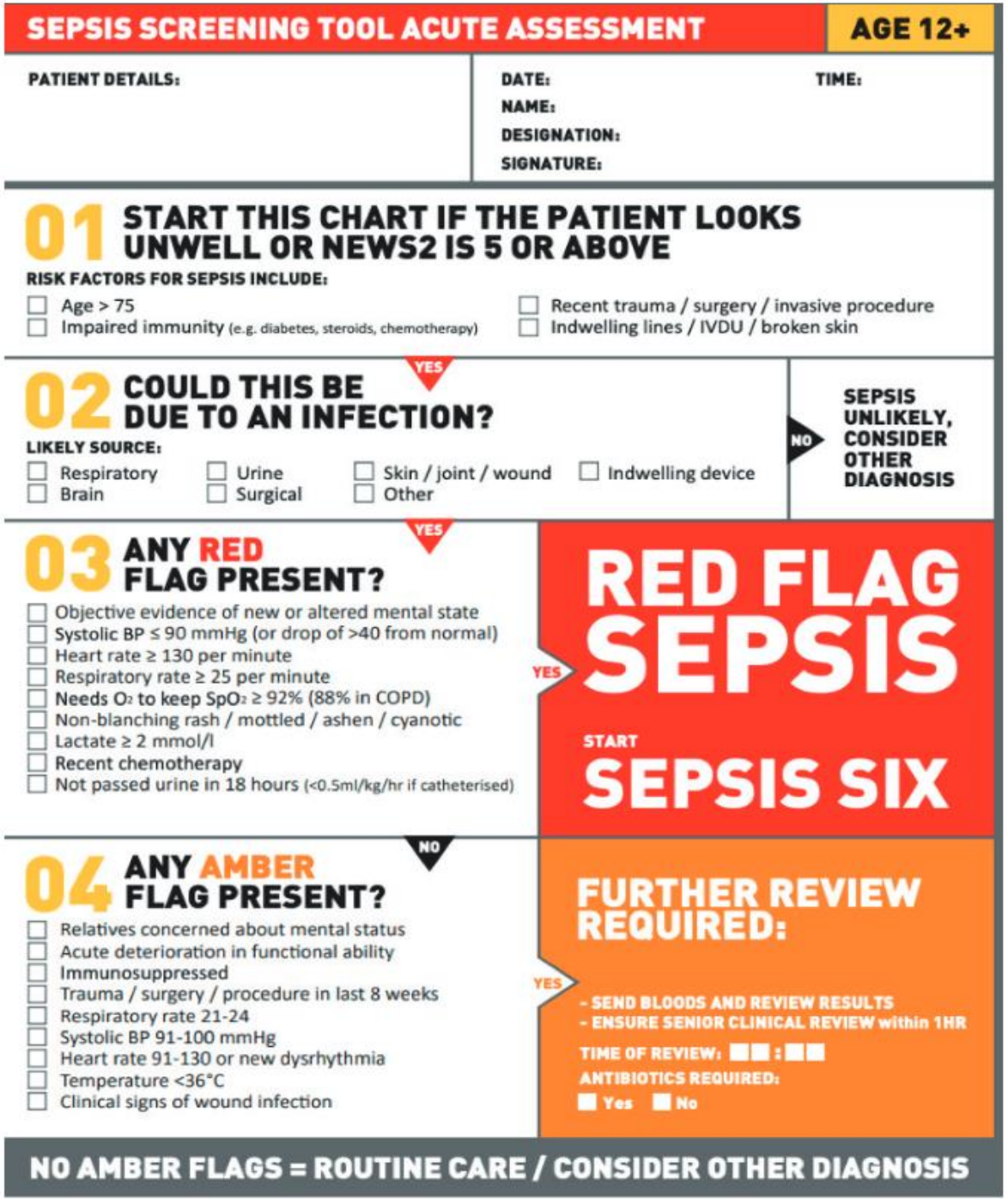
Royal College of Physicians

MEWS

Score	3	2	1	0	1	2	3
Respiratory rate		<9		9-14	15-20	21-29	>30
Heart rate		<40	41-50	51-100	101-110	111-129	>130
Systolic blood pressure	<70	71-80	81-100	101-199		>200	
Temperature		<35		35-38,4		>38,5	
Level of consciousness				Alert	Voice	Pain	Unresponsive

Contact physician when MEWS score ≥4, if oxygen saturation drops to <90 % with oxygen treatment and if you are concerned of the patients' condition.

Color-code	MEWS score	Follow up/new measurements
Blue	0	24 hours
Yellow	1	8-12 hours
Orange	2	4-8 hours
Red	3-4	1-4 hours
	>4	Contact physician



SEPSIS SCREENING TOOL ACUTE ASSESSMENT — AGE 12+

PATIENT DETAILS:

DATE: **TIME:**
NAME:
DESIGNATION:
SIGNATURE:

01 START THIS CHART IF THE PATIENT LOOKS UNWELL OR NEWS2 IS 5 OR ABOVE

RISK FACTORS FOR SEPSIS INCLUDE:

- ☐ Age > 75
- ☐ Impaired immunity (e.g. diabetes, steroids, chemotherapy)
- ☐ Recent trauma / surgery / invasive procedure
- ☐ Indwelling lines / IVDU / broken skin

02 COULD THIS BE DUE TO AN INFECTION?

YES

LIKELY SOURCE:

- ☐ Respiratory
- ☐ Brain
- ☐ Urine
- ☐ Surgical
- ☐ Skin / joint / wound
- ☐ Other
- ☐ Indwelling device

NO → **SEPSIS UNLIKELY, CONSIDER OTHER DIAGNOSIS**

03 ANY RED FLAG PRESENT?

YES

- ☐ Objective evidence of new or altered mental state
- ☐ Systolic BP ≤ 90 mmHg (or drop of >40 from normal)
- ☐ Heart rate ≥ 130 per minute
- ☐ Respiratory rate ≥ 25 per minute
- ☐ Needs O_2 to keep SpO_2 ≥ 92% (88% in COPD)
- ☐ Non-blanching rash / mottled / ashen / cyanotic
- ☐ Lactate ≥ 2 mmol/l
- ☐ Recent chemotherapy
- ☐ Not passed urine in 18 hours (<0.5ml/kg/hr if catheterised)

YES → **RED FLAG SEPSIS**

START **SEPSIS SIX**

04 ANY AMBER FLAG PRESENT?

NO

- ☐ Relatives concerned about mental status
- ☐ Acute deterioration in functional ability
- ☐ Immunosuppressed
- ☐ Trauma / surgery / procedure in last 8 weeks
- ☐ Respiratory rate 21-24
- ☐ Systolic BP 91-100 mmHg
- ☐ Heart rate 91-130 or new dysrhythmia
- ☐ Temperature <36°C
- ☐ Clinical signs of wound infection

YES → **FURTHER REVIEW REQUIRED:**

- SEND BLOODS AND REVIEW RESULTS
- ENSURE SENIOR CLINICAL REVIEW within 1HR

TIME OF REVIEW: ■■:■■

ANTIBIOTICS REQUIRED:

■ Yes ■ No

NO AMBER FLAGS = ROUTINE CARE / CONSIDER OTHER DIAGNOSIS

SEPSIS SCREENING TOOL - THE SEPSIS SIX — AGE 12+

PATIENT DETAILS:

DATE: **TIME:**
NAME:
DESIGNATION:
SIGNATURE:

COMPLETE ALL ACTIONS WITHIN ONE HOUR

01 ENSURE SENIOR CLINICIAN ATTENDS — TIME □□:□□

NOT ALL PATIENTS WITH RED FLAGS WILL NEED THE 'SEPSIS 6' URGENTLY. A SENIOR DECISION MAKER MAY SEEK ALTERNATIVE DIAGNOSES/ DE-ESCALATE CARE. RECORD DECISIONS BELOW

NAME: GRADE:

02 OXYGEN IF REQUIRED — TIME □□:□□

START IF O_2 SATURATIONS LESS THAN 92% - AIM FOR O_2 SATURATIONS OF 94-98%
IF AT RISK OF HYPERCARBIA AIM FOR SATURATIONS OF 88-92%

03 OBTAIN IV ACCESS, TAKE BLOODS — TIME □□:□□

BLOOD CULTURES, BLOOD GLUCOSE, LACTATE, FBC, U&Es, CRP AND CLOTTING
LUMBAR PUNCTURE IF INDICATED

04 GIVE IV ANTIBIOTICS — TIME □□:□□

MAXIMUM DOSE BROAD SPECTRUM THERAPY
CONSIDER: LOCAL POLICY / ALLERGY STATUS / ANTIVIRALS

05 GIVE IV FLUIDS — TIME □□:□□

GIVE FLUID BOLUS OF 20 ml/kg if age <16, 500ml if 16+
NICE RECOMMENDS USING LACTATE TO GUIDE FURTHER FLUID THERAPY

06 MONITOR — TIME □□:□□

USE NEWS2. MEASURE URINARY OUTPUT: THIS MAY REQUIRE A URINARY CATHETER REPEAT LACTATE AT LEAST ONCE PER HOUR IF INITIAL LACTATE ELEVATED OR IF CLINICAL CONDITION CHANGES

RED FLAGS AFTER ONE HOUR – ESCALATE TO CONSULTANT NOW

RECORD ADDITIONAL NOTES HERE:

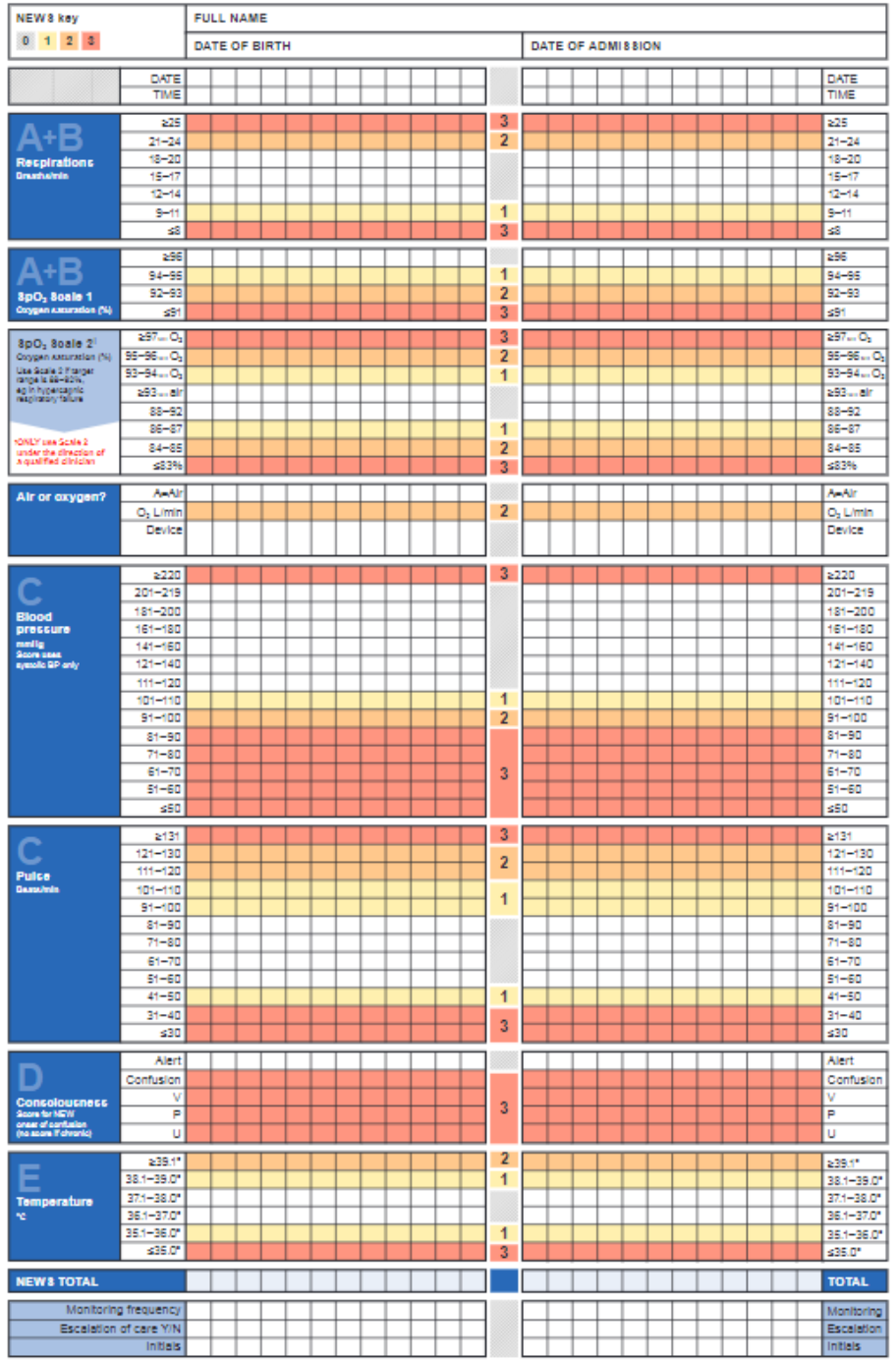
e.g. allergy status, arrival of specialist teams, de-escalation of care, delayed antimicrobial decision making, variance from Sepsis Six

In 2015, the UK Sepsis Trust (UKST) developed an operational tool called Red Flag Sepsis to empower junior professionals to act. This followed the development in 2007 of the Sepsis 6: a simplified care bundle including source control and antibiotics, escalation to critical care where needed, and treatment coordinated by senior clinician.

NEWS 2

Respiratory rate		breaths/min
Hypercapneic respiratory failure	○ No (Scale 1)	
	○ Yes (Scale 2)	
On supplemental O_2	○ No	
	○ Yes	
O_2 saturation		%
Systolic BP		mmHg
Pulse		beats/min
Consciousness	○ Alert	
	○ CVPU	
Temperature		degC

0 to 4 points:	0 to 4 points (but no 3-point risk item): Low clinical risk: Ward-based response
	3 or 4 points (including one 3-point risk item): Low-medium clinical risk: Urgent ward-based response
5 to 6 points:	Medium clinical risk: Key threshold for urgent response
7 to 20 points:	High clinical risk: Urgent or emergency response



Signs of altered tissue perfusion visualized through the three "windows" of the body:

The peripheral window (skin)

the neurologic window

the renal window

Windows

Intensive Care Med (2014) 40:1795

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

Best practice statement

Lactate alone is neither sensitive nor specific enough to rule-in or rule-out the diagnosis on its own.

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

Surviving Sepsis Campaign

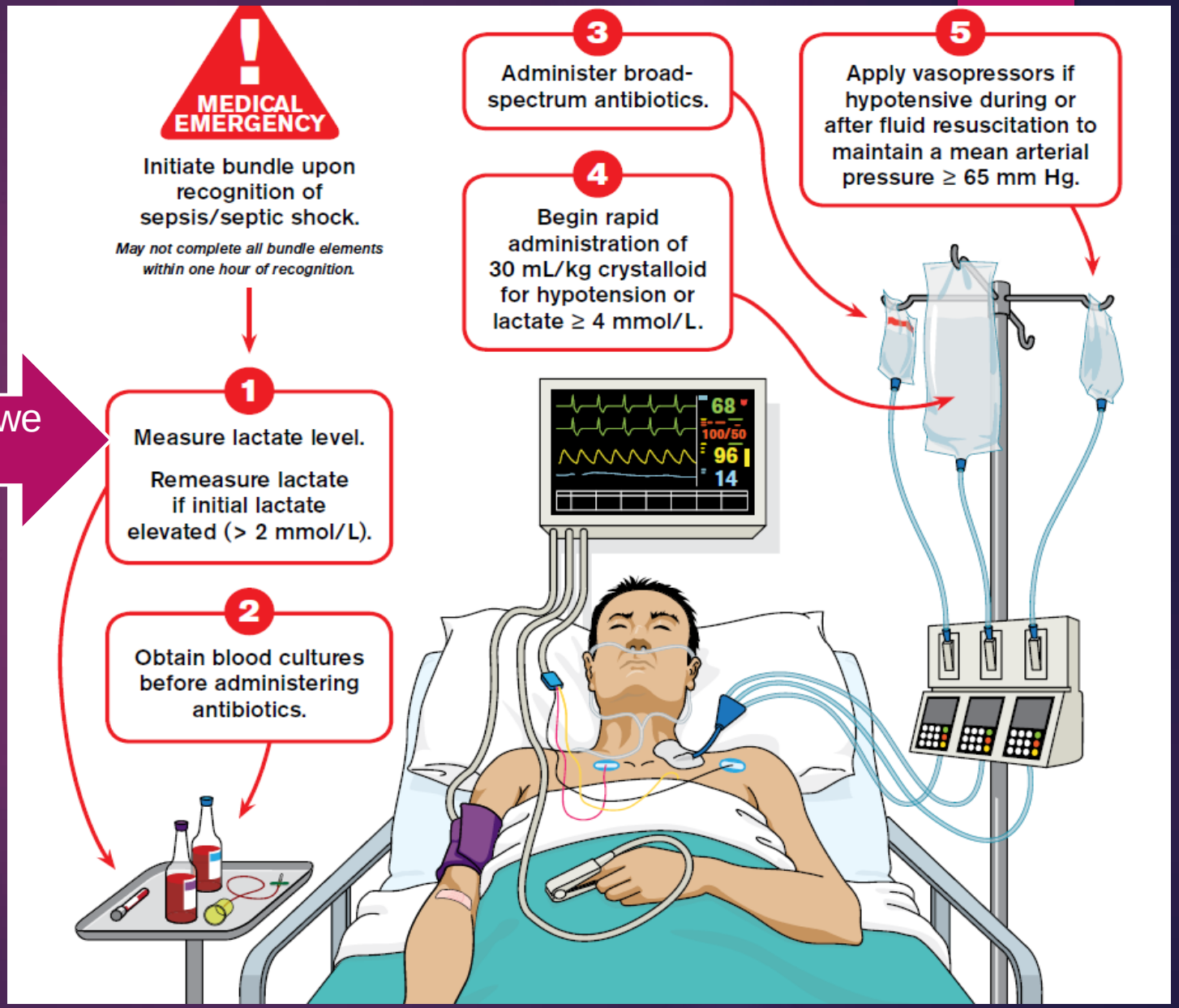
BUNDLE

HOUR-1 BUNDLE: INITIAL RESUSCITATION FOR SEPSIS AND SEPTIC SHOCK:

1) Measure lactate level.*
2) Obtain blood cultures before administering antibiotics.
3) Administer broad-spectrum antibiotics.
4) Begin rapid administration of 30mL/kg crystalloid for hypotension or lactate ≥4 mmol/L.
5) Apply vasopressors if hypotensive during or after fluid resuscitation to maintain a mean arterial pressure ≥ 65 mm Hg.

*Remeasure lactate if initial lactate elevated (> 2 mmol/L).

survivingsepsis.org



- 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, very low-quality evidence.

Dynamic Measures

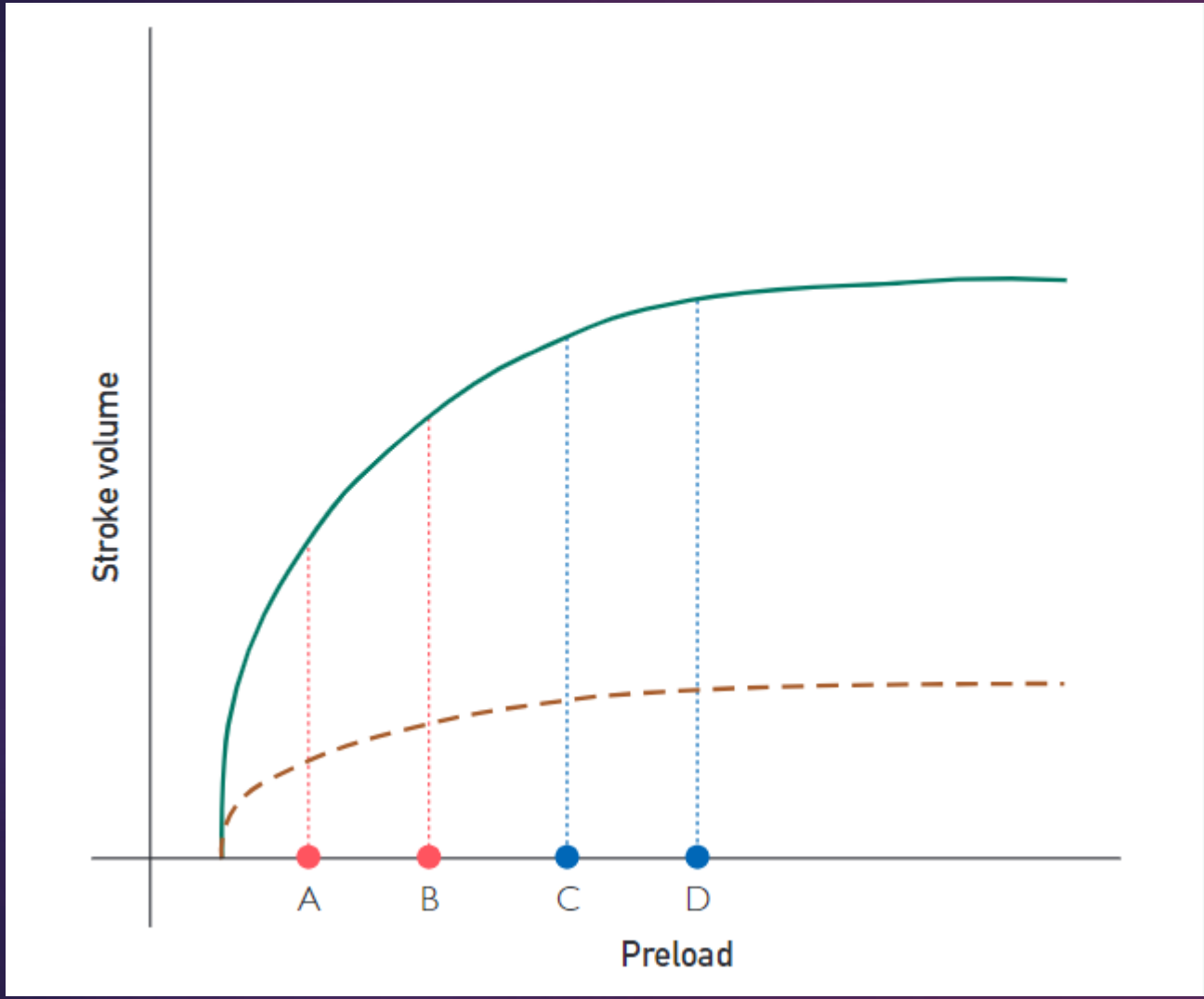
- For adults with sepsis or septic shock, we suggest using **dynamic measures** to guide fluid resuscitation over physical examination or static parameters alone.

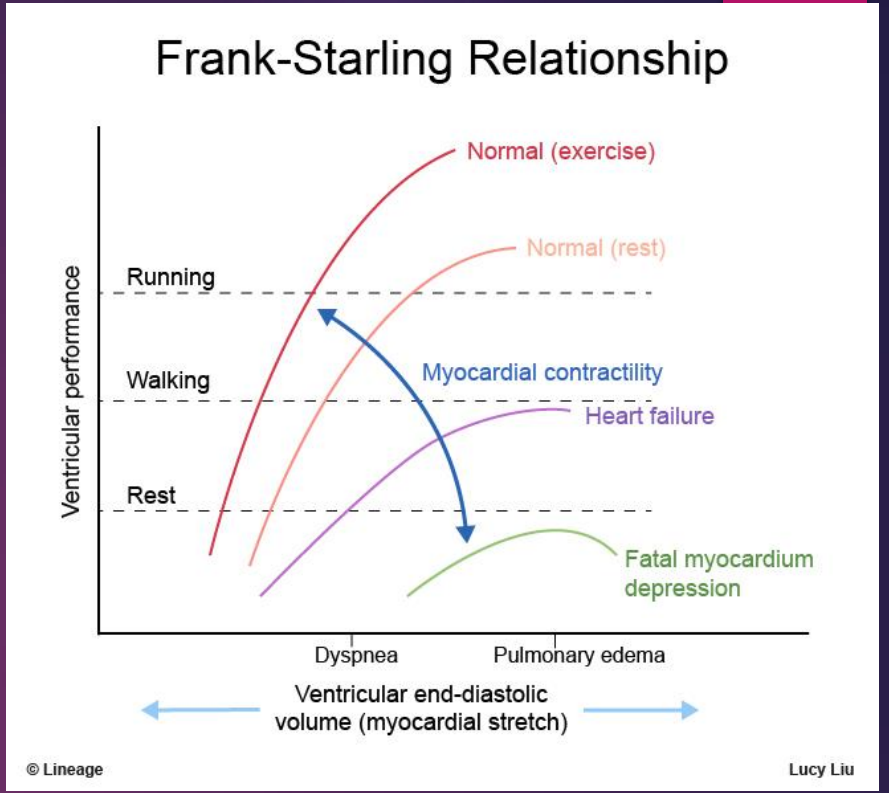
Weak recommendation, very low quality evidence.

include response to a passive leg raise or a fluid bolus, using

- *stroke volume (SV)*
- *stroke volume variation (SVV)*
- *pulse pressure variation (PPV)*
- *echocardiography*

The Frank-Starling Mechanism





The ability of the heart to change its force of contraction and therefore stroke volume in response to changes in venous return is called **The Frank-Starling Mechanism**

Stroke Volume

CO = SV x HR

SV = EDV - ESV

LVEF = SV/EDV

MEASURING CARDIAC OUTPUT

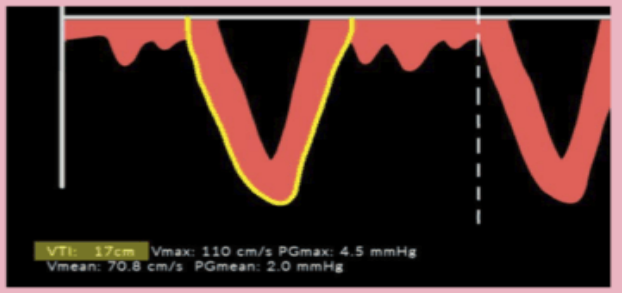
CALCULATE LVOT AREA

1. PARASTERNAL LONG AXIS VIEW
2. ZOOM INTO LVOT
3. MEASURE LVOT DIAMETER IN CM
4. CALCULATE LVOT AREA USING AREA OF A CIRCLE FORMULA

LVOT AREA $= \pi \left(\frac{\text{cm}}{2}\right)^2$

CALCULATE LVOT VTI

1. APICAL 5 CHAMBER VIEW
2. PLACE PULSE WAVE DOPPLER GATE AT LVOT
3. ACTIVATE PW DOPPLER
4. TRACE AROUND EJECTION WAVE
5. RECORD VTI IN CM



CALCULATE CARDIAC OUTPUT

SV = LVOT AREA X LVOT VTI

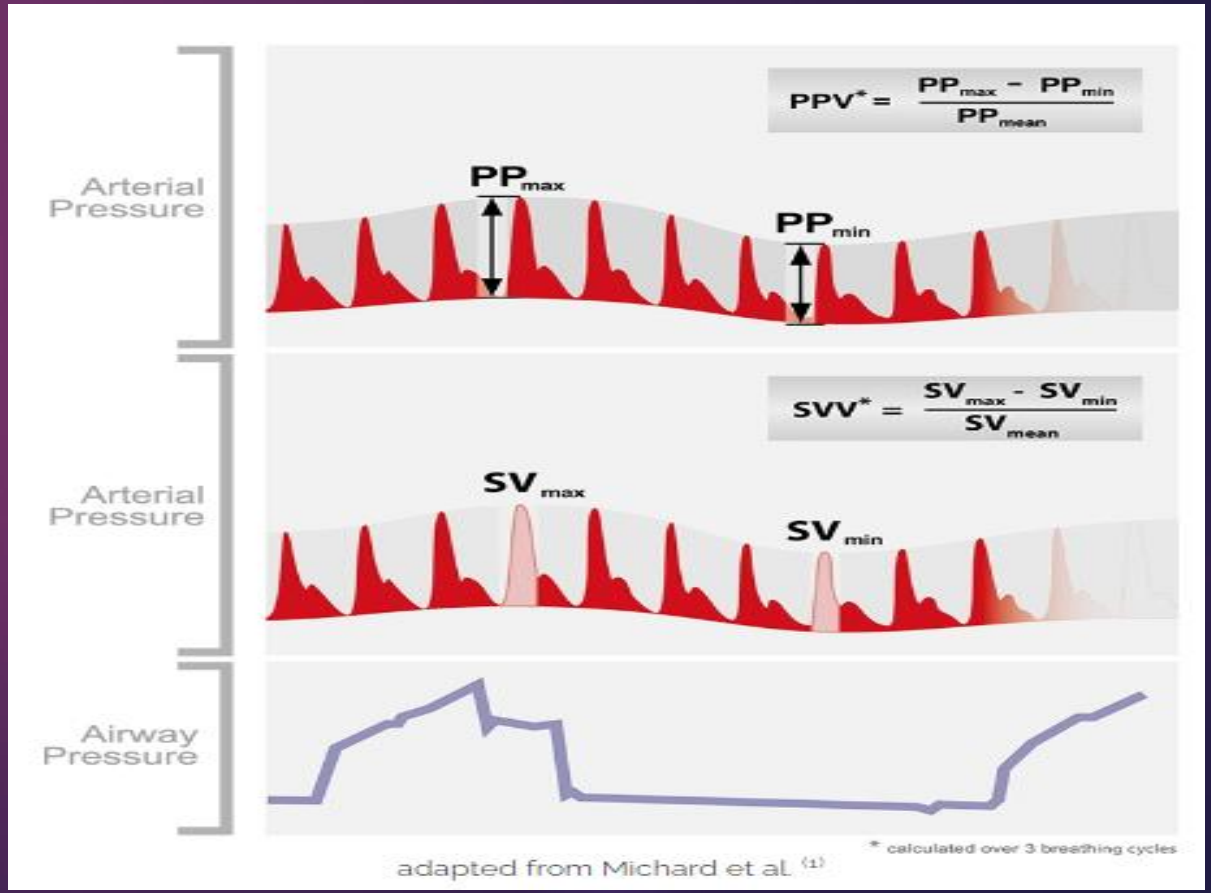
CO = (LVOT AREA X LVOT VTI) X HR

CO (mL/min) = SV (mL/cycle) x HR (bpm)

POCUS 101

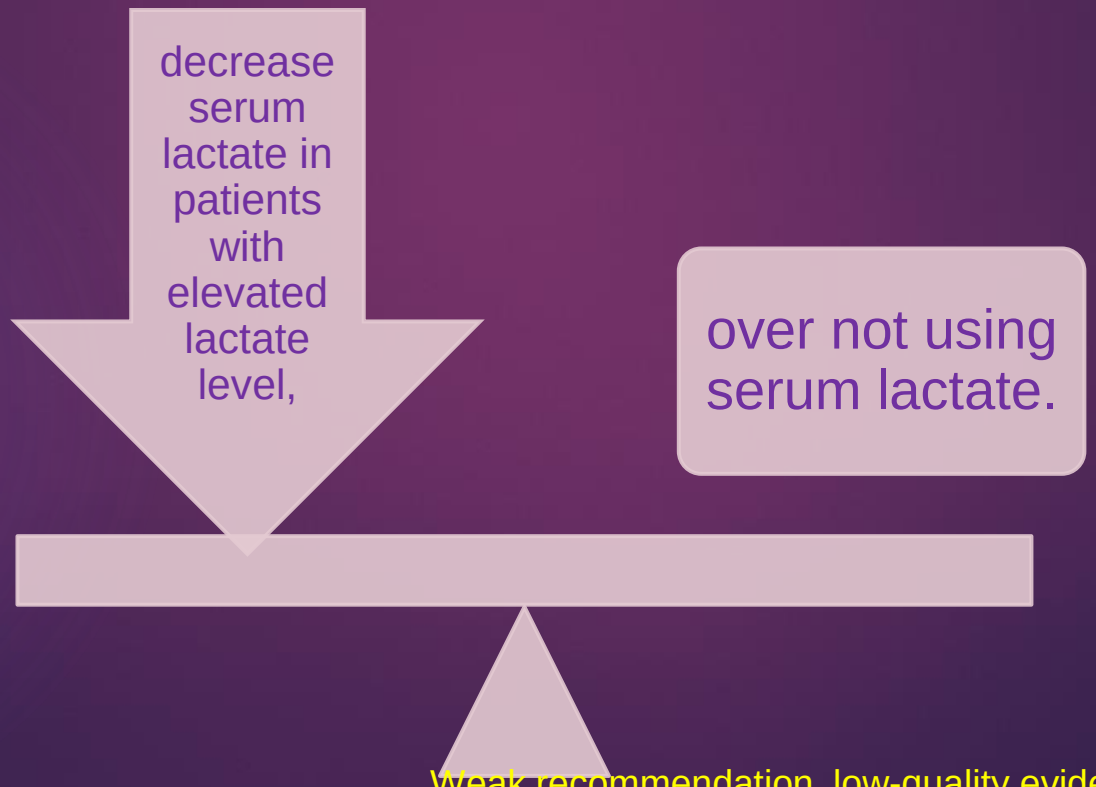
Stroke volume variation (SVV), Pulse pressure variation (PPV)

PPV as well as SVV are calculated from the minimum and maximum of pulse pressure (PPV) or stroke volume (SVV) during a respiratory cycle.



Resuscitation

For patients with sepsis or septic shock, we suggest guiding resuscitation to



Weak recommendation, low-quality evidence.

Resuscitation

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

Etiology of lactic acidosis

Increased lactate production

Increased pyruvate production

Enzymatic defects in glycogenolysis or gluconeogenesis (as with type 1 glycogen storage disease)

Respiratory alkalosis, including salicylate intoxication

Pheochromocytoma

Beta-agonists

Sepsis

Impaired pyruvate utilization

Decreased activity of pyruvate dehydrogenase or pyruvate carboxylase

- Congenital
- Possibly a role in diabetes mellitus, Reye syndrome

Altered redox state favoring pyruvate conversion to lactate

Enhanced metabolic rate

- Grand mal seizure
- Severe exercise
- Hypothermic shivering
- Severe asthma

Decreased oxygen delivery

- Shock
- Cardiac arrest
- Acute pulmonary edema
- Carbon monoxide poisoning
- Severe hypoxemia (PO2 <25 to 30 mmHg)
- Pheochromocytoma

Reduced oxygen utilization

- Cyanide intoxication (decreased oxidative metabolism), which may result from cyanide poisoning or, during a fire, from smoke inhalation of vapors derived from the thermal decomposition of nitrogen-containing materials such as wool, silk, and polyurethane
- Drug-induced mitochondrial dysfunction due to zidovudine or stavudine
- Sepsis

D-lactic acidosis

Primary decrease in lactate utilization

Hypoperfusion and marked acidemia

Alcoholism

Liver disease

Mechanism uncertain

Malignancy

Diabetes mellitus, including metformin in the absence of tissue hypoxia

Acquired immunodeficiency syndrome

Hypoglycemia

Idiopathic

Resuscitation

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

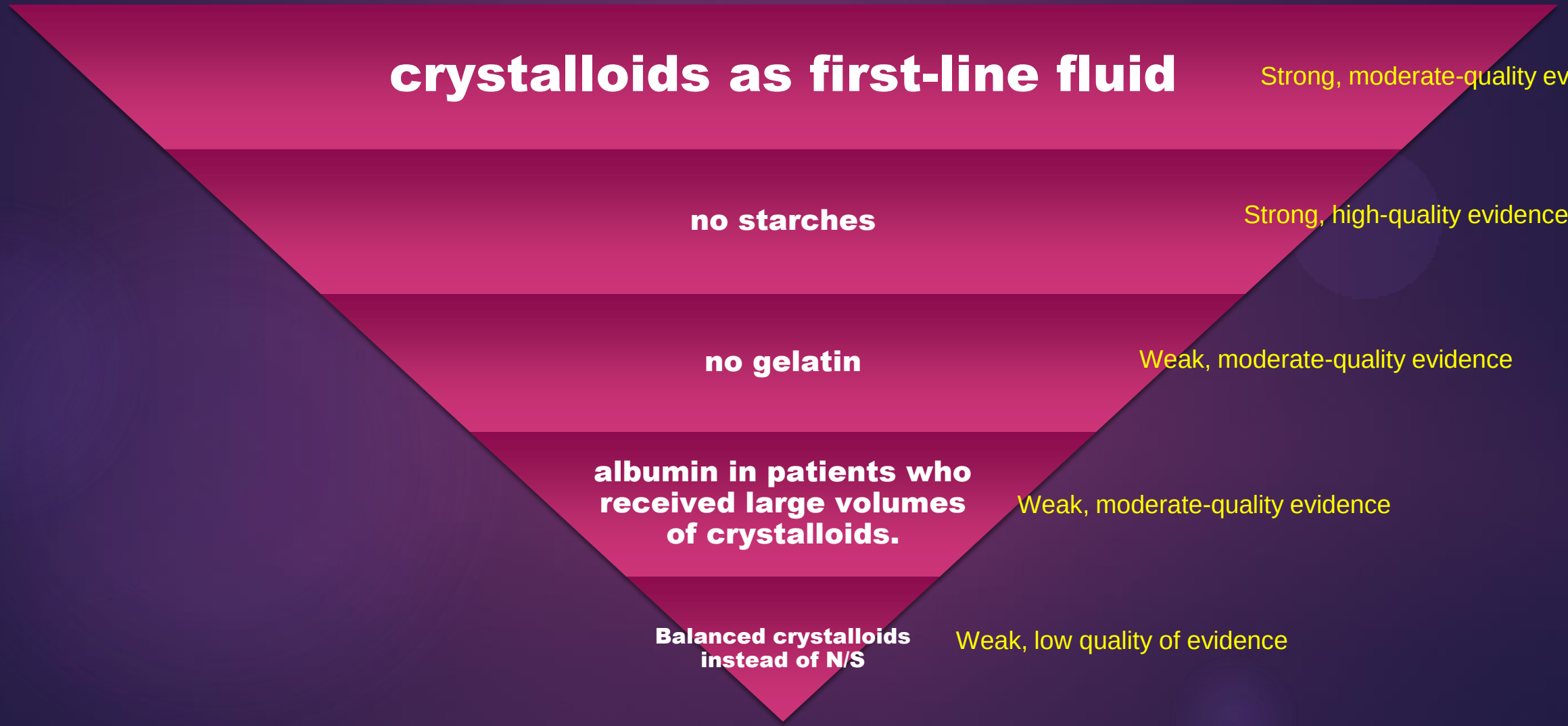
Weak recommendation, low-quality evidence.

Resuscitation

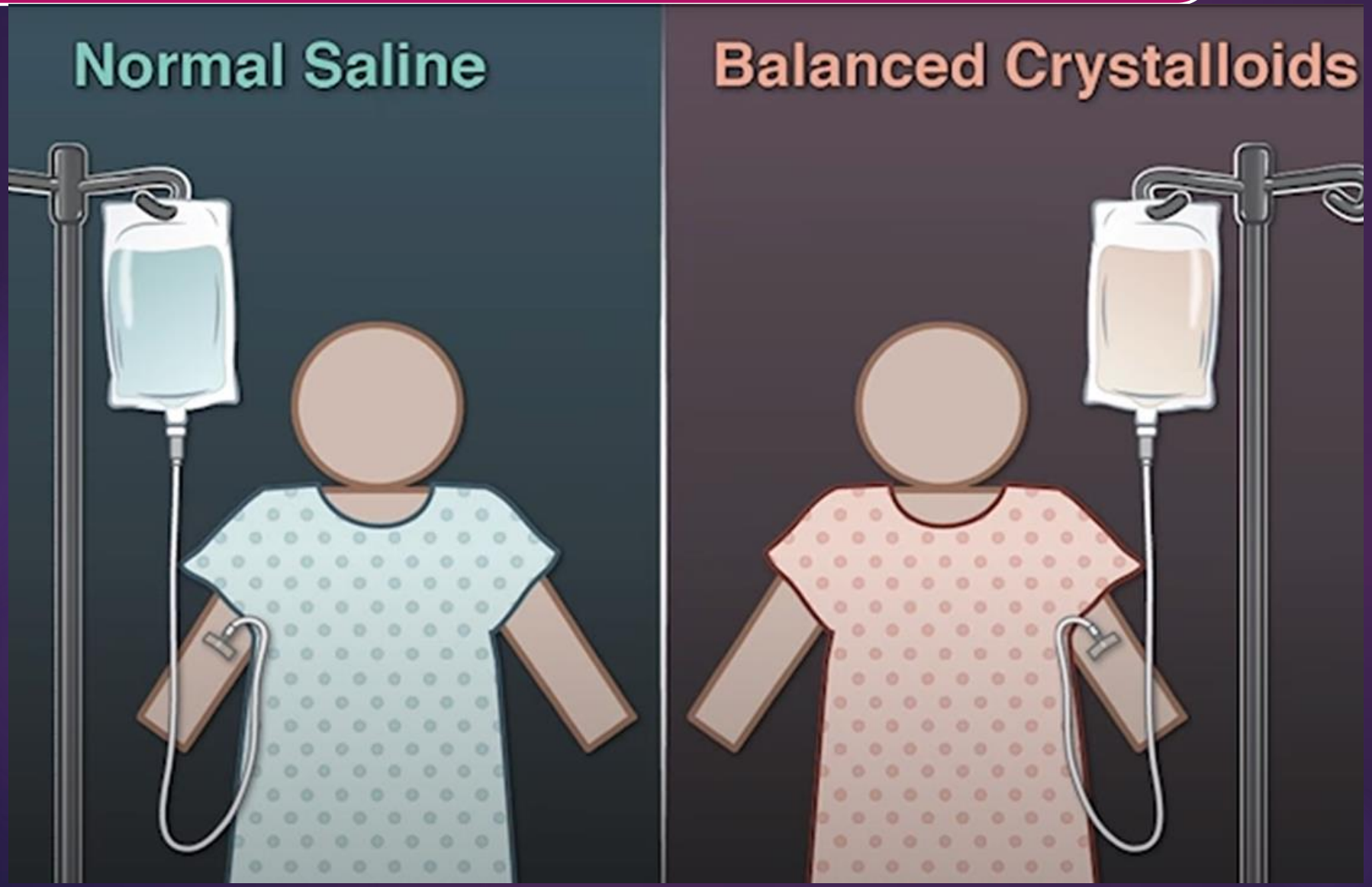
MEAN ARTERIAL PRESSURE

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

Resuscitation



Resuscitation



Vasopressors

For adults with septic shock, we recommend using Norepinephrine as the first-line agent over other vasopressors.

STRONG

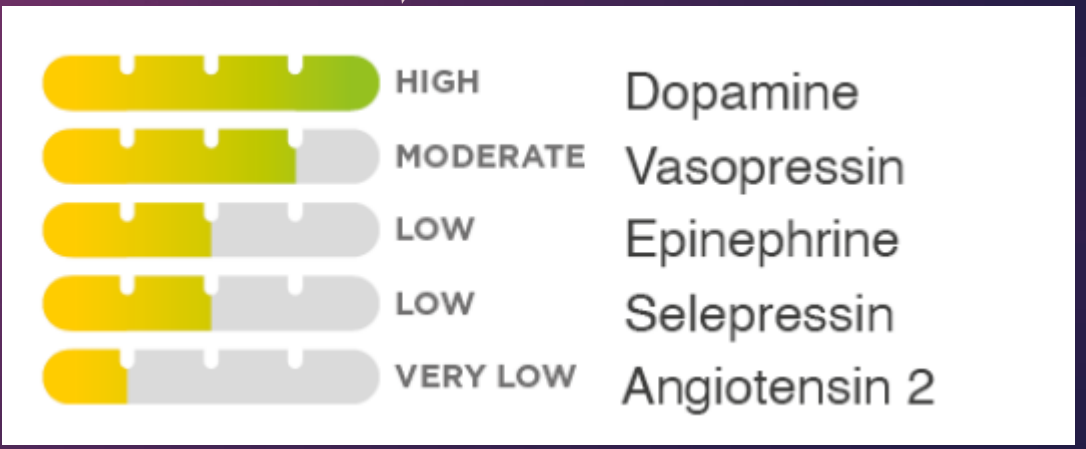
Dopa mine.
High-quality evidence

Vasopressin.
Moderate-quality evidence

Epinephrine.
Low quality of evidence

Selepressin
. Low quality of evidence

Angioten sin II. Very low-quality evidence



Vasoactive Agent Management

Norepinephrine as the first-line agent over other vasopressors.

initial target mean arterial pressure (MAP) of 65 mm Hg over higher MAP targets.

Strong

Consider invasive monitoring of arterial blood pressure

If central line is not yet available

Consider starting vasopressors peripherally to restore mean arterial pressure rather than delaying initiation until a central venous access is secured.

If MAP is still inadequate despite low-to-moderate dose norepinephrine

Consider adding vasopressin instead of escalating the dose of norepinephrine

Inadequate mean arterial pressure levels despite norepinephrine and vasopressin,

Consider adding epinephrine.

Weak

Vasopressors

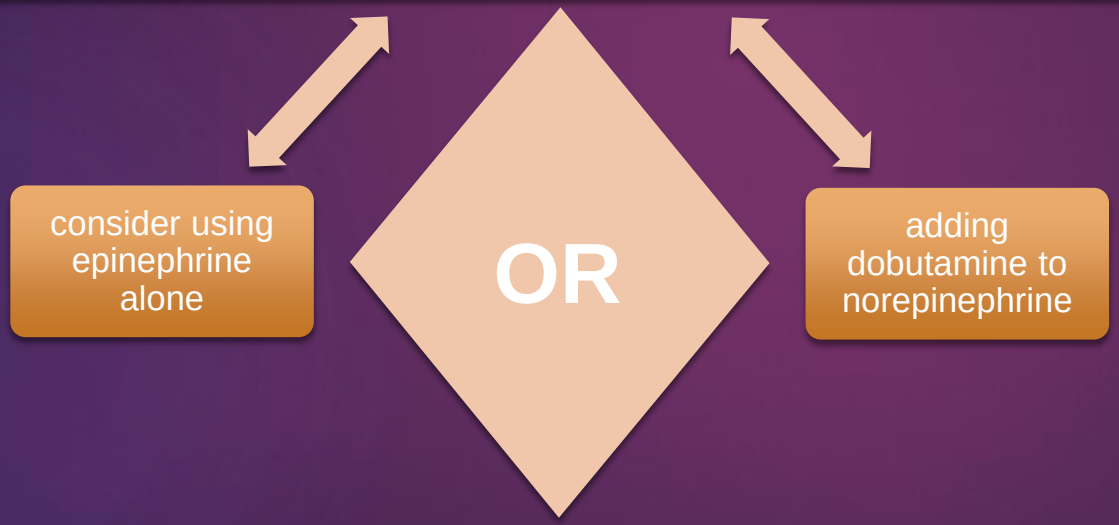
For adults with septic shock, we suggest against using terlipressin.

Weak, low quality of evidence

Vasopressors

For adults with septic shock and cardiac dysfunction with persistent hypoperfusion despite adequate volume status and arterial blood pressure

Weak, low quality of evidence



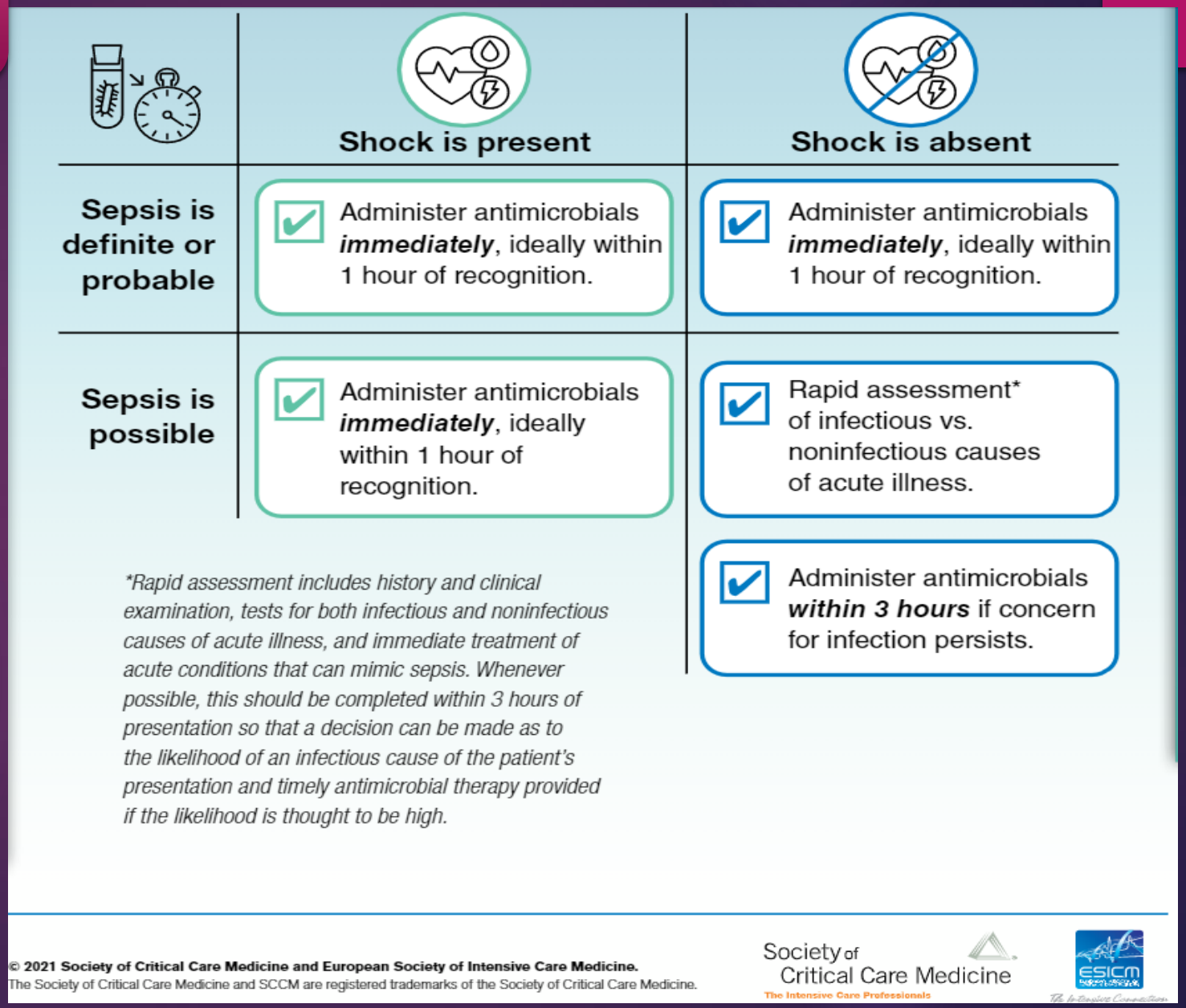
we suggest against using levosimendan.

Weak, low quality of evidence

INFECTION

For adults with possible septic shock or a high likelihood for sepsis, we recommend administering antimicrobials immediately, ideally within 1 hr of recognition.

INFECTION



	Shock is present	Shock is absent
Sepsis is definite or probable	☑ Administer antimicrobials ***immediately***, ideally within 1 hour of recognition.	☑ Administer antimicrobials ***immediately***, ideally within 1 hour of recognition.
Sepsis is possible	☑ Administer antimicrobials ***immediately***, ideally within 1 hour of recognition.	☑ Rapid assessment* of infectious vs. noninfectious causes of acute illness. ☑ Administer antimicrobials ***within 3 hours*** if concern for infection persists.

**Rapid assessment includes history and clinical examination, tests for both infectious and noninfectious causes of acute illness, and immediate treatment of 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 is thought to be high.*

Society of Critical Care Medicine
The Intensive Care Professionals

ESICM

INFECTION

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

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

INFECTION

high risk of MRSA	• empiric antimicrobials with MRSA
high risk for multidrug resistant (MDR)organisms	• two antimicrobials with gram-negative coverage for empiric treatment
High risk of fungal infection, we suggest using	• empiric antifungal therapy

INFECTION

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, moderate-quality evidence

INFECTION

Best practice statement

For adults with sepsis or septic shock,

- prompt removal of intravascular access devices that are a possible source of sepsis or septic shock after other vascular access has been established.
- 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.
- optimising dosing strategies of antimicrobials based on accepted pharmacokinetic/ pharmacodynamic (PK/PD) principles and specific drug properties.

INFECTION

For adults with sepsis or septic shock, we suggest daily assessment for de-escalation of antimicrobials over using fixed durations of therapy without daily reassessment for de-escalation.

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, very low quality ofevidence

For adults with an initial diagnosis of sepsis or septic shock and adequate source control where optimal duration of therapy is unclear, we suggest using procalcitonin AND clinical evaluation to decide when to discontinue antimicrobials over clinical evaluation alone.

ADMISSION TO INTENSIVE CARE

For adults with sepsis or septic shock who require ICU admission, we suggest admitting the patients to the ICU within 6 hr.

Weak, low quality of evidence

2021 RECOMMENDATIONS ON ADDITIONAL THERAPIES

Surviving Sepsis Campaign

MODERATE

For adults with septic shock and an ongoing requirement for vasopressor therapy we **suggest** using IV corticosteroids.

LOW

For adults with sepsis or septic shock we **suggest against** using polymyxin B hemoperfusion.

There is insufficient evidence to make a recommendation on the use of other blood purification techniques.

MODERATE

For adults with sepsis or septic shock we **recommend** using a restrictive (over liberal) transfusion strategy.

LOW

For adults with sepsis or septic shock we **suggest against** using intravenous immunoglobulins.

MODERATE

For adults with sepsis or septic shock, and who have risk factors for gastrointestinal (GI) bleeding, we **suggest** using stress ulcer prophylaxis.

MODERATE

For adults with sepsis or septic shock, we **recommend** using pharmacologic venous thromboembolism (VTE) prophylaxis unless a contraindication to such therapy exists.

MODERATE

For adults with sepsis or septic shock, we **recommend** using low molecular weight heparin over unfractionated heparin for VTE prophylaxis.

LOW

For adults with sepsis or septic shock, we **suggest against** using mechanical VTE prophylaxis, in addition to pharmacological prophylaxis, over pharmacologic prophylaxis alone.

LOW

In adults with sepsis or septic shock and AKI, we **suggest** using either continuous or intermittent renal replacement therapy.

MODERATE

In adults with sepsis or septic shock and AKI, with no definitive indications for renal replacement therapy, we **suggest against** using renal replacement therapy.

MODERATE

For adults with sepsis or septic shock, we **recommend** initiating insulin therapy at a glucose level of ≥ 180mg/dL (10mmol/L).

LOW

For adults with sepsis or septic shock we **suggest against** using IV vitamin C.

LOW

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.

LOW

For adults with septic shock and severe metabolic acidemia (pH ≤ 7.2) and acute kidney injury (AKIN score 2 or 3), we **suggest** using sodium bicarbonate therapy.

VERY LOW

For adult patients with sepsis or septic shock who can be fed enterally, we **suggest** early (within 72 hours) initiation of enteral nutrition.

ESICM The Intensive Care Connection

Society of Critical Care Medicine The Intensive Care Professionals

2021 RECOMMENDATIONS ON VENTILATION

LOW

For adults with sepsis-induced hypoxemic respiratory failure, we **suggest** the use of high flow nasal oxygen over non-invasive ventilation.

HIGH

For adults with sepsis-induced ARDS, we **recommend** using a low tidal volume ventilation strategy (6 mL/kg), over a high tidal volume strategy (>10 mL/kg).

MODERATE

For adults with sepsis-induced severe ARDS, we **recommend** using an upper limit goal for plateau pressures of 30 cm H2O, over higher plateau pressures.

LOW

For adults with sepsis-induced severe ARDS, we **suggest** using Veno-venous (VV) ECMO when conventional mechanical ventilation fails in experienced centres with the infrastructure in place to support its use.

MODERATE

For adults with moderate to severe sepsis-induced ARDS, we **suggest** using higher PEEP over lower PEEP.

LOW

For adults with sepsis-induced respiratory failure (without ARDS), we **suggest** using low tidal volume as compared to high tidal volume ventilation.

MODERATE

When using recruitment maneuvers, we **recommend against** using incremental PEEP titration/strategy.

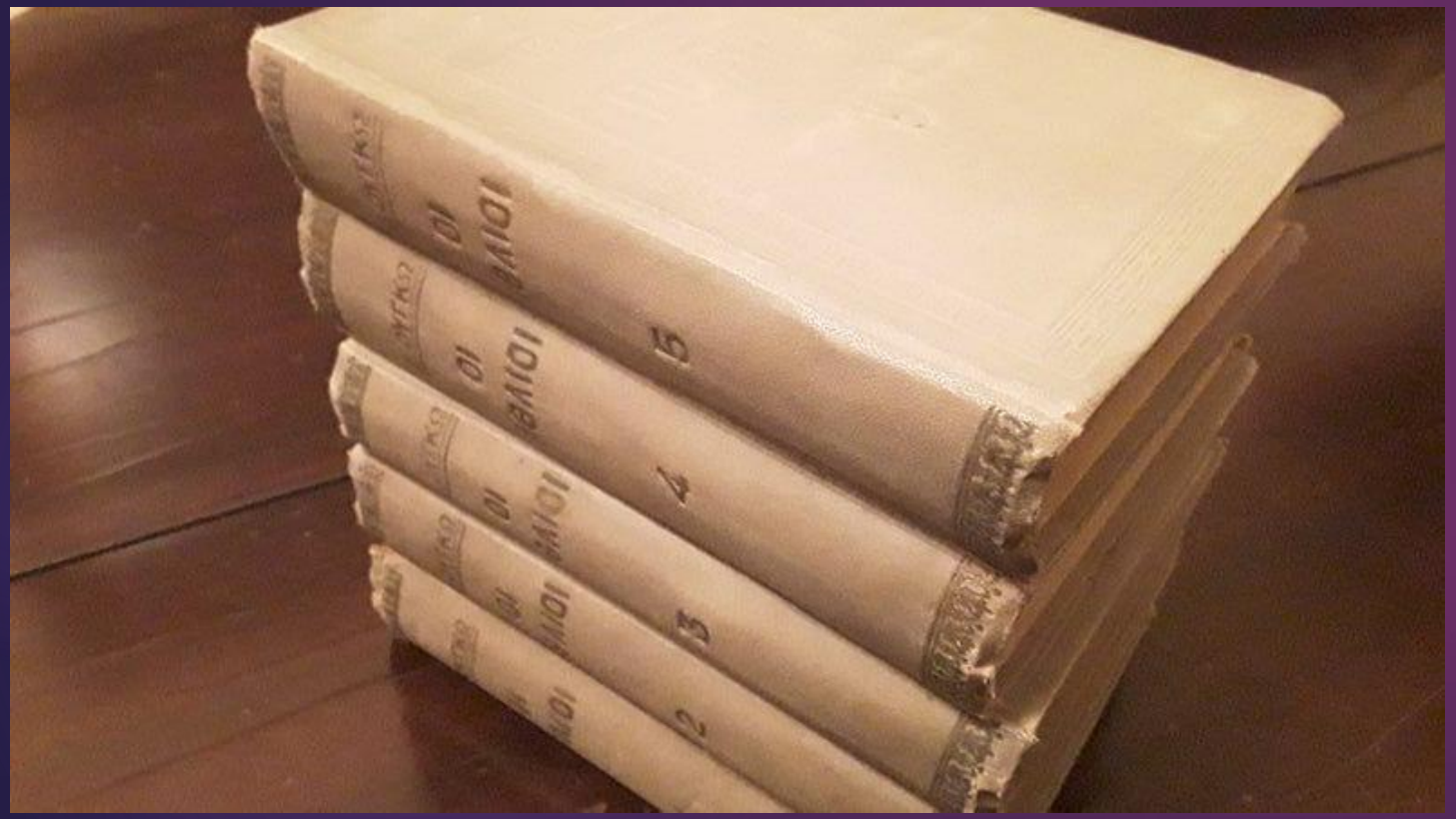
MODERATE

For adults with sepsis-induced moderate-severe ARDS, we **recommend** using prone ventilation for greater than 12 hours daily.

MODERATE

For adults with sepsis induced moderate-severe ARDS, we **suggest** using intermittent NMBA boluses, over NMBA continuous infusion.

ΕΥΧΑΡΙΣΤΩ

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