SEPSIS CARE:
TAKING THE BUNDLE FROM PAPER TO THE BEDSIDE

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DISCLOSURES

- none

OBJECTIVES

01

Apply knowledge of sepsis definitions, sepsis guidelines and bundles into practice

02

Define current SEP-1 process measures

03

Apply research to methods for improving sepsis care and metrics

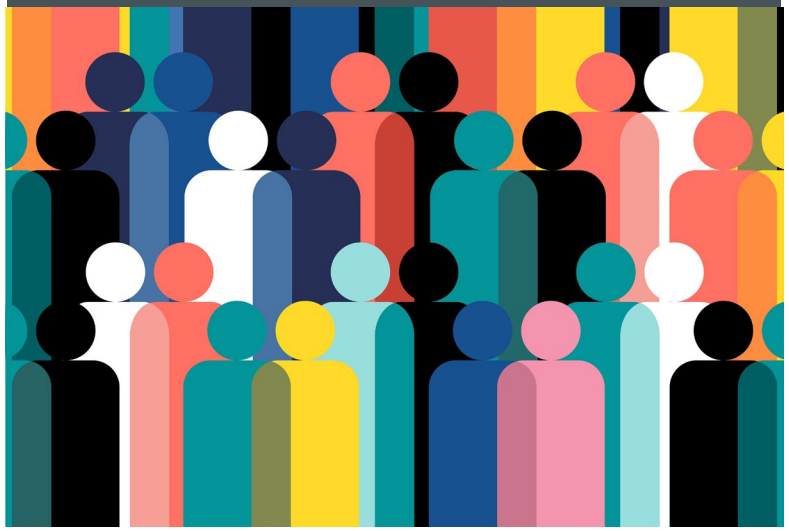
POLLING QUESTION

Have you seen a drop in your SEP-1 sepsis bundle compliance since 2020?

- Yes
- No
- Unchanged
- Don’t know

SEPSIS STATISTICS

https://www.cdc.gov/sepsis/what-is-sepsis.html



1.7 million adults in US have sepsis annually

~350,000 die during their hospitalization or are discharged home to die

1 in 3 adults who die in the hospital had sepsis during that hospitalization

87% of sepsis, or the infection causing sepsis, starts in the community

1. SEPSIS DEFINITIONS (SEPSIS 3)
2. SURVIVING SEPSIS CAMPAIGN: GUIDELINES AND BUNDLES
3. REGULATORY (SEP-1)

SEPSIS DEFINITION HISTORY

Sepsis-3

- Sepsis = Infection plus new OD
- Septic Shock = Sepsis plus increased mortality (circulatory/cellular/ metabolic abnormalities)

Singer M, Deutschman CS, Seymour CW, et al. JAMA 2016;315:801-810.

Sepsis-2

- Sepsis = Infection plus SIRS
- Severe Sepsis = Sepsis plus organ dysfunction
- Septic Shock = hypotension despite adequate fluid resuscitation

Levy MM, Fink MP, Marshall JC, et al. Intensive Care Med 2003;29:530-538.

Sepsis-1

- Sepsis = Infection plus SIRS
- SIRS criteria
  - Temperature > 38°C or < 36°C
  - Heart rate > 90 bpm
  - Respiratory rate > 20 breaths/min or $PaCO_2$ < 32 torr
  - WBC > 12,000 cell/mm^3, <4000 cells/ mm^3, or > 10% immature bands
- Severe Sepsis = Sepsis plus organ dysfunction
- Septic Shock = hypotension despite adequate fluid resuscitation

Members of the American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference Committee. Crit Care Med 1992;20:864-874.

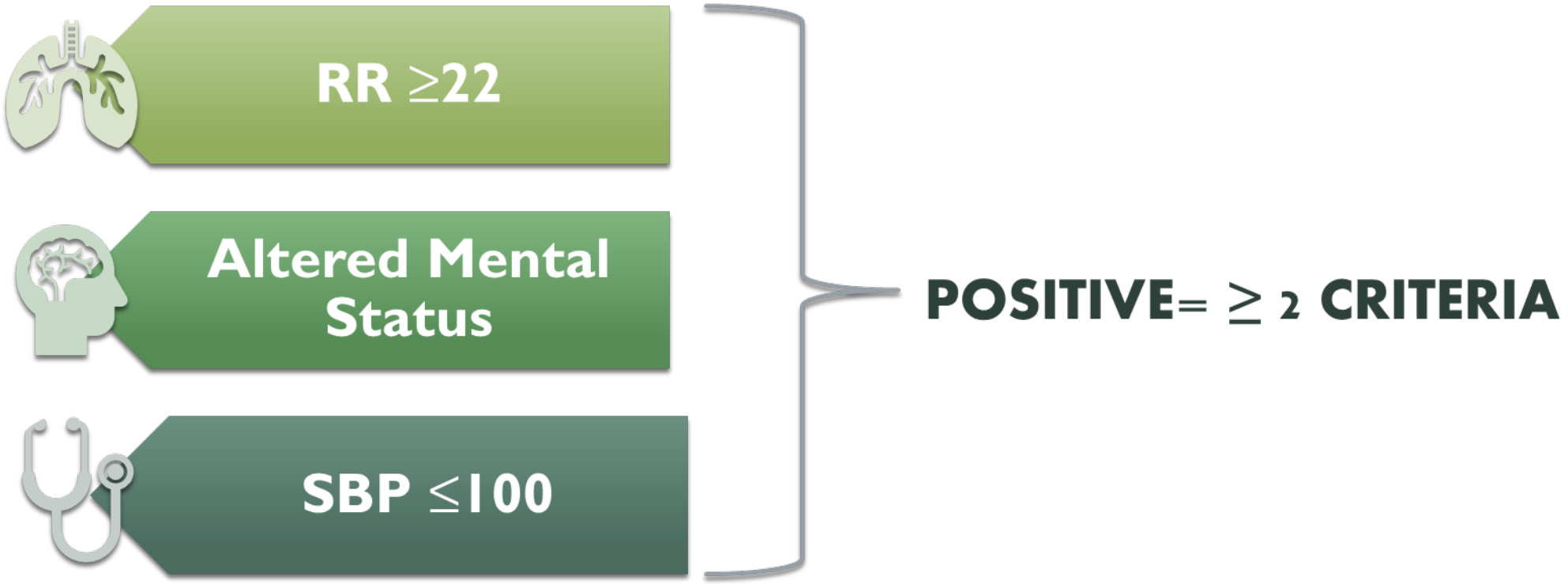
SEPSIS-3 DEFINITION **SEPSIS**

- *Life-threatening NEW* ***organ dysfunction*** caused by patient response to an infection
- Sepsis starts with an infection but not all infections lead to Sepsis

Singer, et al. JAMA. 2016;315(8):801-810.

QUICK SEPSIS-RELATED ORGAN FAILURE ASSESSMENT **(QSOFA)**

- Tool for non-ICU SEPSIS patients to identify increased mortality risk/organ dysfunction



Singer, et al. JAMA. 2016;315(8):801-810.

SEPSIS-RELATED ORGAN FAILURE ASSESSMENT **(SOFA)**

- Tool for ICU SEPSIS patients to assess organ dysfunction
- Increased risk of mortality ≥ 2 OR INCREASING SCORE OVER TIME

Table 1. Sequential [Sepsis-Related] Organ Failure Assessment Score[a]

	Score				
System	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

Abbreviations: Fio_2, fraction of inspired oxygen; MAP, mean arterial pressure; Pao_2, partial pressure of oxygen.

[a] Adapted from Vincent et al.[27]

[b] Catecholamine doses are given as μg/kg/min for at least 1 hour.

[c] Glasgow Coma Scale scores range from 3-15; higher score indicates better neurological function.

Vincent, et al. Intensive Care Med. 1996;22(7):707-710

SEPSIS-3 DEFINITION **SEPTIC SHOCK**

- Sepsis WITH profound circulatory and cellular/metabolic abnormalities that substantially increase mortality
  - Clinical criteria includes SEPSIS with:
    - Persisting hypotension requiring vasopressors to maintain a MAP ≥ 65 mmHg,

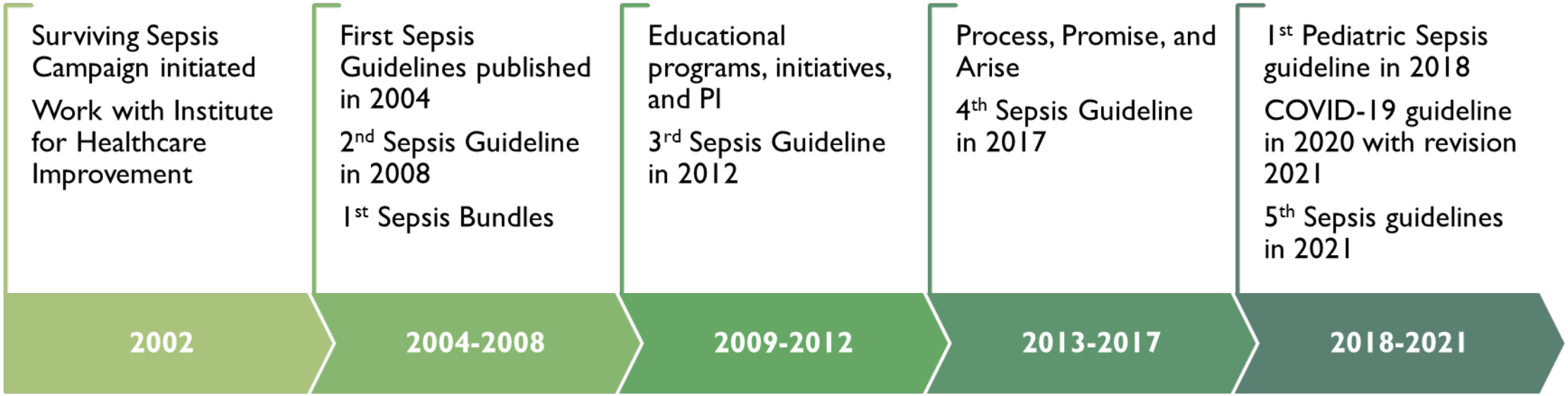
  AND

    - Lactate > 2 despite fluid resuscitation

Microsoft Stock Image

Singer, et al. JAMA. 2016;315(8):801-810.

SURVIVING SEPSIS CAMPAIGN



SURVIVING SEPSIS BUNDLE 2018

https://www.sccm.org/sccm/media/PDFs/Surviving-Sepsis-Campaign-Hour-1-Bundle.pdf

Hour-1 Bundle

Initial Resuscitation for Sepsis and Septic Shock

Surviving Sepsis Campaign

MEDICAL EMERGENCY

Initiate bundle upon recognition of sepsis/septic shock.

May not complete all bundle elements within one hour of recognition.

1. Measure lactate level.

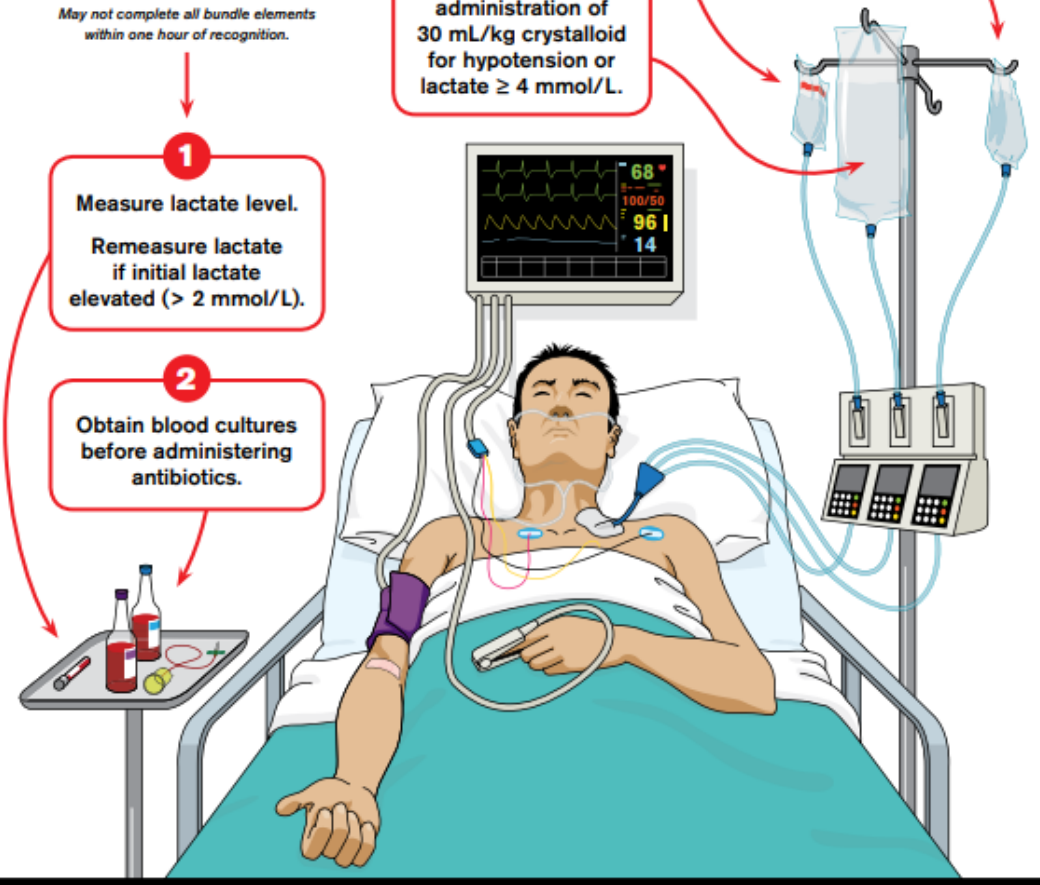
   Remeasure lactate if initial lactate elevated (> 2 mmol/L).

2. Obtain blood cultures before administering antibiotics.

3. Administer broad-spectrum antibiotics.

4. Begin rapid administration of 30 mL/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.



Bundle: SurvivingSepsis.org/Bundle **Complete Guidelines: SurvivingSepsis.org/Guidelines**

Society of Critical Care Medicine

ESICM

5TH SURVIVING SEPSIS CAMPAIGN INTERNATIONAL GUIDELINES

Published 10/4/21

GRADE methodology

6 Sections

- Screening and Early Treatment
- Infection
- Hemodynamic Management
- Ventilation
- Additional Therapies
- Long Term Outcomes & Goals of Care

Evans L, et al. *Crit Care Med.* 2021;49(11):e1063-e1143.

ONLINE SPECIAL ARTICLE

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

KEY WORDS: adults; evidence-based medicine; guidelines; sepsis; septic shock

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INTRODUCTION

Sepsis is life-threatening organ dysfunction caused by a dysregulated host response to infection (1). 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 (2–4). Early identification and appropriate management in the initial hours after the development of sepsis improve outcomes.

The recommendations in this document are intended to provide guidance for the clinician caring for adult patients with sepsis or septic shock in the hospital setting. Recommendations from these guidelines cannot replace the clinician's decision-making capability when presented with a unique patient's clinical variables. These guidelines are intended to reflect best practice (**Table 1**).

(References 5–24 are referred to in the Methodology section which can be accessed at Supplemental Digital Content: Methodology.)

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.

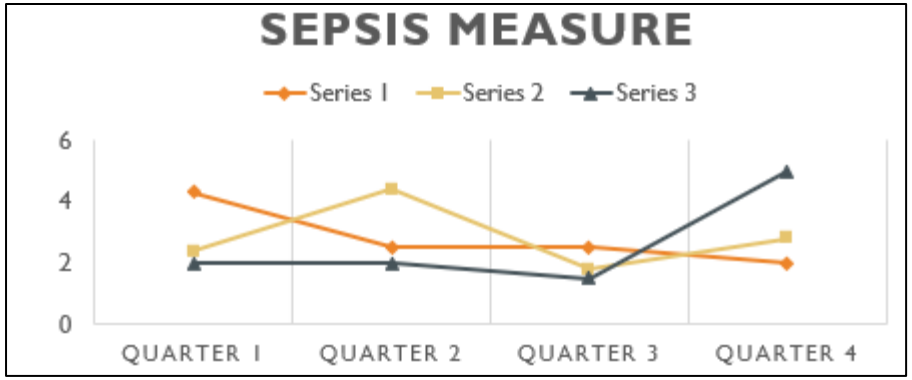
SOME GUIDELINE HIGHLIGHTS

SCREENING AND EARLY TREATMENT

We recommend using a performance improvement program for sepsis, including sepsis screening for acutely ill, high-risk patients and standard operating procedure for treatment

Strong recommendation, moderate-quality evidence for screening
Strong recommendation, very low-quality of evidence for SOP

- Sepsis improvement programs
  - Sepsis screening
  - Measurement of **sepsis bundle performance**, **patient outcomes**, and actions for identified opportunities



Dellinger RP. *Crit Care Med*. 2015;68:597-600.
Schorr C, et al. *J Hosp Med*. 2016;11(Suppl 1):S32-S39.
Osborn TM. *Crit Care Clin*. 2017;33:323-344.
Kahn JM, et al. *JAMA*. 2019;322:240-250.

SCREENING AND EARLY TREATMENT

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

Strong recommendation, moderate-quality evidence

- Originally intended as a predictor of poor outcomes for patients with sepsis but not as screening tool itself
- Studies have shown that **qSOFA** is more specific but less sensitive for early identification of sepsis than other tools

qSOFA

Positive = 2 or more

Seymour CW, et al. *JAMA*. 2016;315(8):762-774.

SCREENING AND EARLY TREATMENT

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

Weak recommendation, low quality evidence

- Lactate guideline history
  - **2017**: Suggest guiding resuscitation to normalize lactate (Weak, Low quality)
  - **2012:** Suggest targeting resuscitation to normalize lactate (Grade 2C, Weak, moderate)
    - Lactate normalization may be feasible option if Scvo2 is not available
  - **2008:** *"Although lactate may lack precision, elevated levels in sepsis support aggressive resuscitation"*
  - **2004:** "Although lactate measurement may be useful, it lacks precision as a measure of tissue metabolic state"

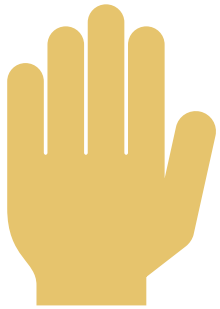
Morris E, et al. *Br J Gen Pract.* 2017;67:e859-e870

SCREENING AND EARLY TREATMENT

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 of evidence

- Capillary refill time (CRT) is the time it takes for the distal capillary bed, usually a finger, to regain color after sufficient pressure has been applied to cause blanching.



Abnormal > 3 seconds

Hernandez G, et al. *JAMA*. 2019;321(7):654-664.
Zampieri FG, et al. *Am J Resp Crit Care Med*. 2020;201(4):423-429.

SCREENING AND EARLY TREATMENT

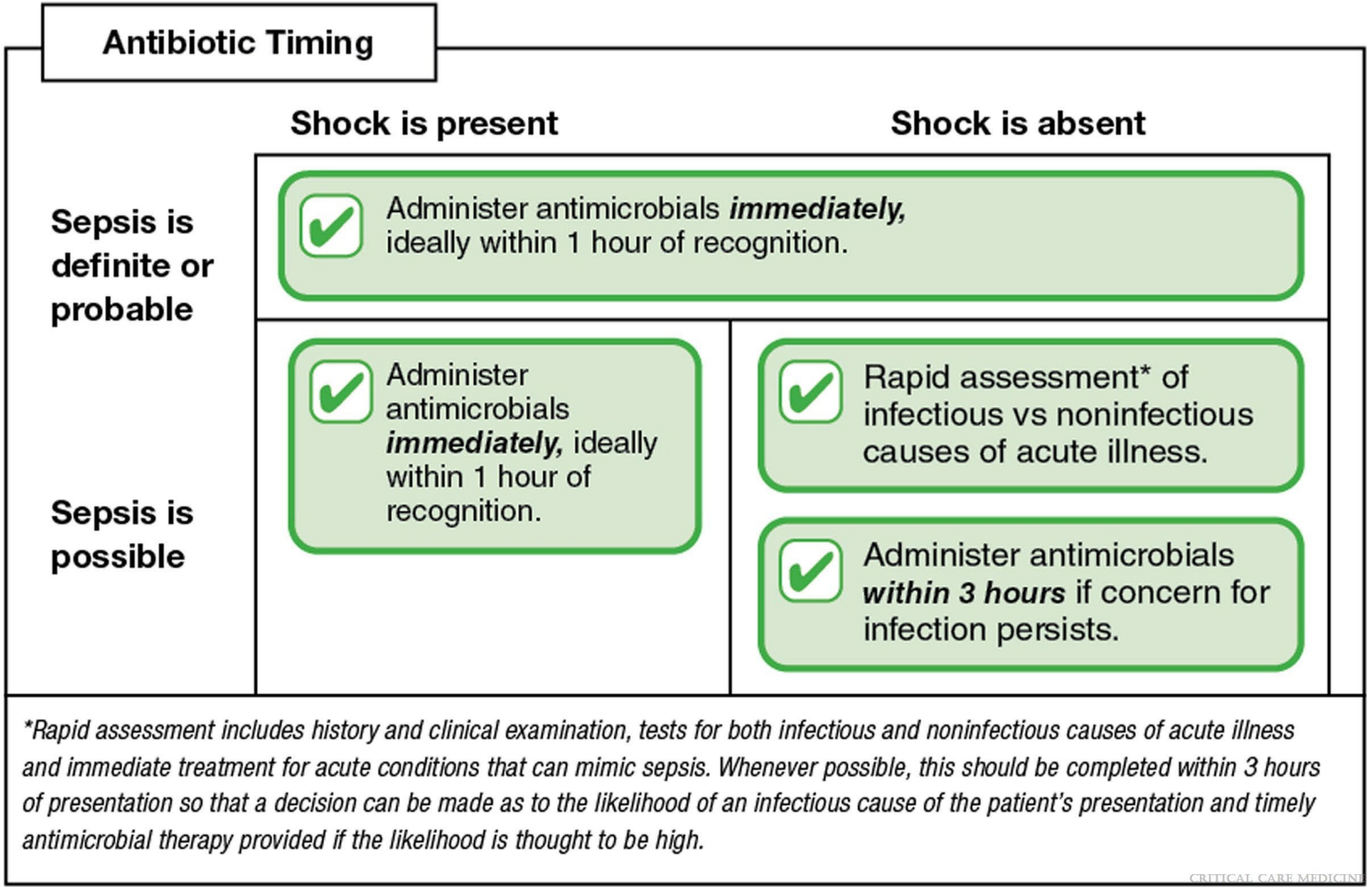
For patients with sepsis-induced hypoperfusion or septic shock, we suggest that at least 30 ml/kg of IV crystalloid fluid should be given within the first 3 hr of resuscitation

Weak recommendation, low quality of evidence

- 30 ml/kg/min was initially based on observational evidence
- Additional studies have supported ~ volume of 28-30 ml/kg/min
- Evidence was downgraded from **STRONG** to ***WEAK***

Levy MM, et al. *Crit Care Med.* 2010;36:222-231
Kuttab HL, et al. *Crit Care Med.* 2019;47:1582-1590
Rowan KM, et al. *N Engl J Med.* 2017;376:2223-2234

INFECTION



Critical Care Medicine49(11):e1063-e1143, November 2021.

INFECTION

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

- Catheter removal is preferred definitive treatment
- Some implanted tunneled catheter infections ***may be*** treated with prolonged antibiotics if removal of the catheter is not practical
  - Vascular accessibility
  - Risk of complications with new line
  - Possibility that CVC may not be source

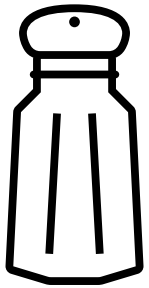
Lorente L, et al. *Crit Care*. 2014. Oct 17;18(5):564, doi: 10.1186/s13054-014-0564-3.

HEMODYNAMIC MANAGEMENT

For adults with sepsis or septic shock, we suggest using balanced crystalloids instead of normal saline for resuscitation

Weak recommendation, low quality of evidence

- What are Balanced Crystalloids?
  - SMART trial (2018) compared balanced crystalloid (LR, Plasma-Lyte A) vs NS
  - Post Guideline - BASICS (2021) compared balanced crystalloids (Plasma-Lyte 148) vs NS



Plasma	135-145 m Eq/L
NS	154 m Eq/L
LR	130 m Eq/L
Plasma-Lyte	140 m Eq/L

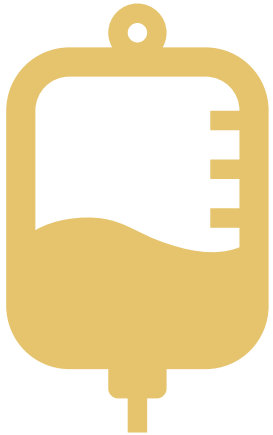
Semler MW, et al. *N Engl J Med 2018*;378:829-839.
Zampieri FG, et al. *JAMA* 2021;326(9):818-829.

HEMODYNAMIC MANAGEMENT

For adults with sepsis or septic shock, we suggest using albumin in patients who received large volume of crystalloids

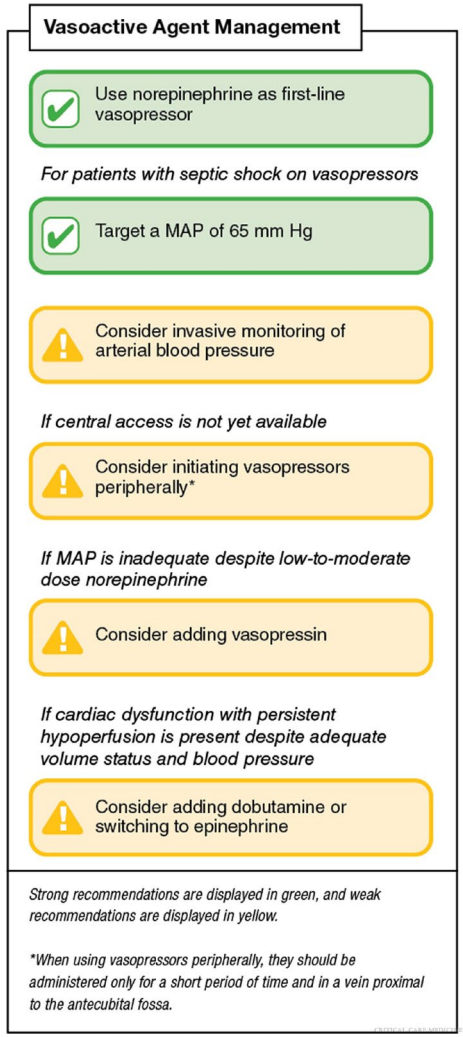
Weak, low quality of evidence

- Albumin is more costly than crystalloids
- Multiple studies have not shown benefit in mortality
- Evidence suggests
  - Higher MAPs earlier
  - Higher static filling pressures
  - Lower net fluid balances



Caironi P, et al. *Engl J Med* 2014;371)1);84. doi: 10.1056.
Martin GS, et al. *J Crit Care*. 2019;50:144-154.

HEMODYNAMIC MANAGEMENT



Use norepinephrine as first-line vasopressor

For patients with septic shock on vasopressors

Target a MAP of 65 mm Hg

Consider invasive monitoring of arterial blood pressure

If central access is not yet available

Consider initiating vasopressors peripherally*

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

Consider adding vasopressin

If cardiac dysfunction with persistent hypoperfusion is present despite adequate volume status and blood pressure

Consider adding dobutamine or switching to epinephrine

Critical Care Medicine49(11):e1063-e1143, November 2021.

HEMODYNAMIC MANAGEMENT

For adults with septic shock, we suggest starting vasopressors peripherally to restore mean arterial pressure rather than delaying initiation until a central venous catheter access is secured

Weak recommendation, very low quality of evidence

- Systematic reviews
  - Extravasation 3.4% with no reports of tissue necrosis or limb ischemia
  - Most patients have no long-term sequelae
- Meta-analysis
  - 85% extravasations occurred catheters distal to antecubital fossa
  - Infusions < 6 hours were unlikely to cause local tissue injury

Cardenas-Garcia J, et al. J Hosp Med 2015;10:581–585.
Tian DH, et al. Emerg Med Australas 2020;32:220–227.
Loubani OM, Green RS: J Crit Care 2015;30:653.e9–653.
Padmanaban A, et al. J Crit Care Med 2020;6(4):210-216

POLLING QUESTION

Do you have a policy for peripheral vasopressors at your facility?

- Yes
- No
- In process

HEMODYNAMIC MANAGEMENT

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

- Discrepancies in cuff vs invasive is more pronounced in shock
- Systematic review showed that risk of limb ischemia and bleeding:
  - Radial arterial line <1%
  - Femoral arterial line <1%-1.58%

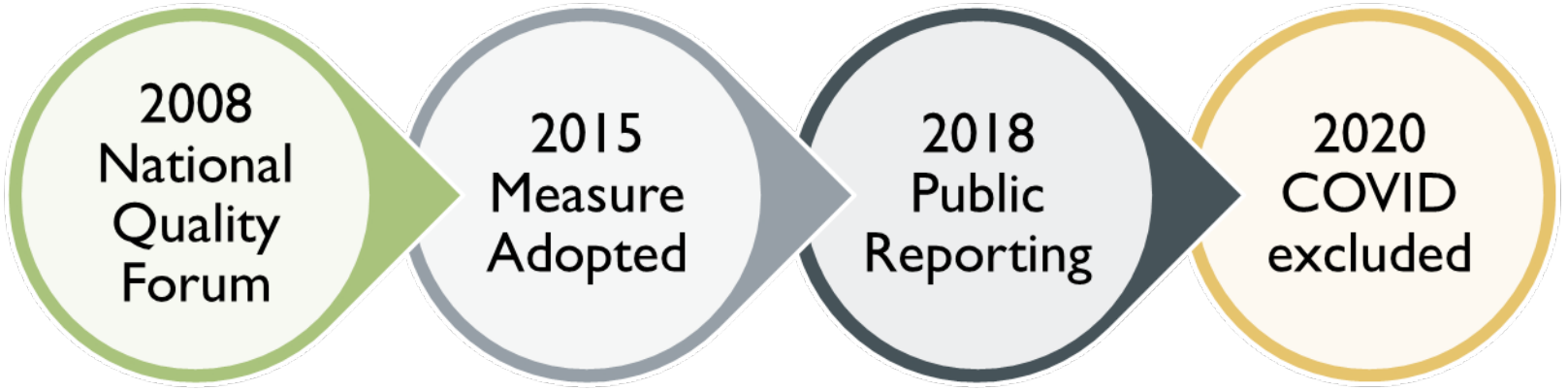
Microsoft Stock Image

Scheer B, et al. Crit Care. 2002;6(3):199-204.

SEP-1 EARLY MANAGEMENT BUNDLE, SEVERE SEPSIS/SEPTIC SHOCK

https://qualitynet.cms.gov/inpatient/specifications-manuals et al.

DEVELOPMENT OF SEP-1



- **7/1/22-12/31/22** – SEP-1 Version 5.12
- **1/1/23-6/30/23** – SEP-1 Version 5.13

Current National Average **57%**

https://qualitynet.cms.gov/inpatient/specifications-manuals#tab2

SEP-1

Inpatients, ≥ 18 years with ICD-10 CM Principal or other diagnosis code of sepsis, severe sepsis or septic shock, and not equal to U07.1

START

ALL within 3 hours

- Initial lactate measure
- Antibiotic
- Blood cultures before antibiotic

AND within 6 hours if LA ≥ 2

- Repeat LA

AND within 3 hours of initial hypotension OR Septic Shock

- 30 mL/kg crystalloids

AND within 6 hours of Septic Shock, ONLY if hypotension persists after fluids

- Vasopressors

AND within 6 hours of Septic Shock, ONLY if hypotension persists after fluids OR initial LA ≥ 4

- Repeat volume status and tissue perfusion assessment

END?

SEP-1 EXCLUSIONS

Within 6 hours of presentation of Severe Sepsis or Septic Shock

- Comfort or Palliative Care
- Administrative contraindication to care
- Discharge

Other

- LOS > 120 days
- Transfer from acute care facility (LTAC, other hospital, free standing ED, etc.)
- Participating in clinical trial for sepsis, severe sepsis, septic shock
- IV antibiotics for > 24 hours prior to presentation of severe sepsis

OTHER SEP-1 CRITERIA

PREGNANT 20 WEEKS – DAY 3 POST DELIVERY

- NEW SEP-1 5.12 (7/1/22-12/31/22)
- What is included?

1. Defines hypotension as SBP <85 mmHg or MAP <65 mmHg
2. Do not use lactate obtained during active delivery
   - Documentation of uterine contractions resulting in cervical change through delivery or childbirth

SEVERE SEPSIS OR SEPTIC SHOCK TIME

Severe Sepsis Time

- No longer arrival to ED
- Combination;
  - Provider note source of infection
  - SIRS (2)
  - OD (1)

OR

- Provider note stating severe sepsis or septic shock

Septic Shock Time

- Provider documentation

OR

- Severe Sepsis AND Persistent Hypotension
- Severe Sepsis AND initial LA ≥ 4

LA, ANTIBIOTIC, BC

ALL within 3 hours

- Initial lactate measure
- Antibiotic
- Blood cultures before antibiotic

LA

- If 2nd LA > 2 AND higher than initial, must repeat within 6 hours
- Example
  - 21:08 LA 2.1
  - 00:40 LA 2.6
  - 05:00 LA 2.3
- Document any delay due to difficult stick or refusal

Antibiotic

- Any IV antibiotic
- Within 24 hours prior to or within 3 hours of Severe Sepsis

BC

- If delay due to difficult stick and documented (nursing or provider), may give antibiotic first and obtain BC ASAP
- 1 set blood cultures passes

HYPOTENSION

AND within 3 hours of initial hypotension OR Septic Shock

- 30 mL/kg crystalloids

- **Hypotension** = 2 measures (SBP < 90, MAP < 65, or decrease in SBP > 40 within 3 hours of each other without other causes
  - Exclusions: OR, IR, delivery, CPR, conscious sedation, or provider documentation
- Example: provider documentation that BP normal for the patient, due to a chronic condition, a medication, acute condition, acute on chronic condition, or due to an acute condition that has a non-infectious source/process
  - *Hypotension due to acute onset of uncontrolled AFib*
  - *BP normally < 90 mmHg, patient on midodrine for ESRD*

FLUIDS

AND within 3 hours of initial hypotension OR Septic Shock

- 30 mL/kg crystalloids

- Provider may order less than 30 mL/kg crystalloids for the following:
  - Concerns for heart failure, renal failure, concern for fluid overload, or patient responded to lesser volume
  - **MUST order a targeted volume AND reason MUST be documented by the provider**
    - Examples
      - *1500 mL bolus ordered due to heart failure*
      - *Smaller volumes bolus given of total 500 mL due to fluid overload*
      - *Bolus stopped; patient responded to first liter*

MORE FLUIDS


Microsoft Stock Image

AND within 3 hours of initial hypotension OR Septic Shock

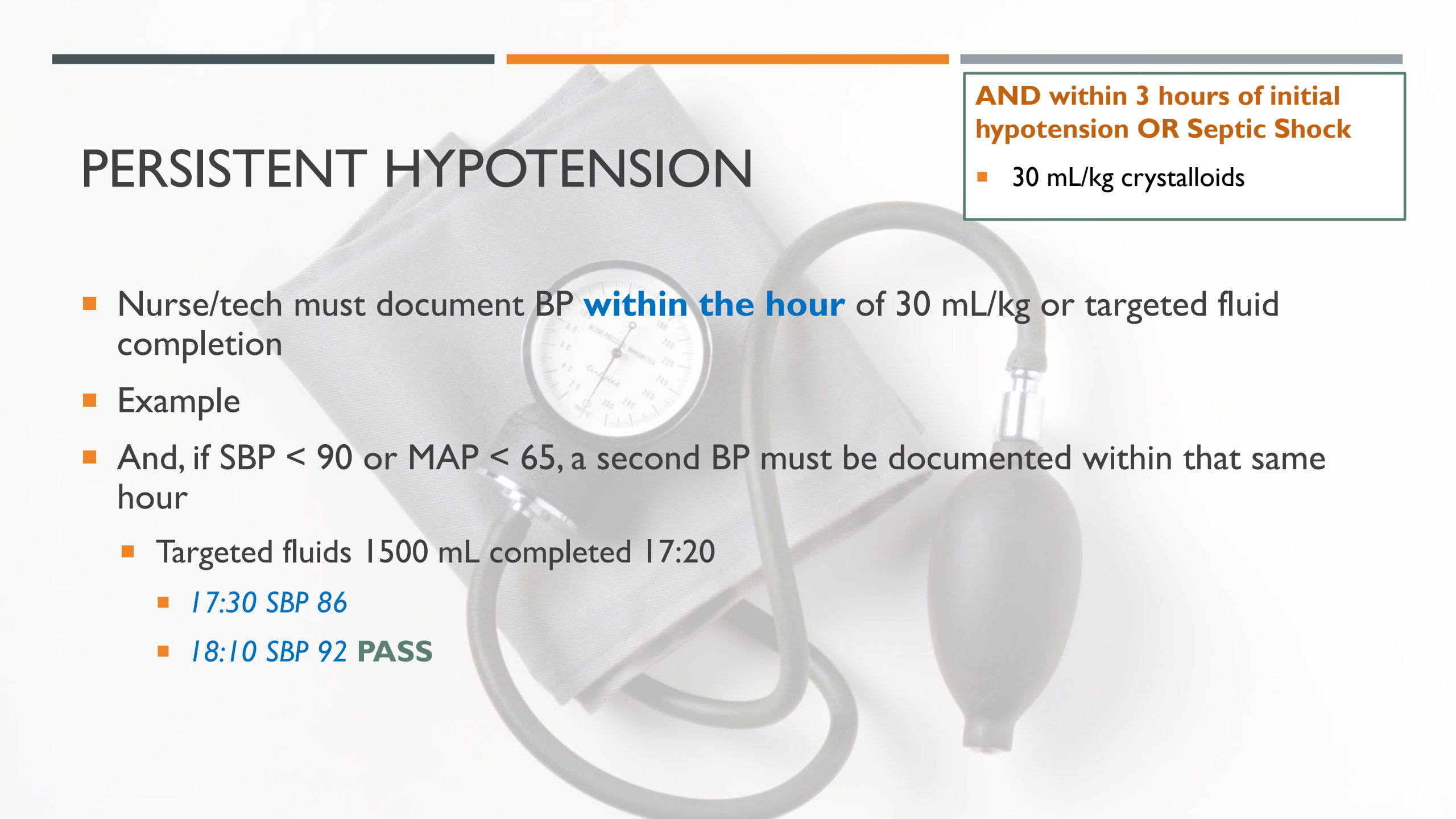
- 30 mL/kg crystalloids

- Calculated fluids must be given 6 hours prior or through 3 hours after initial hypotension OR septic shock presentation (don't forget about EMS)
- May be within 10% of targeted volume
  - 104 kg X 30 mL/kg = 3120 mL targeted volume
  - 3000 mL bolus ordered = (3120 – 10% = 2808) **PASS**
- Any crystalloids over125 mL/hour can be considered a bolus (Don't forget about Vancomycin)

PERSISTENT HYPOTENSION

AND within 3 hours of initial hypotension OR Septic Shock

- 30 mL/kg crystalloids



- Nurse/tech must document BP **within the hour** of 30 mL/kg or targeted fluid completion
- Example
- And, if SBP < 90 or MAP < 65, a second BP must be documented within that same hour
  - Targeted fluids 1500 mL completed 17:20
    - *17:30 SBP 86*
    - *18:10 SBP 92* **PASS**

VASOPRESSORS

AND within 6 hours of Septic Shock, ONLY if hypotension persists after fluids

- Vasopressors

- Vasopressor administration at septic shock presentation up to 6 hours after demonstrated by persistent hypotension after fluids
- May give peripherally rather than delay
  - Facility protocol/criteria

SEPSIS REASSESSMENT

AND within 6 hours of Septic Shock, ONLY if hypotension persists after fluids OR initial LA ≥ 4

- Repeat volume status and tissue perfusion assessment

- Provider documentation; 3 options after start of fluids and within 6 hours of Septic Shock time

Option 1

Performing or completing Physical exam, *perfusion reassessment, sepsis or septic shock focused exam*, *sepsis reassessment,* or *systems review*

Option 2

5/8 measures documented;

- PaO2
- Capillary refill
- Cardiopulmonary assessment
- Peripheral pulses
- Shock index
- Skin color or condition
- Urine output
- Vital signs

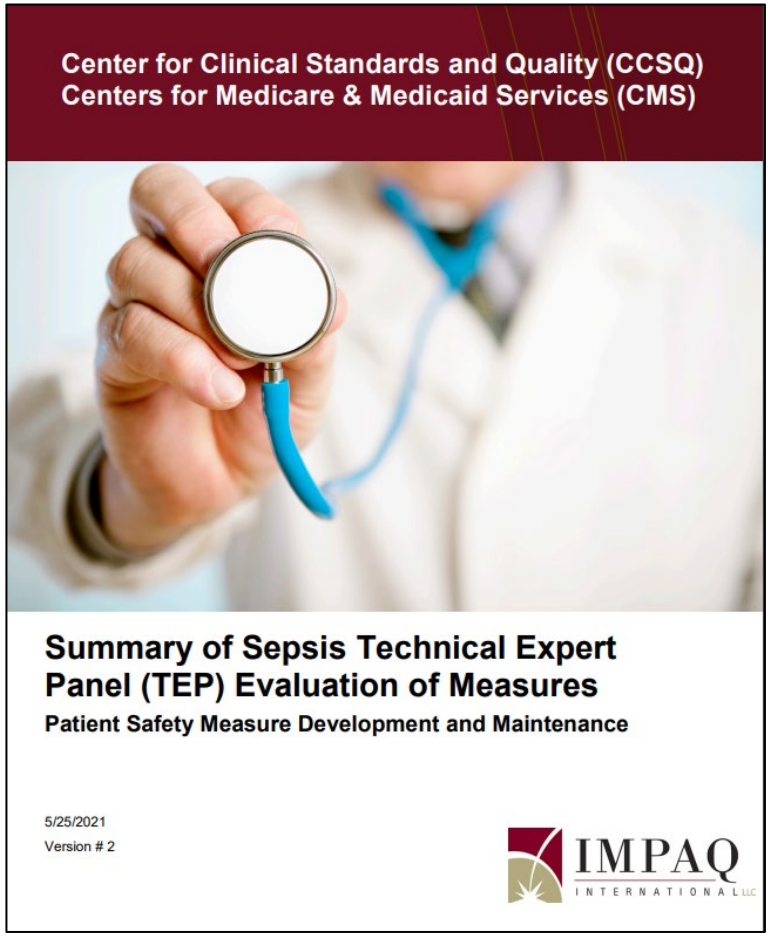
Option 3

One of the following:

- CVP
- ScvO2, SvO2
- Echocardiogram
- Fluid challenge or PLR

PROPOSED OUTCOME MEASURE (CMS MEASURE)

- Outcome Measure Recommendations
  - 30-day mortality
  - Community-acquired sepsis
  - Define sepsis criteria using structured EHR fields and ICD-10-CM diagnosis
  - Exclusions
    - Age < 18 or > 115
    - Uncertainty patient sex or date of death
    - Discharged AMA within X hours of presentation
    - Hospice enrollment
    - Prior inpatient sepsis within 30-day window
  - Attribution of mortality to first hospital in transferred sequence



https://www.cms.gov/files/document/patientsafetysepsistepsumm-508.pdf

IMPROVING SEPSIS CARE AND METRICS

WORD CLOUD

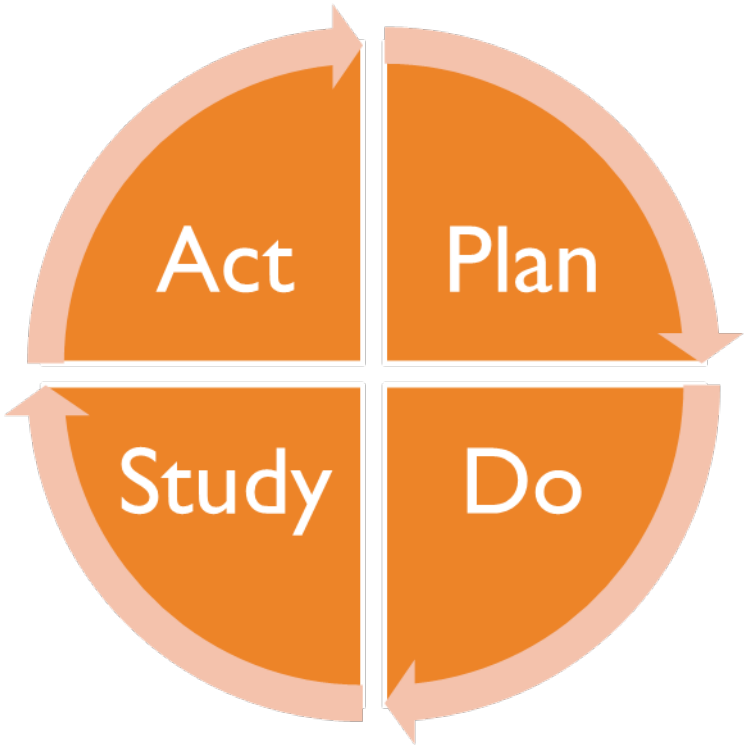
- One to two words to describe biggest barrier to improving sepsis care?

AHRQ OVERVIEW OF IMPROVEMENT MODELS

1. Emphasis on **leadership**;
   - Hold people accountable
   - Communicate vision and strategy
   - Eliminate cultural and other barriers
2. Clear **goals**
3. Use of **measurement and analysis** (identify gap and guide solution)
4. Emphasis on **stakeholders** as participants
5. Use of **structured, iterative processes** to implement interventions
   - And support analysis and implementation
6. **Monitoring** of front-line clinical activity (observations)
7. Report process data as **feedback** on effects of change or to track the progress of the implementation process
8. **Transparent Metrics**

https://www.ahrq.gov/cahps/quality-improvement/improvement-guide/4-approach-qi-process/sect4part2.html

IHI MODEL FOR IMPROVEMENT



What are we trying to accomplish?

How will we know that a change is an improvement?

What change can we make that will result in improvement?

https://www.ihi.org/resources/Pages/HowtoImprove/default.aspx

Sample Review Sheet

Sepsis Review FIN Sepsis Time Septic Shock Time

Arrival ED 10/24/22 09:42
ED Sepsis Advisory 10/24/22 10:27
Admission ICU 10/24/22 17:51
10/24/22 10:24 HPI

Providers:

Nurses:

Sepsis 3-Hour Bundle

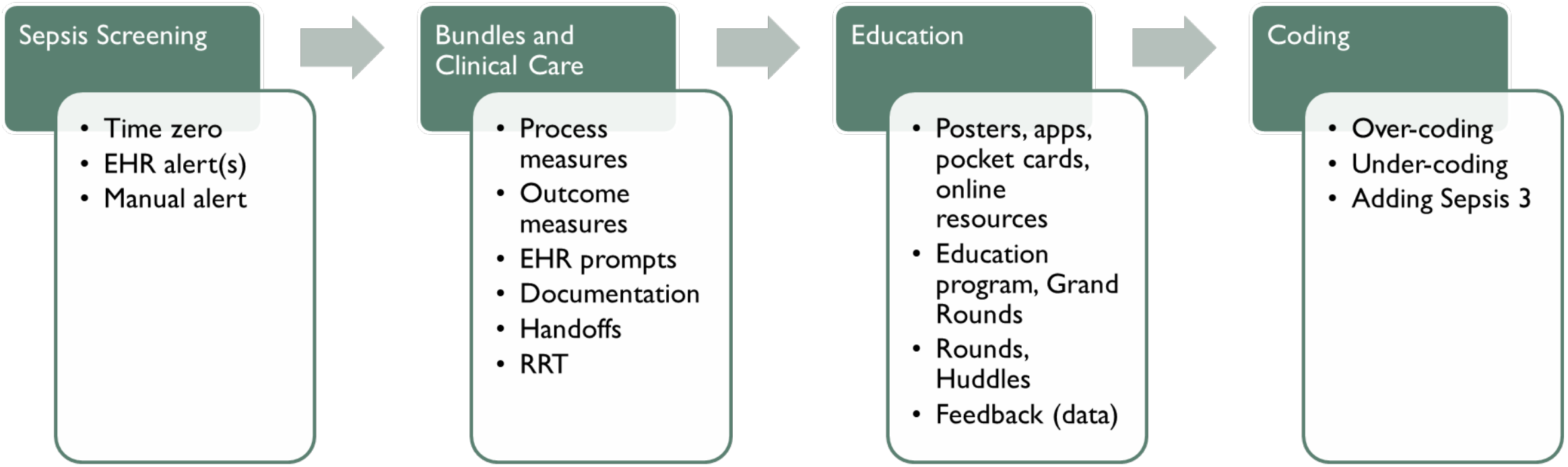
- **Lactate** and repeat if initial > 2 mmol/L within 6 hours.
- **Blood Cultures** prior to antibiotic(s)
- **Antibiotic(s)**
- **Fluid Resuscitation** with 30 mL/kg crystalloid fluid for SBP < 90, MAP < 65, OR initial Lactate ≥ 4 mmol/L May give less fluid for documented patient volume overloaded, concerns for heart failure, renal failure, or patient responded to lesser fluids

Septic Shock 6-Hour Bundle

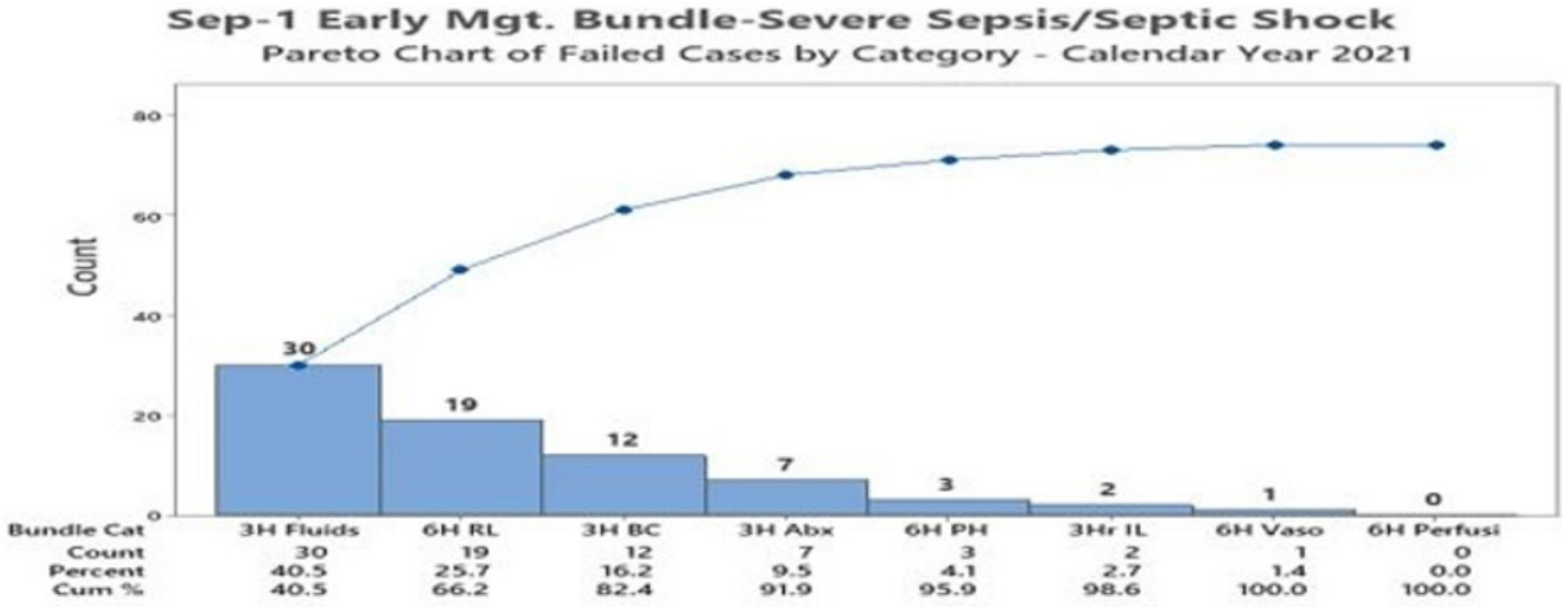
A. **Provider reassessment** volume status and tissue perfusion assessment documented after initial volume
B. **Vasopressor** for hypotension after volume resuscitation
C. **Persistent hypotension*** nursing documentation of BP with hour of calculated 30 ml/kg or lesser target volume with 2 consecutive BP reading

3 Hour Bundle		Metric Met	Comments
Lactate	3.9 (resulted 10:40)	☒ Yes ☐ No	
Blood Cultures	Ordered 10:21, obtained 10:15)	☒ Yes ☐ No	
Antibiotic	Cefepime (ordered 10:21, given 11:52) Vanco (ordered 10:21, given 12:50)	☒ Yes ☐ No	
Fluid Resuscitation with 30 ml/kg or targeted volume	1L NS (ordered 10:46, given 10:56) 1L NS (ordered 10:46, given 11:52) 1L NS (ordered 10:46, given 12:50)	☒ Yes ☐ No	Weigh 49 kg x 30 = 1470 Total volume =3500 with vanco Fluid Time to Targeted infusion ~11:15
Persistent Hypotension*	11:09 SBP 90 11:31 SBP 86 11:36 SBP 78	☒ Yes ☐ No ☐ NA	Need BP documented within hour of targeted fluids.
Repeat Lactate	1.7 (resulted 14:00)	☒ Yes, ☐ No ☐ NA	
Vasopressors	Norepi (ordered 11:35, given 11:46)	☒ Yes, ☐ No ☐ NA	
Provider Reassessment	12:12 Initial lactate 3.9. S/p 3 L IVF. Would not give additional fluids at this time based on review.	☒ Yes, ☐ No ☐ NA	
	Composite bundle measure	☒Pass ☐ Fail	

SEPSIS CARE OPPORTUNITIES



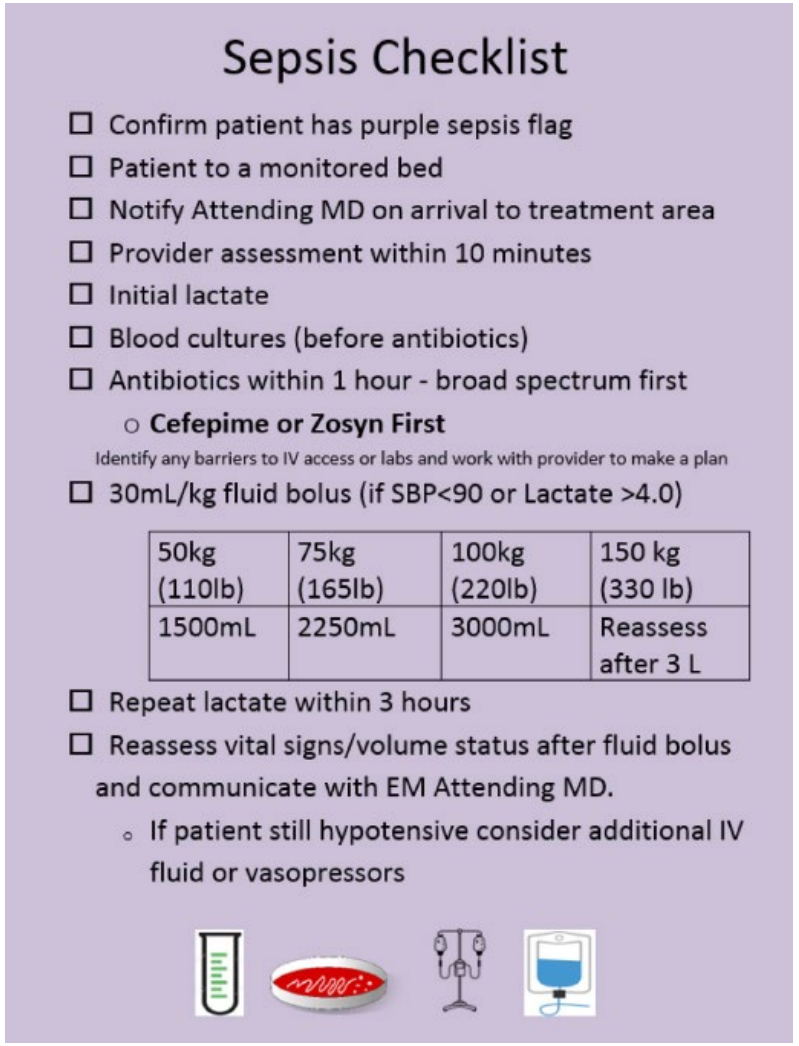
Microsoft Stock Image



RECENTLY PUBLISHED PI EXAMPLES

MULTIDISCIPLINARY ED SEPSIS HUDDLE

- 999 bed Academic center and Level I trauma center
- **Gap analysis** revealed communication key area of focus
- Intervention
  - Sepsis Huddle with checklist
  - After positive screen
  - Provider, nurse, ED pharmacist
- Results (statistically significant)
  - Time 0 to antibiotics and first lactate



Sonis JD, et al. *AJEM*. 2020;38:2400-2404.

ED NURSE SEPSIS IDENTIFICATION TOOL

- 310 bed hospital
- **Gap analysis** revealed failure to recognize early signs/symptoms
- Intervention
  - ER nurse sepsis screening tool (paper)
- Results (statistically significant)
  - Time to bundle completion
  - Time to antibiotics

ER Nurse Sepsis Identification Tool

1. ID patients with 2 or more SIRS indicators at triage
2. If positive, "code sepsis" called overhead and ER provider notified to implement sepsis order set
3. Tool was used to track progress of bundles
4. If patient admitted, tool was part of of SBAR process and given to inpatient nurse
5. Tools reviewed weekly

Threatt DL. *J Nurs Care Qual*. 2020;35(2):135-139.

INTERDISCIPLINARY CODE SEPSIS TEAM

- 238 bed Community hospital
- **Gap analysis** revealed failure to improve bundle measures/outcomes
- Intervention
  - ER nurse sepsis screening tool (paper)
- Results
  - Improvement in time to each bundle element except antibiotics and blood cultures
  - Statistically significant fluid resuscitation, initial LA, and time to second LA
  - Mortality rates showed steady decline

ED Sepsis-Alert Algorithm

1. Existing electronic sepsis alert to trigger RN completion of full sepsis screen
2. Criteria for Code Sepsis Team
   a) Infection with 3 SIRS
3. If positive, RN would call switchboard and state "sepsis alert ED room X, patient name or MRN"
4. Page sent to unit coordinator, technician, pharmacist, RT, and sepsis project lead
5. UC would notify provider
6. Team begin sepsis checklist and order set
7. Checklist used for handoff

Delawder J, Hulton L. *JEN*. 2020;46:91-98.

NURSE-DRIVEN RRT PROTOCOL

- Acute care area of the study institution
- **Gap analysis** revealed poor bundle compliance
- Intervention
  - Suspected Sepsis Protocol implemented by RRT
  - RRT consists of 1-2 critical care trained RNs
- Results
  - Time to antibiotic ↓'d by ½ (269 min -135 min)
  - Fluid resuscitation volume was higher doubling compliance rate

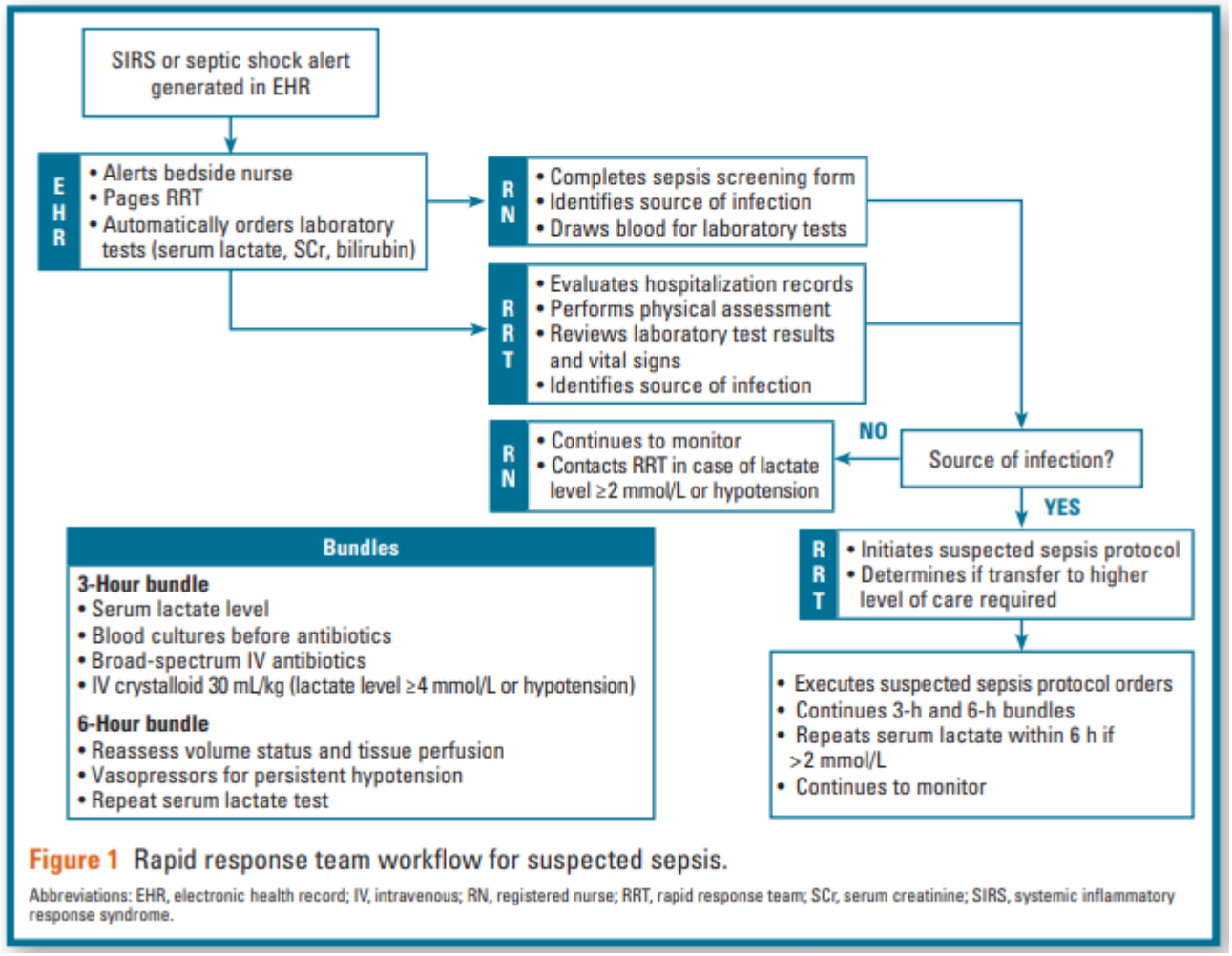


Figure 1 Rapid response team workflow for suspected sepsis.

Abbreviations: EHR, electronic health record; IV, intravenous; RN, registered nurse; RRT, rapid response team; SCr, serum creatinine; SIRS, systemic inflammatory response syndrome.

Semanco M, Wright S, Rich RL. *Crit Care Nurs*. 2022;42(5).51-57.

WHY WE DO WHAT WE DO

https://youtu.be/12Qbnn6XfH0

You must be the change you wish to see in the world.

Mahatma Gandhi

Pictures from Microsoft Stock Images

THANK YOU

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Sepsis Resources

- American Association of Critical Care Nurses - https://www.aacn.org/clinical-resources/sepsis
- Center for Disease Control - https://www.cdc.gov/sepsis/index.html
- Centers for Medicare & Medicaid ICD-10-CM Official Guidelines for Coding and reporting - https://www.cms.gov/files/document/fy-2022-icd-10-cm-coding-guidelines-updated-02012022.pdf
- European Society of Intensive Care Medicine - https://www.esicm.org/resources/sepsis-resources/
- Global Maternity Sepsis Study - https://srhr.org/sepsis/resources/
- Sepsis Alliance – https://www.sepsis.org
- Society of Critical Care Medicine - https://www.sccm.org/SurvivingSepsisCampaign/Home
- UK Sepsis Trust - https://sepsistrust.org/about/about-sepsis/
- World Federation of Critical Care Nurse - https://wfccn.org/sepsis-materials/
- World Health Organization - Sepsis (who.int)
- World Sepsis Day - https://www.worldsepsisday.org/declaration

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