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Sepsis Care in 2022: Identification and Management Strategies to Optimized Patient Outcomes

Compass, Telligen, IPRO and Alliant

Joint Hospital Quality Improvement Contract (HQIC) Learning and Action Network

August 25, 2022

We will get started shortly!

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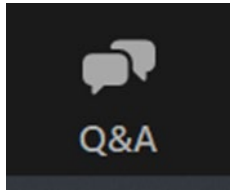

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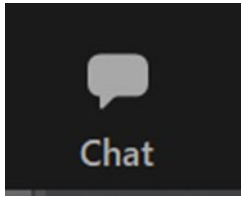
- This event is being recorded



Glossary

- BSI – Bloodstream Infection
- CAUTI – Catheter Associated Urinary Tract Infection
- ESM- EPIC Sepsis Model
- ED – Emergency Department
- EGDT – Early Goal Directed Therapy
- qSOFA- Quick SOFA Score
- MAP- Mean Arterial Pressure
- SBAR (Situation, Background, Assessment, Recommendation)
- EMR- Electronic Medical Record
- HAPI – Hospital-Acquired Pressure Injury
- POA – Present on Admission
- SOFA (Sequential Organ Failure Assessment)
- VAP – Ventilator Associated Pneumonia
- RSVP (reason, story, vital signs & plan)
- IV- Intravenous
- SaO2 –Saturation
- Hct – Hematocrit
- CI – Cardiac Index
- VO2 – Venous Oxygen
- UO – Urine Output
- NNT – Number Needed to Treat
- ARISE – Australasian Resuscitation in Sepsis Evaluation
- LOS – Level Of Sedation
- ARR – Absolute Risk Reduction
- RR –Respiratory Rate
- HCA – Hospital Corporation of America
- FTE – Full time equivalent
- CNS – Central Nervous System
- SSC – Surviving Sepsis Campaign
- ICU – Intensive Care Unit
- HRET – Health Research and Educational Trust
- VAE – Ventilator Associated Event
- VAP –Ventilator Assisted Pneumonia
- CLABSI – Central Line Blood Stream Infection
- CVP – Central Venous Pressure
- ScvO2 – central venous saturation
- IE – for example
- IHI – Institute for Health Care Improvement
- PDCA – Plan-Do-Check-Act
- QI – Quality Improvement
- PI – Performance Improvement
- CHF –Congestive Heart Failure
- EF – Ejection Fraction
- MD – Medical Doctor
- SIRS- Systemic Inflammatory Response Syndrome
- RRT – Rapid Response Team

Course Speaker

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Sepsis Care in 2022: Identification and Management Strategies to Optimized Patient Outcomes

Pat Posa RN, BSN, MSA, CCRN-K, FAAN
Quality and Patient Safety Program Manager
Ann Arbor, MI
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Overview-Objectives

Summarize	Examine	Identify
Summarize the four-tier process for effective sepsis program development	Examine the evidence for the sepsis bundles and share proven strategies to resolve barriers in implementation and measurement.	Identify gaps between the evidence and your hospital's sepsis program

Polling Question

Who is with us today?

- Quality coordinator
- Sepsis coordinator
- Chief Medical Officer , Chief of Nursing, Chief Executive Officer
- Unit manager
- Physicians/Advanced Practice Providers
- Frontline nurses
- Nurse educators
- Clinical nurse specialist

Sepsis is a Public Health Problem

- Affects **>1.7 million** Americans per year
- Sepsis occurs in just **10% of United States hospital patients**, but it contributes to as many as half of all hospital deaths
- **3rd leading cause of death** in the US
- **$41.5 billion** spent on sepsis inpatient care and skilled nursing for Medicare beneficiaries in 2018
- **1-week mortality** for Medicare beneficiaries with sepsis is **18% vs 4.1%** with no sepsis
- **87%** of all adult sepsis cases begin outside the hospital

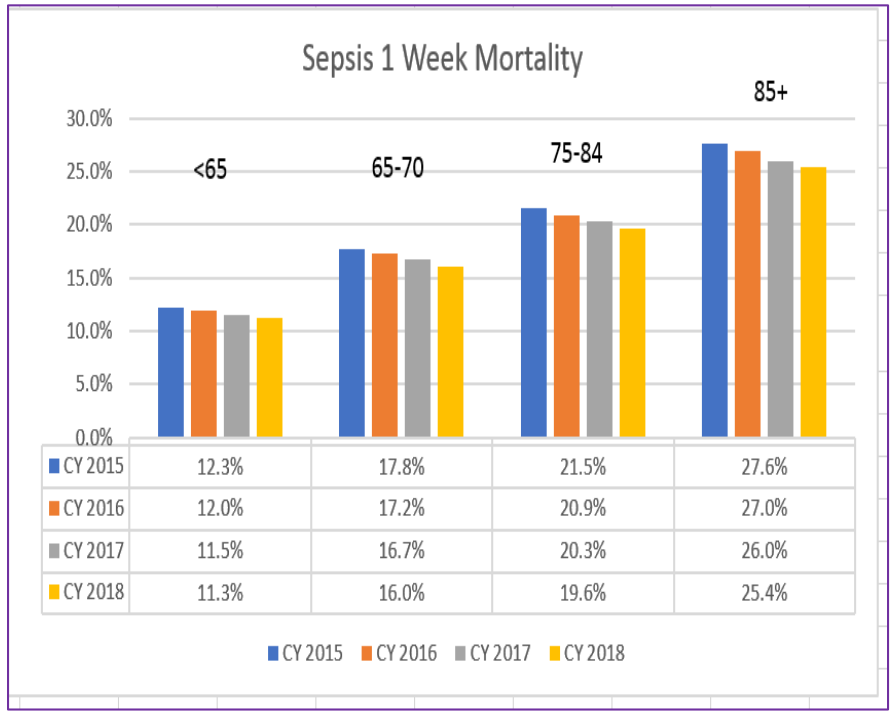
700 people die each day from sepsis in the U.S.

One every 2 minutes

Rhee C, et al. *JAMA*. 2017;318(13):1241-1249.
Angus DC, et al.. *Crit Care Med* 2001;29:1303-10.
Buchman TG, et al. Crit Care Med. 2020;48(3):276-288.
Novosad SA, et al. CDC Morbidity and Mortality Weekly Report., 2016;65(33):864-869
Buchman TG, et al. Crit Care Med. 2020;48(3):276-288

Sepsis Admissions and Mortality for Medicare Beneficiaries

Over the 7-year study interval, the rate of sepsis admissions increased by 50%.

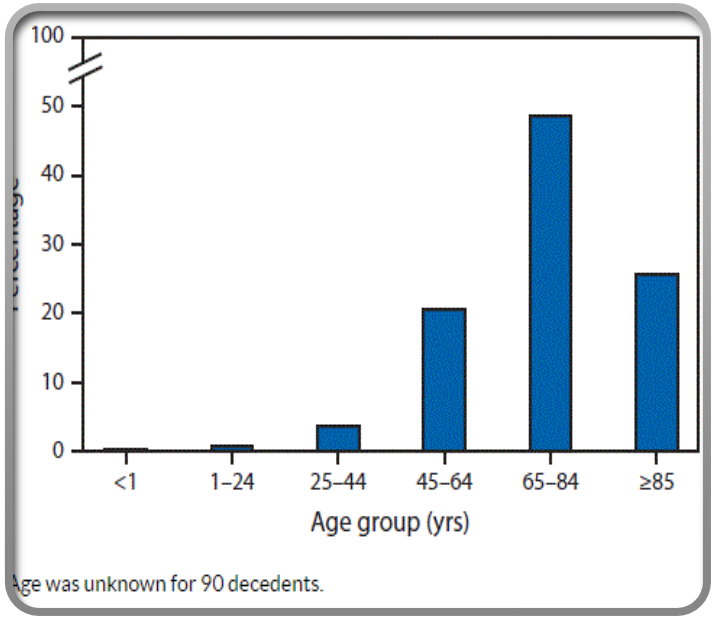


Mortality after hospital discharge is high

- The one-week mortality after discharge among Medicare beneficiaries for
  - Septic shock 40.6%
  - Severe sepsis 15.3%
  - Unspecified sepsis is 11%.
- 6-month after discharge (CY 2018), Medicare beneficiaries mortality rate;
  - septic shock 60%
  - severe sepsis 36%
  - unspecified sepsis 30.9%.
- This high mortality rate continues at 1 and 3 years post initial sepsis hospitalization.

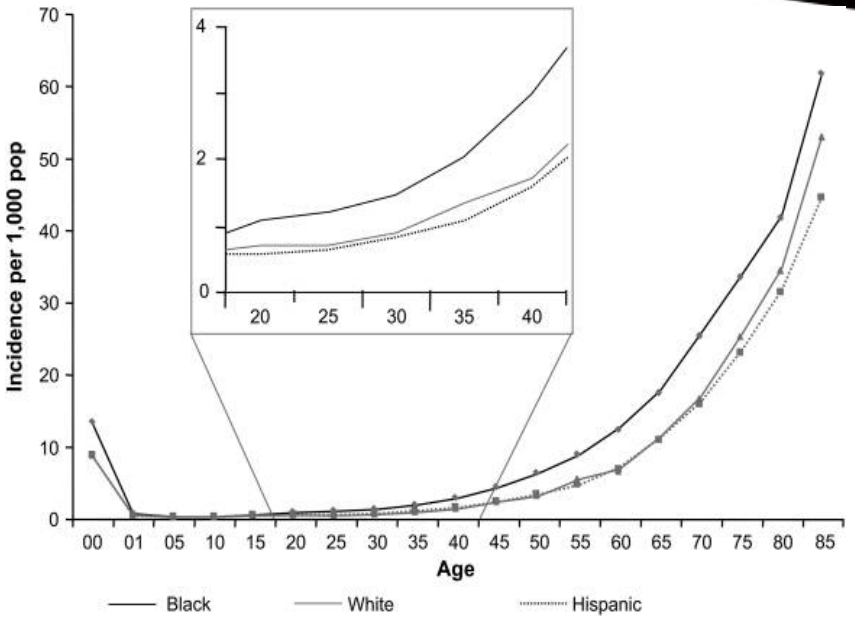
Buchman TG, et al. Crit Care Med. 2020;48(3):276-288, Supplement

Sepsis Deaths by Age Group and Ethnicity



Sepsis Deaths by Age Group

- (N = 2,470,666) based on death certificate data, by age groups* — United States, 1999–2014



Rates of Severe sepsis by ethnicity

- Blacks (6.08 per 1,000)
- Hispanics (4.06 per 1,000)
- Whites (3.58 per 1,000)

Epstein L, MMWR Morb Mortal Wkly Rep 2016;65:342–345.
DOI: http://dx.doi.org/10.15585/mmwr.mm6513a2 (Link)
Barnato AE *Am J Respir Crit Care Med*. 2008;177(3):279-284

Implicit Bias/Disparities in Sepsis

- Disparities have also been noted in racial minorities, as some studies have observed higher adjusted rates of complications and deviations from standards of practice in the management of sepsis in these groups compared with white populations.
- Schrader and Lewis investigated racial disparities in the emergency room triage process and reported that black patients had longer wait times and lower acuity ratings than white patients.
- Although several factors, including poverty and reduced access to healthcare, could contribute to the poorer outcomes in racial minorities, variability in care persists despite adjustments.

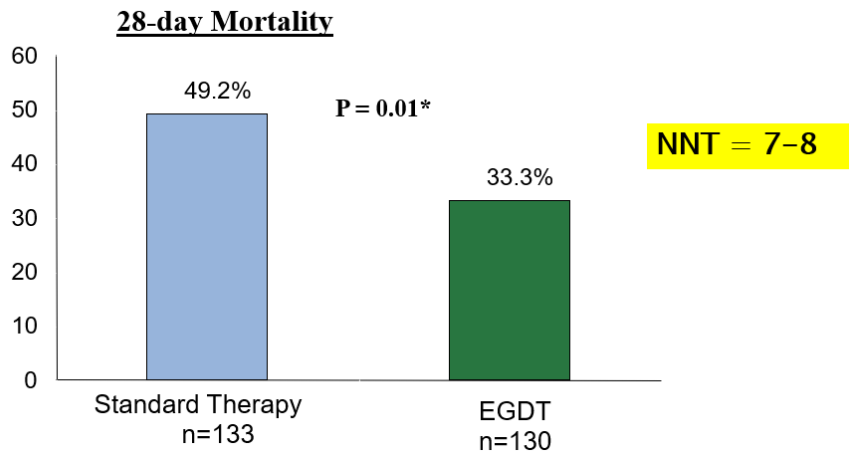
DiMeglio M, *Healthcare (Basel)* 2018;6(4):133
Schrader CD, J E*merg Med.* 2013;44:511-518.

Managing Sepsis

Early Goal Directed Therapy

Methodology: 263 severe sepsis patients

- EGDT
  - Continuous ScvO2 monitoring and tx with fluids, blood, inotropes and/or vasoactives to maintain:
    - ScvO2 ≥70%, SaO2 ≥ 93%, Hct ≥ 30%, CI/VO2
    - CVP ≥ 8-12
    - MAP ≥ 65
    - UO ≥ .5ml/kg/hr
- Standard Therapy
  - CVP > 8-12
  - MAP > 65
  - UO > .5ml/kg/hr



Rivers et. al. N Engl J Med. 2001;345;19:1368-1377.

Changing Paradigm: Septic Shock Management

ProCESS

- ProCESS trial – randomized, 31 centers, 1,341 patients

ARISE

- ARISE trial – randomized, 51 centers (mostly Australia and New Zealand), 1,600 patients

ProMISe

- ProMISe – randomized, UK, 56 centers, 1,260 patients

Results of Three International Studies (2014-2015)

- ARISE and ProMISe had two groups: EGDT* and usual care
- ProCESS had three groups: EGDT, structured resuscitation and usual care
- Before randomization, all patients received antibiotics and an average of 2500 mL of NS (equal to 30 ml/kg), had blood cultures and lactate drawn
- No statistically significant difference in mortality between groups
- Mortality rate 18 % for ARISE and ProCESS
- Mortality rate 30 % for ProMISe

ORIGINAL ARTICLE

Time to Treatment and Mortality during Mandated Emergency Care for Sepsis

Christopher W. Seymour, M.D., Foster Gesten, M.D., Hallie C. Prescott, M.D., Marcus E. Friedrich, M.D., Theodore J. Iwashyna, M.D., Ph.D., Gary S. Phillips, M.A.S., Stanley Lemeshow, Ph.D., Tiffany Osborn, M.D., M.P.H., Kathleen M. Terry, Ph.D., and Mitchell M. Levy, M.D.

- In 2013, New York began requiring hospitals to follow protocols for the early identification
- April 2014 to June 30, 2016
- 49,331 patients at 149 hospitals
- 82.5% had the three-hour bundle completed within three hours (median time was 1.3 hours)
- Longer time to completion of the three-hour bundle was associated with higher risk-adjusted, in-hospital mortality as well as longer time to administration of antibiotics (14% higher for both)

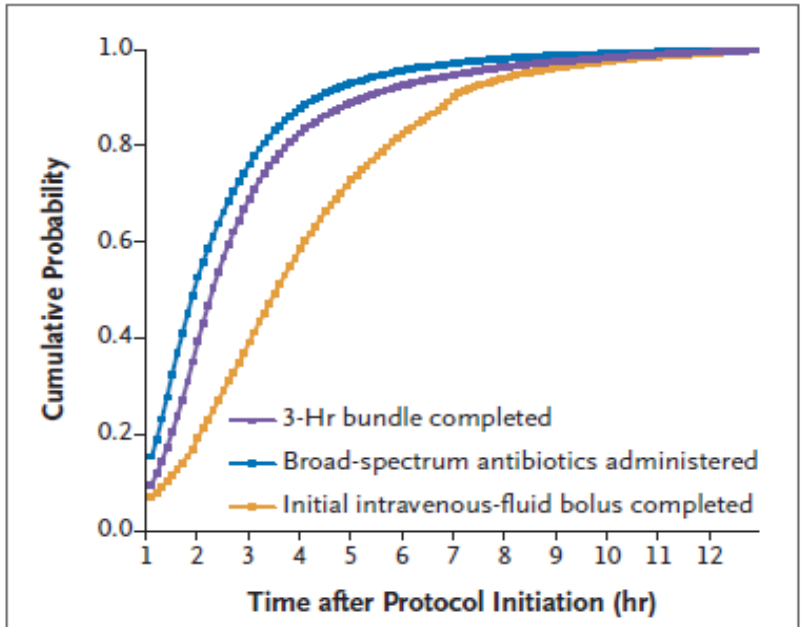


Figure 1. Cumulative Probability of Completion of the 3-Hour Bundle, Administration of Broad-Spectrum Antibiotics, and Completion of the Initial Intravenous-Fluid Bolus after the Time That the Sepsis Protocol Was Initiated.

The 3-hour bundle for the care of patients with sepsis or septic shock had to include receipt of the following care within 3 hours: obtaining of a blood culture before the administration of antibiotics, measurement of the serum lactate level, and the administration of broad-spectrum antibiotics; however, protocols could be tailored by each hospital. We also assessed the time to the administration of broad-spectrum antibiotics and the time to the completion of an initial bolus of intravenous fluids.

Effect of Bundle Compliance with SEP-1 on Mortality among Medicare Beneficiaries with Sepsis

- A propensity score matched cohort study
  - Standard and stringent
- 3241 hospitals from 10/01/2015 to 03/31/2017
- Compliance was completion of all SEP-1 elements
- 2 matches completed to evaluate population level effects
  - Standard: 122,870 compliant matched to those care were non-compliant
  - Stringent:107,016 compliant matched with those care were non-compliant
- Outcome Measures:
  - 30-day mortality
  - Changes in LOS

Townsend SR, et al. Chest. Article in Press September 2021

Compliance with SEP-1 Decrease Mortality

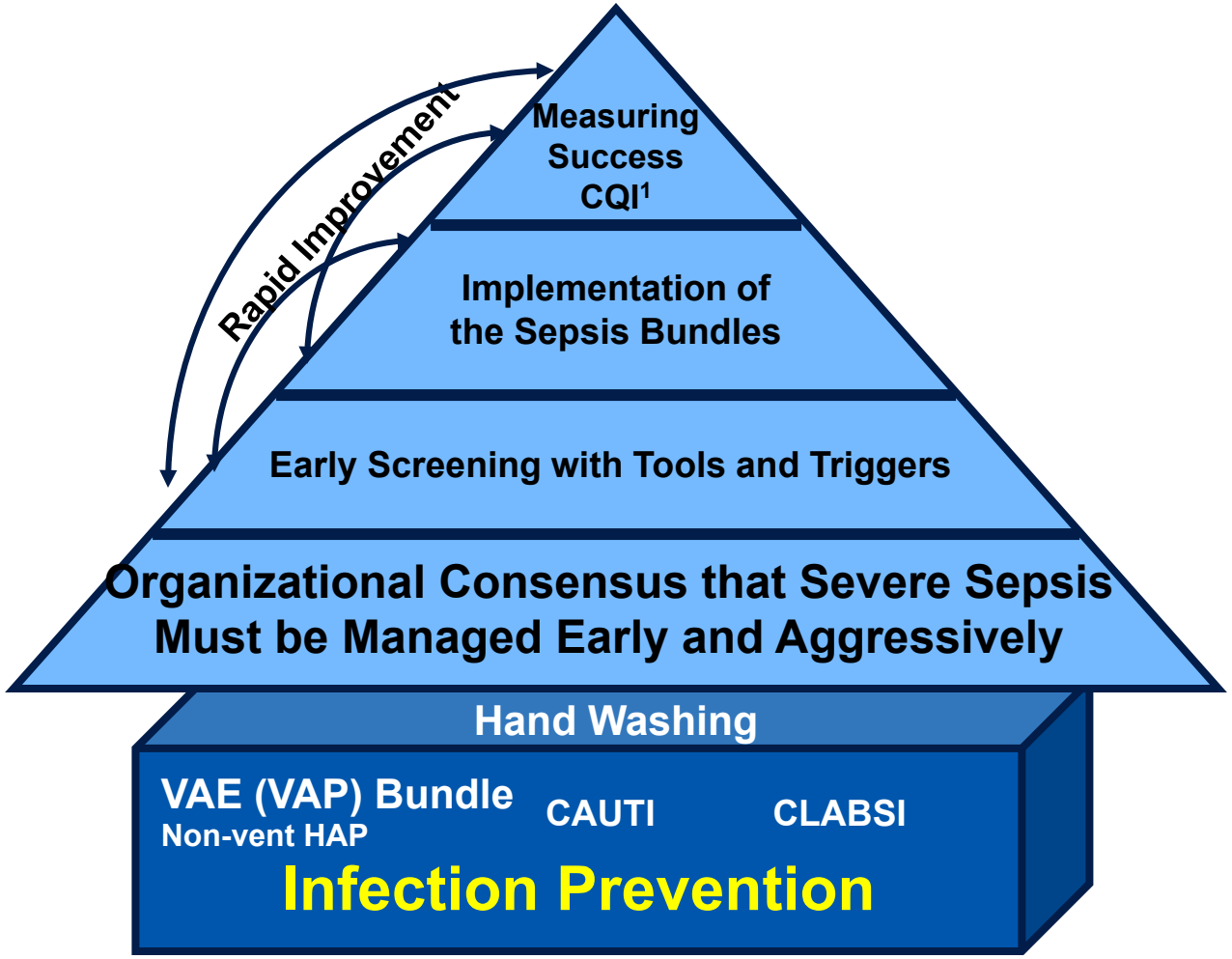
Compliant Care 30-day Mortality	Non-Compliant Care 30-day Mortality
21.81%	27.48%

ARR = 5.67%	RR = .794	NNT = 17.65
(95% CI,5.33-6.0;p < .001)	(95% CI, 0.783- 0.805)	(95% CI, 16.66-18.76)

Compliant care: LOS 5 days vs 6 days (p<.001)

Townsend SR, et al. Chest. Article in Press September 2021

Sepsis Practice Collaborative Model
4 Tier Process for Program Implementation



Documentation Improvement ~ Accurate Coding

Adapted from: Sepsis Solutions International

[1]Continuous Quality Improvement

GAP Analysis

COMPONENTS	YES	NO	NA	Action Steps
Organizational Commitment/ Team				
Physicia				
action p				
Multidis				
meeting				
manage				
ICU, Me				
Executiv				
and pro				
Sepsis T				
or qualit				
Managir				
quality,				
Baseline				
and out				

Identification/ Screening	
Early alert or warning system/process in place in the ED or describe triggers	
screening:	
ED	
ICU	
INPATIENT UNITS	
PERINATAL	
PEDIATRICS	
Is a screening process compl as designed?	
All ED patients are screened/ sepsis in triage?	
All ICU patients are screened sepsis upon admission and e describe process	
All med surg patients are scr for sepsis upon admission an describe process	
All OB patients are screened	

Implementing the Bundles				
Sepsis order sets are in place and utilized by providers (CPOE/Paper)				
Sepsis provider documentation place and utilized to meet SEP-				
Communication between physi related to diagnosis and treatm specific for sepsis; handoffs rea appropriate sepsis language				
Appropriate utilization of centr adequate skill and resource to when clinical criteria met				
Able to get lactate levels in one				
Able to get antibiotics in one ho hours for ED				
Process in place for reassessme status and tissue perfusion for patients				
Identify resistance/barriers to bundles and developed solutio blood cultures before antibiotic lactate, etc.)				

COMPONENTS	YES	NO	NA	Action Steps
Measurement/Continuous Improvement				
Define real time method for tracking patients (i.e., severe sepsis patient log)				
Define concurrent review process for core measure and core measure defect review process				
Sepsis Coordinator rounds in clinical areas to answer questions and ensure appropriate implementation of the bundles				
Provide a sample of topics for the team meeting				
Do you have a way to know your data elements that fall out each month and a process for follow up?				
Do you have a process to address deviations from evidence based care processes with physicians, nurses, and other clinical staff				
Education				
Provider Education completed – Define in status column				
Nursing Education completed – Define is status column				
General Sepsis Education – Define in column				
Tools to assist bedside staff have been implemented (i.e., algorithm, clinical pathway, pocket cards, etc.)				

Tier I: Organizational Consensus and Support Milestones and Checklist

1. Define Sepsis Program Goal and aligned with organizational goals
2. Identify Executive sponsor
3. Collect Baseline Data—essential step
4. Develop sepsis team(do we have all the right people here?) and schedule monthly(minimum) meeting for at least 6 months
5. Identify **nursing** and **physician champions** in ED and ICUs and ensure champions attend team meeting
   - Create a sepsis coordinator position to oversee program
6. Begin to define action plan and timeline for program development and implementation

Impact of Sepsis Coordinator

HCA added sepsis coordinators to all facilities (FTE was based upon sepsis volume)

- Severe sepsis/septic shock mortality dropped from 22% to 15%
- Bundle compliance improved to 61%
- Other key elements initiated were order sets, sepsis alerts, routine screening, sepsis champions and community outreach

Sepsis Coordinator Network

- 1,682 members
- 1,448 hospitals and facilities

www.sepsisalliance.org

Presentation at Colorado Hospital association Sepsis Program

The role of nursing best practice champions in diffusing practice guidelines: a mixed methods study Worldviews EvidBased Nurs.2010 Dec;7(4):238-51. doi: 10.1111/j.1741-6787.2010.00202.x. Epub2010 Sep 28.

Role of the Sepsis Coordinator

- Facilitates implementation/evaluation of the Sepsis program including all systems necessary for the multidisciplinary approach throughout the continuum of care.
- Makes regular rounds on sepsis patients to evaluate appropriateness of orders, treatment plans, nursing intervention, physician documentation and compliance with the Sepsis bundle
- Utilizes currently available reports to identify sepsis cases and facilitates data collection process and assesses and analyzes outcomes.
- Collaborates with frontline staff to identify on-going care concerns related to sepsis care
- Collaborates with leadership and colleagues in identifying sepsis quality of care issues

Determines baseline compliance with physician documentation and compliance with the Sepsis bundle.

Provides real time/detailed feedback to all clinical providers and departments and scheduled updates to the Sepsis Collaborative Team and work groups.

Assist the rapid response team and other hospital staff, when necessary, if dealing with a patient situation

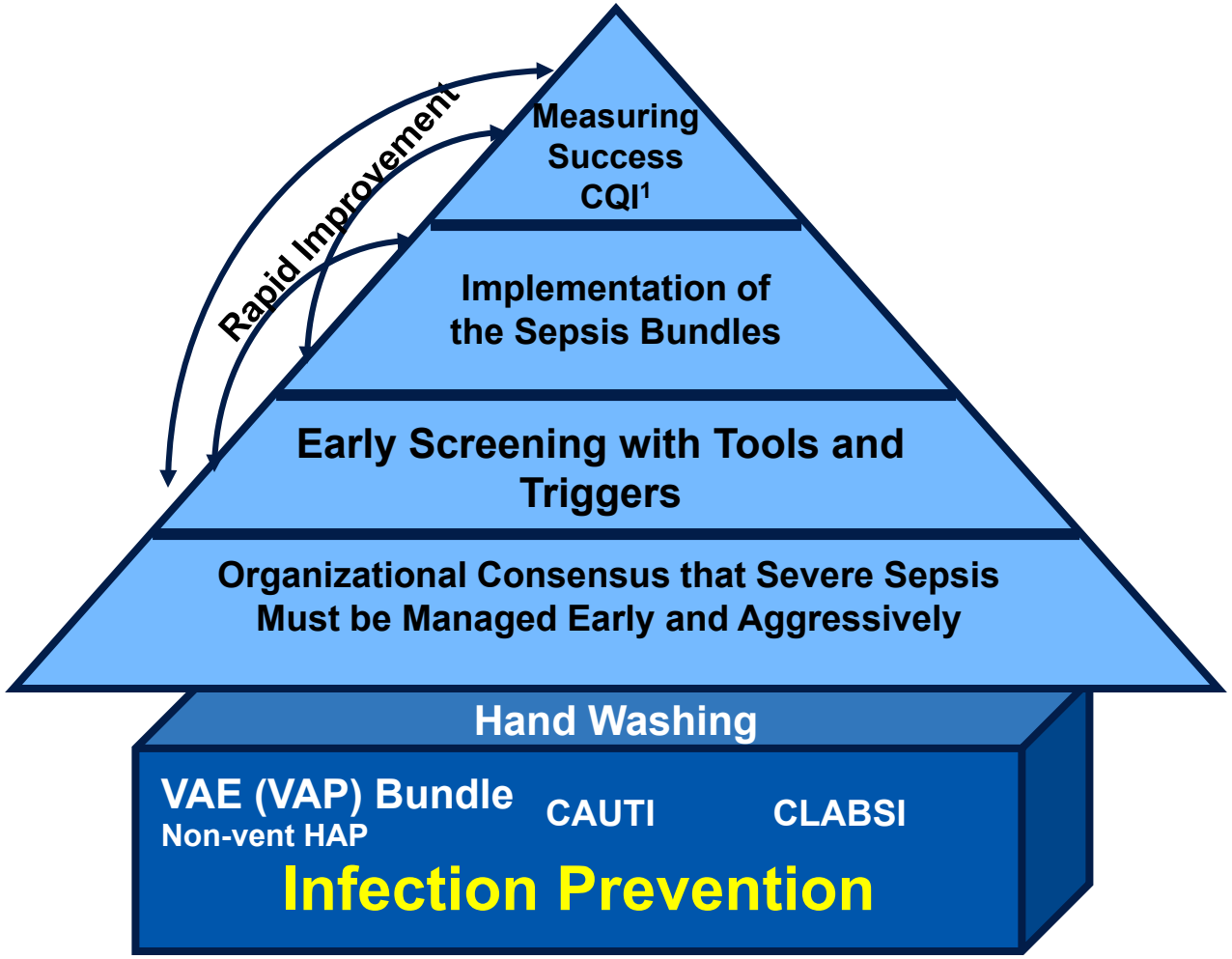
Conducts sepsis organizational tracers to identify quality and safety issues.

Analyze data to identify trends and issues, also use improvement tools to assist with problem solving and action planning.

Provides formal and informal education to medical and clinical staff.

Maintains knowledge of current trends and developments in the sepsis management, fields of quality, and safety.

Sepsis Practice Collaborative Model
4 Tier Process for Program Implementation



Documentation Improvement ~ Accurate Coding

Adapted from: Sepsis Solutions International

[1]Continuous Quality Improvement

Tier II: Screening for Severe Sepsis Milestones and Checklist

- Routine screening process for ED, rapid response team, ICU and house wide
- Develop audit process to evaluate compliance and effectiveness
- Ensure screening process has clear “next steps” defined for nursing staff

If you don’t screen you will miss patients
that may have benefited from the interventions

1. Dellinger RP, Levy MM, Carlet JM, et al. Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock: 2008. *Crit Care Med.* 2008;36:296-327.
2. Schorr C. et al Journal of Hospital Medicine, 2016;11:S32-S39

What is Sepsis?

- “Sepsis is a life-threatening complication of infection that arises when the body’s response to infection injures its own tissues and organs.”

How is sepsis identified?

	Sepsis-1	Sepsis-2	Sepsis-3
Sepsis	Infection + 2+ SIRS criteria*	Infection + Expanded diagnostic criteria	Infection + acute organ dysfunction (suggest 2+ SOFA points)
Severe Sepsis	Sepsis-1 + acute organ dysfunction	Sepsis-2 + acute organ dysfunction	
Septic Shock	Sepsis + Hypoperfusion (SBP<90 or lactate ≥ 4mmol/L)	Sepsis + hypoperfusion (SBP<90 or lactate ≥ 4mmol/L)	Sepsis + hypotension + lactate > 2

*SIRS criteria:
Temperature <36 C or >38C
Heart Rate >90
Resp Rate >20
WBC <4 or >12

Sepsis-1: Bone, *et al. Chest*, 1992.
Sepsis-2: Levy, *et al. Crit Care Med*, 2003.
Sepsis-3: Singer, *et al. JAMA*, 2016.

SOFA

qSOFA: (have 2 or more of these, then evaluate for SOFA)

Respiratory Rate≥ 22
Altered Mental Status
Systolic BP ≤ 100mmHg

2+ Sequential (Sepsis-Related) Organ Failure Assessment (SOFA) points:

Respiration: $PaO_2/FIO_2 < 300$
Coagulation: Platelet count $<100 \times 10_3/\mu L$
Liver: bilirubin: ≥2.0 mg/dL
Cardiovascular: receiving vasopressor support
CNS: Glasgow coma scale <13
Renal: creatinine ≥ 2.0 mg/dL

- 13% to 50% of patients with infections who died within 30 days had a q SOFA score of ≥ 2 at ED presentation
- Predictors of mortality, not designed to predict an etiology of illness

Uffen JW et al. Clinical Microbiology and Infection. 2020 in press

Sepsis 3:

Singer et al, JAMA 2016. PMID: 26903338

- **Sepsis is:** 'life-threatening organ dysfunction caused by a dysregulated host response to infection'
  - Sepsis-3 does away with:
    - SIRS criteria (sepsis is pro- and anti-inflammatory)
    - Severe sepsis (sepsis = the old severe sepsis)
    - Antiquated concepts: sepsis syndrome; septicemia
- **Sepsis:** infection plus 2 or more SOFA (Sequential Organ Failure Assessment) points
- **Septic shock:** vasopressor-dependent hypotension + lactate >2

Sepsis-3 includes clinical criteria to predict life-threatening disease

Challenges with New Sep-3 Definitions

- SIRS not part of the definition:
  - the most appropriate use for SIRS is that its presence prompts an immediate search for both infection, as its possible source, and organ dysfunction, as its possible companion
- Doesn't recognize 'cryptic shock'
- People will begin to use qSOFA as a screening tool
  - qSOFA and SOFA are predictors of mortality; they are not test of early sepsis at risk to progress to organ failure
- Only their predictive ability for morality and prolonged ICU stay have been evaluated, not their utility in reducing mortality

Simpson, S. Chest. January 2018 SIRS in the Time of Sepsis-3

"As the physician say of hectic fever, that in the beginning of the malady it is difficult to detect but easy to treat, but in the course of time, having been neither detected nor treated in the beginning, it becomes easy to detect but difficult to treat"

Niccolo Machiavelli, 14th Century

Simpson, S. Chest. January 2018 SIRS in the Time of Sepsis-3

SSC Guidelines-2021

MODERATE

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

qSOFA: 3-point scale for predicting mortality among patients with suspected infection

Box 4. qSOFA (Quick SOFA) Criteria

Respiratory rate ≥22/min

Altered mentation

Systolic blood pressure ≤100 mm Hg

Screening for Patients Likely to Have Sepsis

Annals of Internal Medicine

qSOFA, Cue Confusion

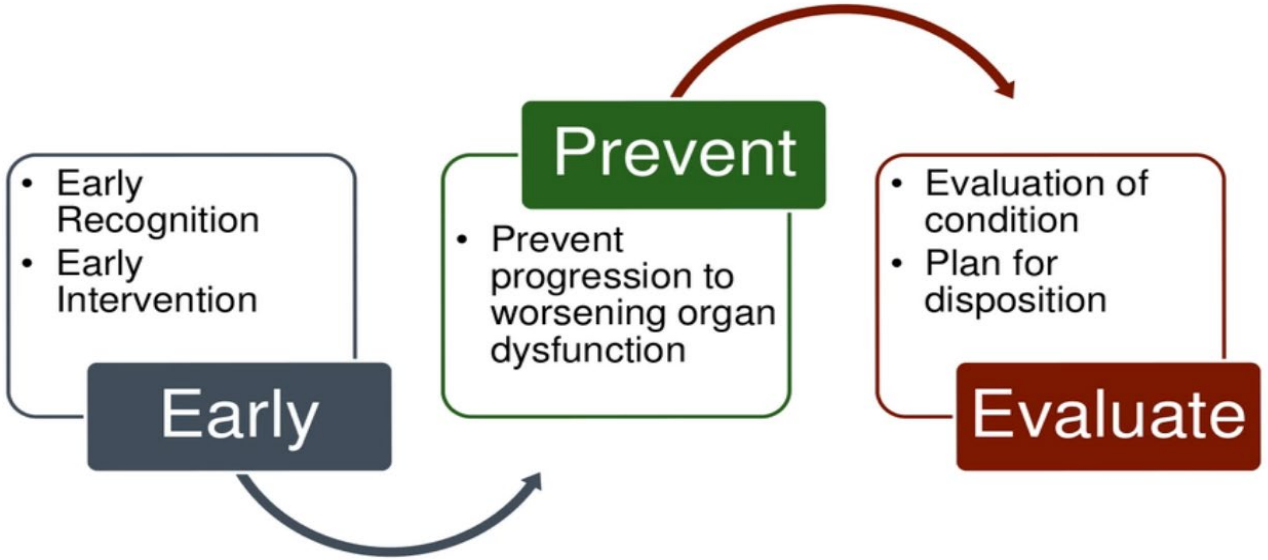
Singer, *et al. JAMA*, 2016.
Singer and Shankar-Hari. *Annals of Internal Medicine*, 2018.

qSOFA was developed as a risk prediction tool

Sep-2 Definitions (used by CMS and coders)

- **Infection**
- **Sepsis:** infection plus 2 or more SIRS
- **Severe Sepsis:** infection plus 2 or more SIRS plus new organ dysfunction
- **Septic Shock:** severe sepsis with a lactic acid greater than or equal to 4mmol/L OR continued hypotension (systolic BP<90 or 40mmHg decrease from their baseline) after initial fluid bolus (30ml/kg)

What is the Purpose of Nurse Screening



Source:
Empowering Nurses for Early Sepsis Recognition accessed on https://www.youtube.com/watch?v=s687VMj6iwo (Link)

PATIENT CARE UNIT SEVERE SEPSIS SCREENING TOOL

SAINT JOSEPH MERCY HEALTH SYSTEM
A Member of Trinity Health

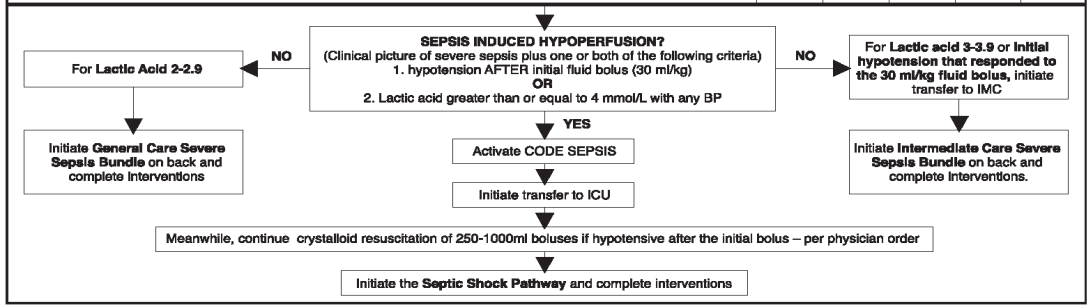
ST. JOSEPH MERCY ANN ARBOR
ST. JOSEPH MERCY LIVINGSTON
ST. JOSEPH MERCY SALINE

Patient Units Severe Sepsis Screening Tool

Severe Sepsis = Infection + SIRS + Organ Dysfunction

Directions: The screening tool is for use in identifying patients with severe sepsis. Screen each patient upon admission, once per shift and PRN with change in condition.

	DATE:					
	TIME:					
I.	**SIRS-Systemic Inflammatory Response Syndrome (two or more of the following):**					
	Temperature greater than or equal to 100.4°F or less than or equal to 96.8°F					
	Heart Rate greater than 90 beats/minute					
	Respiratory Rate greater than 20 breaths per minute					
	WBC greater than or equal to 12,000/mm3 or less than or equal to 4,000/mm3 or greater than 0.5 K/uL bands					
	Blood glucose greater than 140 ml/dL in non-diabetic patient					
	Negative screen for severe sepsis (Please initial)					
	if check two of the above, move to II					
II.	**Infection (one or more of following):**					
	Suspected or documented infection					
	Antibiotic Therapy (not prophylaxis)					
	If check none of above – Negative screen for severe sepsis (Please initial) – answer infection question NO in I-View					
	If check one of the above – anewer infection question YES in I-View, call physician for serum lactic acid order and move to III					
III.	**Organ Dysfunction (change from baseline) (one or more of the following within 3 days of new infection)**					
	Respiratory: SaO2 less than 90% OR increasing O2 requirements					
	Cardiovascular: SBP less than 90mmHg OR 40mmHg less than baseline OR MAP less than 65mmHg					
	Renal: urine output less than 0.5ml/kg/hr; creatinine increase of greater than 0.5mg/dl from baseline					
	CNS: altered consciousness (unrelated to primary neuro pathology) Glascow Coma Score less than or equal to 12					
	Hematologic: platelets less than 100,000; INR greater than 1.5					
	Hepatic: Serum total bilirubin greater than or equal to 4mg/dl					
	Metabolic: Serum lactic acid greater than or equal to 2mmol/L					
	Negative screen for severe sepsis (Please initial)					
	If check one in section III or a severe sepsis alert fires, patient has screened positive for severe sepsis					
	1. Call rapid response team					
	2. Call physician, physician assistant or nurse practitioner and implement urgent measures protocol.					
	3. Initiate or ensure IV access (2 large bore IV's if no central access)					
	4. Obtain a venous blood gas (peripheral draw), serum lactic acid, CBC (if it has been greater than 12 hrs since last test), two sets of blood cultures (if greater than 24 hours since last set)					
	5. If patient is hypotensive: Give crystalloid (NS) fluid bolus – 30ml/kg over one hour or as fast as possible until hypotension resolved, unless known EF is less than 35% or active treatment for heart failure.					

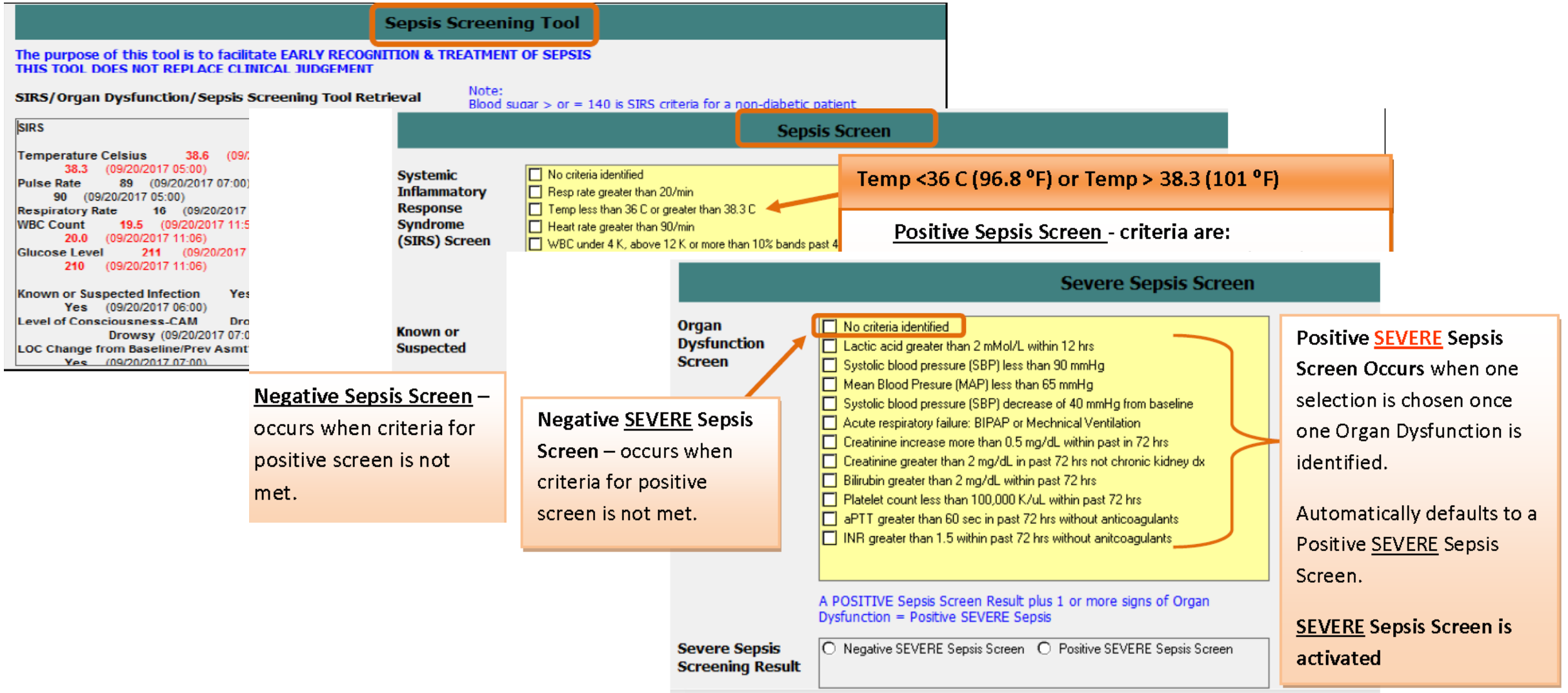


* A A 1 3 1 4 *

RN Signature, Initial Date & Time:

292239 (02352) SevereSepsis DRAFT R 8/12 (MD

Electronic Routine Screening

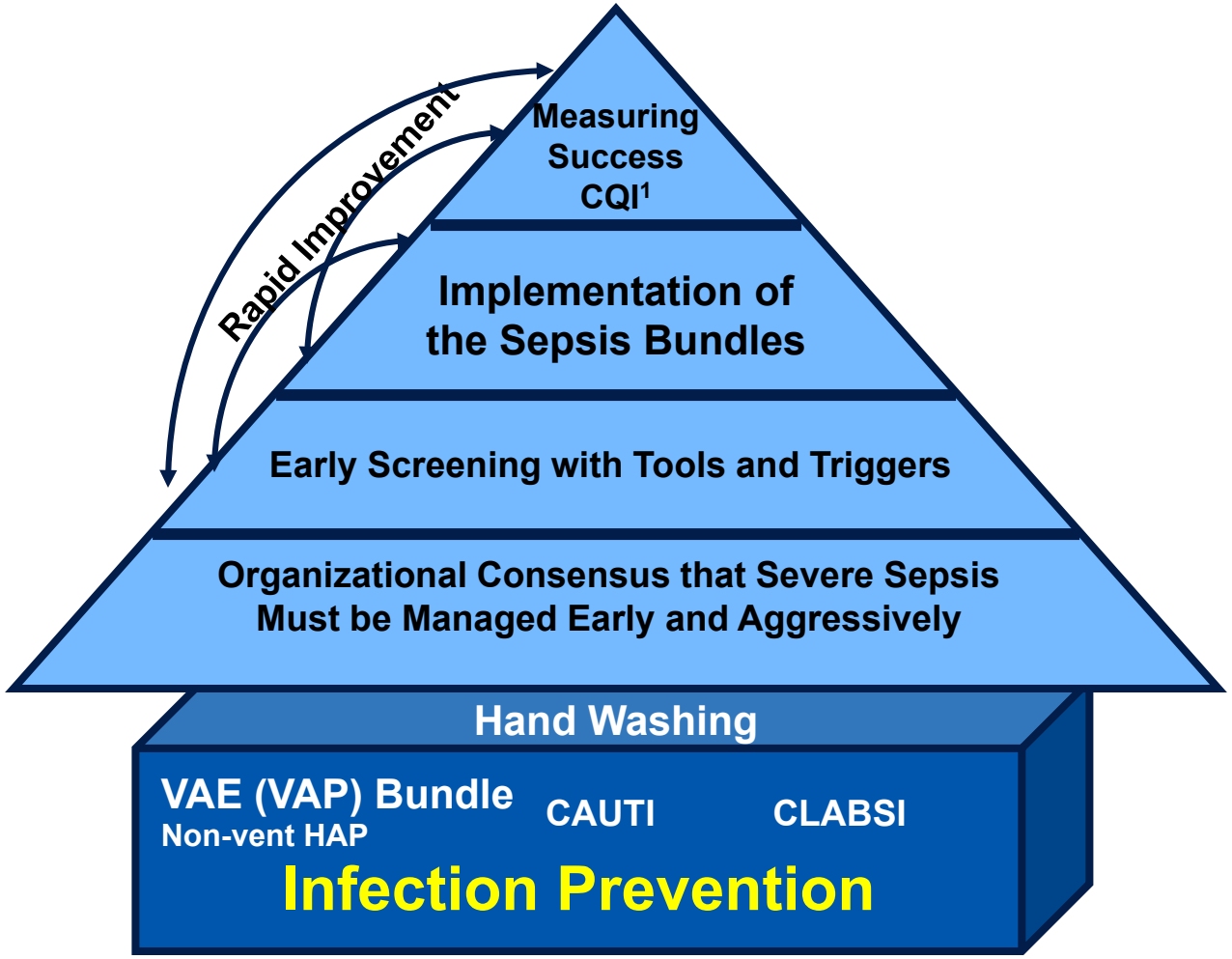


The Importance of Early Detection

- Efforts to **just treat recognized sepsis** alone is not enough.
- A critical aspect of **mortality reduction** has been pushing practitioners to identify sepsis early.
  - It may well be that **earlier recognition** accounts for much of the signal in mortality reduction and partially explains sharply increasing incidence.
  - Without recognition that the **clock is ticking**, there is simply no incentive to recognize a challenging diagnosis early.

Source:
Levy MM, Dellinger RP, Townsend SR ,et al. Crit Care Med. 2010 Feb;38(2):367-74.
Gaieski 13 DF, Edwards JM, Kallan MJ, et al. Crit Care Med. 2013 Feb 25

Sepsis Practice Collaborative Model
4 Tier Process for Program Implementation



Documentation Improvement ~ Accurate Coding

Adapted from: Sepsis Solutions International

[1]Continuous Quality Improvement

Components of TIER III
Milestones and checklist

- Understand current process for caring for septic shock patients
    - ‘Go and See’ work
    - Baseline data
- Order sets
- Common Barriers/Issues: *identified Gaps from ‘Go and See’ work*
- Educational plan
- Implementation plan
    - Unit champions
    - Prospective rounding
    - Independent checks

SEP-1

TO BE COMPLETED WITHIN 3 HOURS OF TIME OF PRESENTATION † :

1. Measure lactate level
2. Obtain blood cultures prior to administration of antibiotics
3. Administer broad spectrum antibiotics
4. Administer 30ml/kg crystalloid for hypotension or lactate ≥4mmol/L

† *"time of presentation" is defined as the time of earliest chart annotation consistent with all elements severe sepsis or septic shock ascertained through chart review.*

SEP-1

TO BE COMPLETED WITHIN 6 HOURS OF TIME OF PRESENTATION:

5. Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥65mmHg
6. In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was ≥4 mmol/L, re-assess volume status and tissue perfusion and document findings according to table 1.
7. Re-measure lactate if initial lactate elevated.

SEP-1

TABLE 1

DOCUMENT REASSESSMENT OF VOLUME STATUS AND TISSUE PERFUSION WITH:

Either

- Repeat focused exam(after initial fluid resuscitation) by licensed independent practitioner indicating an assessment of perfusion/volume status.

Or one of the following:

- Measure CVP
- Measure ScvO2
- Bedside cardiovascular ultrasound
- Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge

SSC Guidelines—2012-2016-2021

	2012	2016	2021
Sepsis Definition	Systemic manifestation of infection + suspected infection Severe sepsis: sepsis + organ dysfunction	Life threatening organ dysfunction caused by dysregulated response to infection; no severe sepsis category	no change from 2016
Initial Resuscitation	at least 30 ml/kg in first 3 hours Crystalloid fluid (no recommendation on 0.9% NaCl vs balanced solution Albumin if patients require "substantial fluids (weak)		For patients with sepsis induced hypo perfusion or septic shock **we suggest** that at least 30ML per kilogram of IV crystalloid fluid should be given within the first three hours of resuscitation. **We suggest** using balanced crystalloids instead of normal saline for resuscitation.
	Protocolized care including CVP, ScVO2 normalize lactate	Use dynamic resuscitation markers (passive leg raise) Target MAP of 65mmHg Reassess hemodynamic status to guide resuscitation Normalize lactate	No change from 2016 Suggest use of cap refill to assess resuscitation
Vasopressors	target MAP of 65mmHg 1. Norepinephrine 2. Epinephrine if not at target MAP OR vasopressin to reduce norepinephrine requirement 3 Avoid dopamine in most patients		No change- from 2016 We suggest starting vasopressors peripherally to restore MAP rather than delaying initiation till central venous access secured
Steroids	only indicated for patients with septic shock refractory to adequate fluid and vasopressors		For adults with septic shock & ongoing requirement for vasopressor **we suggest** using IV corticosteroid
Antibiotics	One or more antibiotics active against presumed pathogen Combination therapy (double coverage) for neutropenic patients and pseudomonas	Initial broad spectrum antibiotics (ex: vancomycin + piparcilin-tazobactam) Against combined therapy (ex: do not double cover pseudomonas) May use procalcitonin to guide de-escalation	For adults with possible septic shock or high likelihood of sepsis **we recommend** administering antimicrobials immediately, ideally within 1 hr. of recognition. For those with possible sepsis- **we suggest** a time limited course of rapid investigation & if concern for infection persist provided antimicrobials in 3 hrs. For patients at high risk of MRSA **we recommend** empiric antimicrobials with MRSA coverage. We suggest against empiric with MRSA coverage not using if at low risk
Source control	Achieve within 12 hours, if feasible	Achieve as soon as medically and logically feasible	no change from 2016
Ventilator	6cc/kg tidal volume prone patient with severe ARDS (P/F <150 in 2017 guidelines		no change form 2016
	no recommendation regarding HFOV	Recommend against high frequency oscillatory ventilation (HFOV)	no change form 2016
	weak recommendation for noninvasive ventilation in select patients with sepsis induced ARDS	unable to make recommendation on noninvasive ventilation	For adults with sepsis induced ARDS we suggest using VV ECMO when conventional MV fails in experience centers We suggest high flow NC over non-invasive

Dellinger, R. P. et al CCM 2012 Rhodes et al CCM 2017 Evans L, et al. ICM 2021;

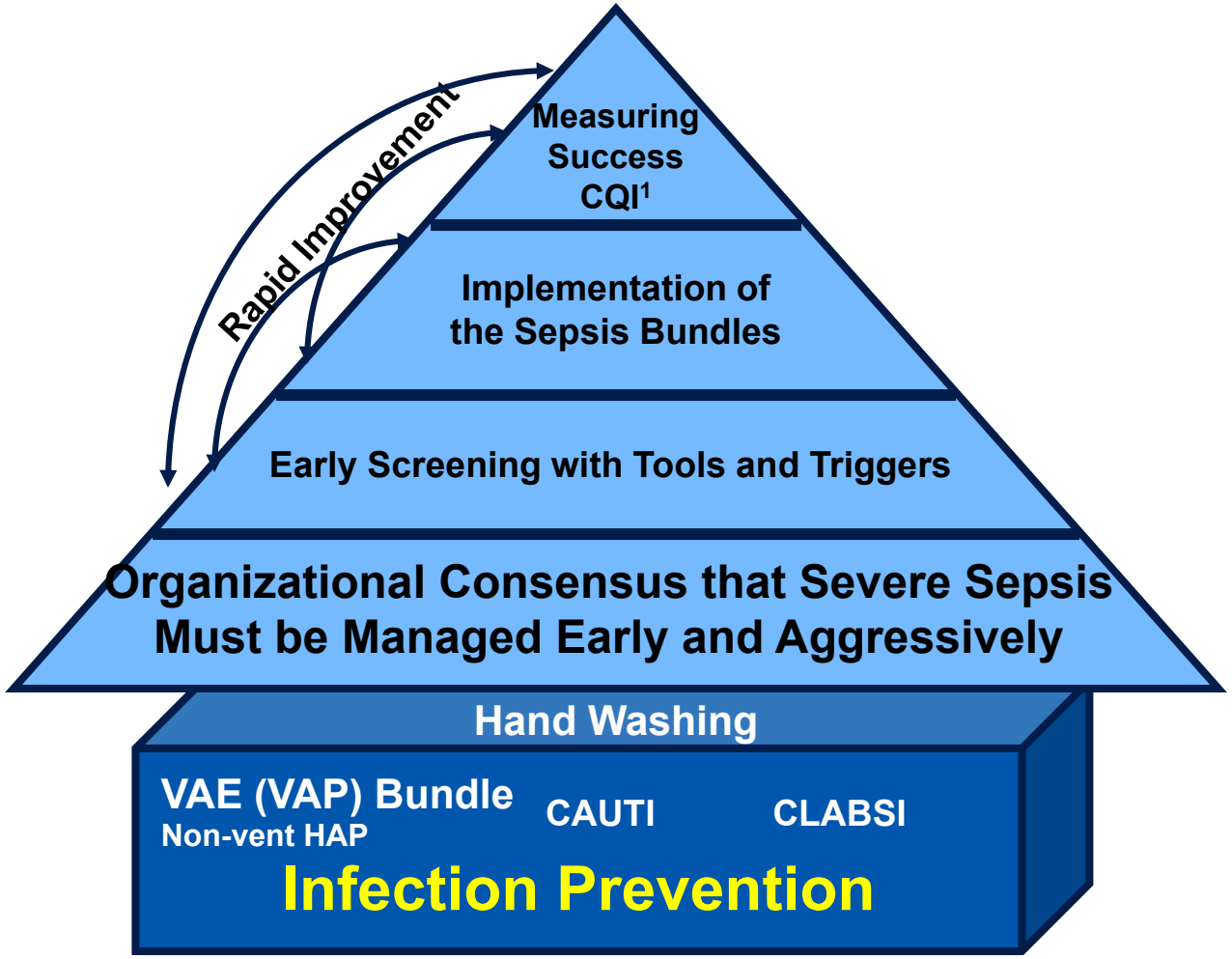
TO SAVE LIVES.....

Early identification

Early antibiotics

Early fluid resuscitation

Sepsis Practice Collaborative Model
4 Tier Process for Program Implementation



Documentation Improvement ~ Accurate Coding

Adapted from: Sepsis Solutions International

[1]Continuous Quality Improvement

Tier IV: Measurement Milestones and Checklist

- Define outcome and process data elements that will be collected
- Develop and implement a data collection process
- Revise and update goals and action plan as needed
- Execute implementation plan
- Continuous improvement

What outcome and process data should be collected and reviewed?

- Understand your volume of sepsis, severe sepsis and septic shock—look at mortality, LOS, cost, readmission
- Stratify your data by:
  - POA, non-POA
  - Medical vs surgical
  - Discharge disposition
  - Sepsis severity
- Process Metrics
  - Overall SEP-1 compliance
  - 3-hour bundle compliance
  - Each individual element compliance

Feedback to Individual Providers

Patient Initials: **Abstractor Name & Date:**

Severe Sepsis/Septic Shock Feedback Report - MICU

The purpose of this report is to give feedback on the below listed patient recently treated for Severe Sepsis/Septic Shock, and to emphasize the current quality improvement initiative related to Sepsis. We welcome your input and clinical expertise on opportunities that might help us improve on any of these measures.

Performing all the elements within the resuscitation bundles listed below in a timely manner can significantly reduce mortality of our Severe Sepsis and Septic Shock patients. Thank you for your dedication and care for these patients. If you have any questions, please contact Dr. _____, MICU Sepsis Champion or Dr. _____, ED Quality Coordinator or Emily C. Swiss, Sepsis Program Leader at _____

Patient Name:	**FIN:**
ED Arrival Date & Time:	**ED RN:**
ED Physician:	**ED Resident:**
Floor Arrival Date, Time, & Unit:	**Pt Transferred From:**
ICU Arrival Date & Time:	
Attending:	**Resident:**
RN:	**PRISM Score:**

Sepsis Quality Indicators

	Date & Time	Result	Goal Met (Y/N)	Goal
3 Hour Measures				
Lactic Acid				Drawn within 3h of Severe Sepsis (Look 6hrs Prior)
Blood Cultures before Antibiotics				Drawn before ABX (Look 48hrs Prior)
Broad-Spectrum Antibiotics				Hung within 3h of Severe Sepsis (Look 24hrs Prior)
30mL/kg Fluid Bolus Weight in kg:				As Fast As Possible. Infused within 3h of Severe Sepsis. (Goal = Y/N if Hypotensive, LA ≥ 4, OR Septic Shock)
Check BP in hour after conclusion of 30ml/kg fluid bolus				At least one BP documented
Central Line Placed, If Requires Vasopressors				Placed within 2h of Vasopressor Start
6 Hour Measures				
Vasopressor Started for SBP < 90 or MAP ≤ 65mmHG				Started 1hr of Persistent Hypotension After Initial Fluid Bolus
CMS Requirement- Vasopressor Started for SBP < 90 or MAP ≤ 65mmHG				CMS Requirement-Started within 6h of Septic Shock
Repeat Focused Exam by MD/AP (VS, Cardiopulm, Cap Refill, Peripheral Pulse, AND Skin Findings) OR 2 Measures (CVP, $SeVO_2$, Bedside Cardiovascular Ultrasound, SV Optimization with Fluid Challenge/Passive Leg Raise)				Documented within 6h of Septic Shock
Repeat Lactic Acid				Repeat within 6h of Severe Sepsis >2

Comments:

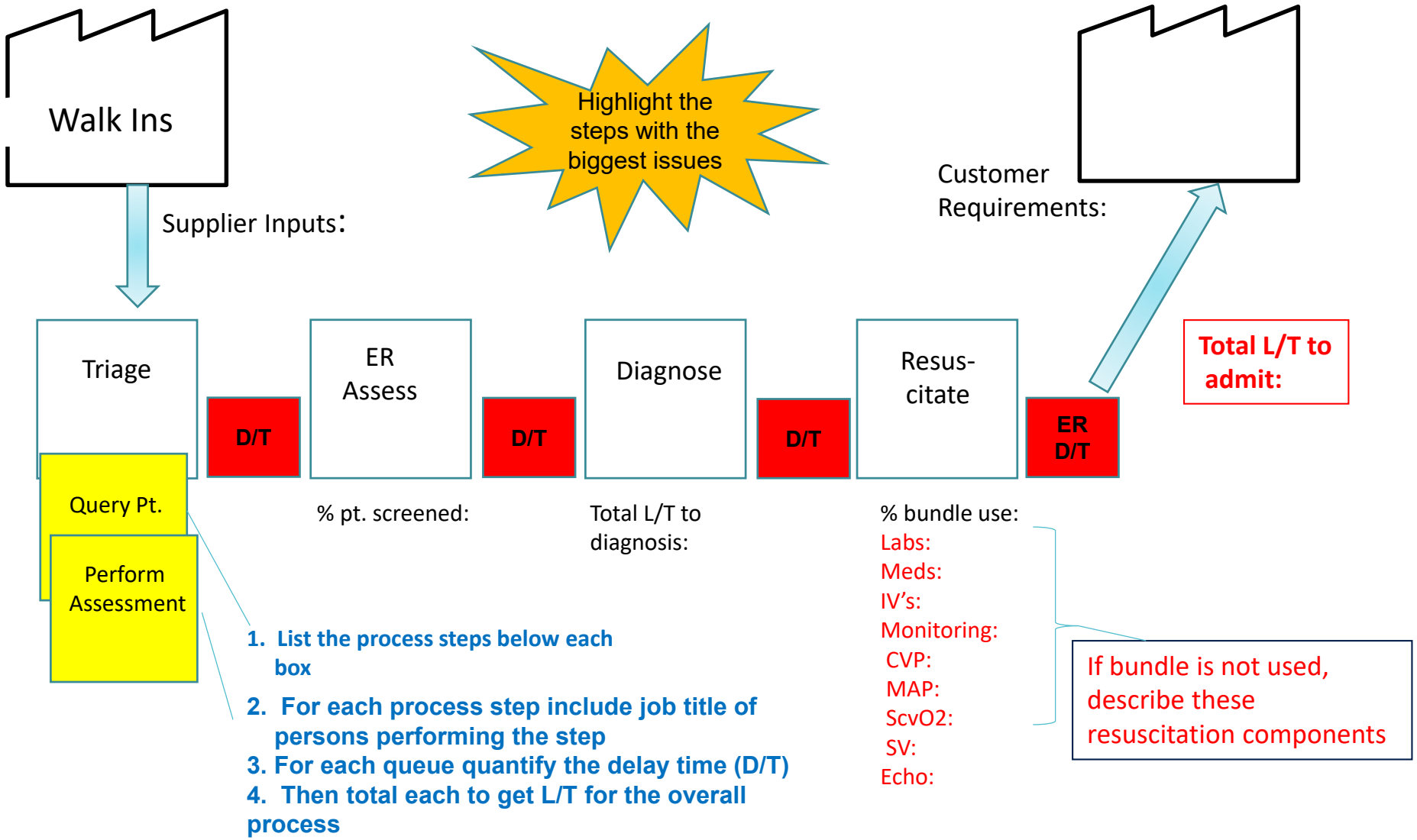
Identify Gaps in Application of Evidence

- Set performance targets
  - IE: 90% compliance with obtaining lactates in 3 hours
- Prioritize area to work on first
  - Focus on screening and the 3-hour bundle first then move to the 6-hour bundle
- Understand the ‘why’ there are gaps
  - “go and see”—walk the process, talk with front line staff
  - Cause and effect—Fishbone
- Define action plan—
  - Can use IHI Model for Improvement
  - PDCA—tests of change

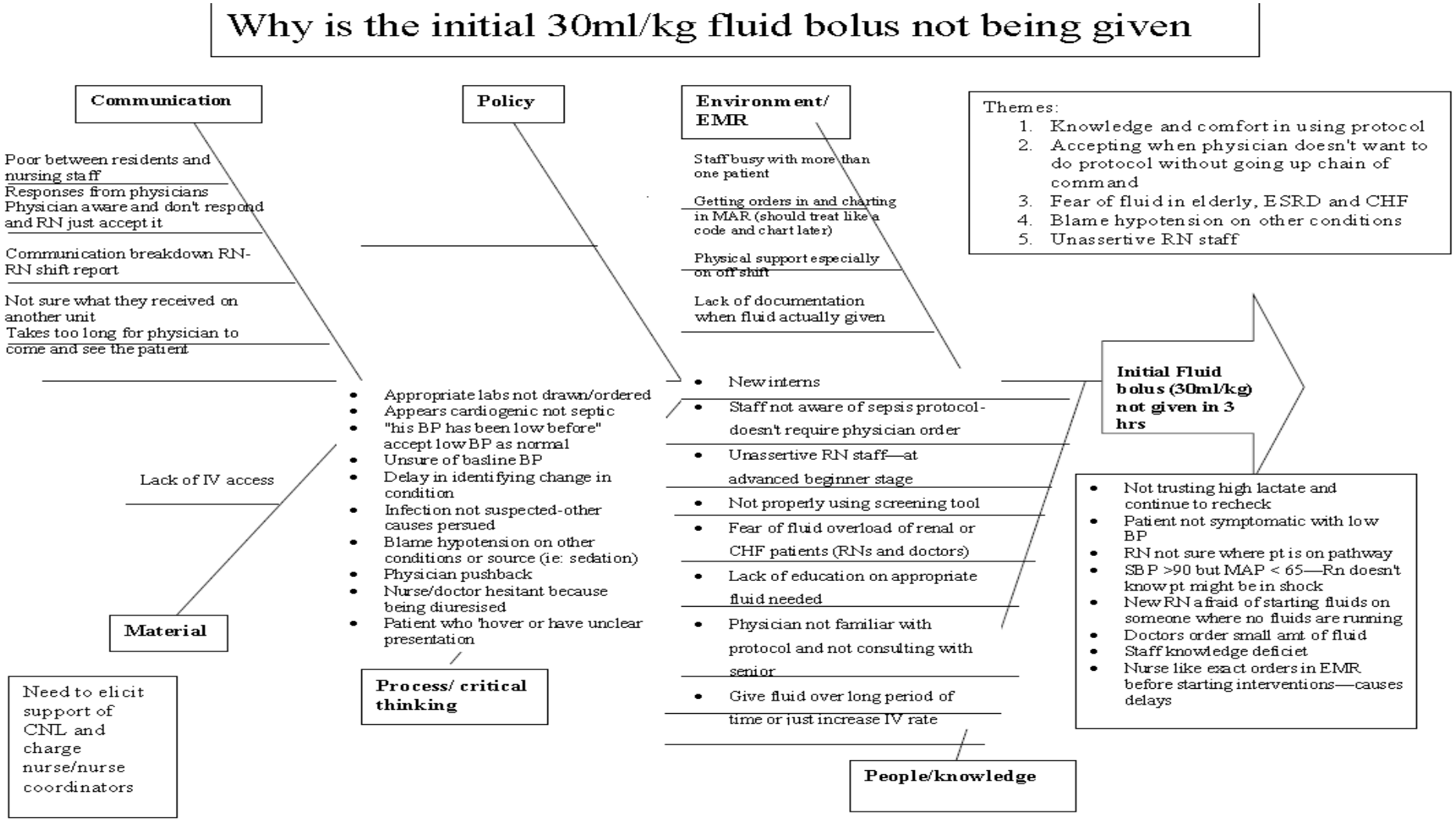
Determining the Gaps: Understanding Why

- Success relies on a complex set of tasks being completed in a limited amount of time
- Requires data collection and analysis to determine the bottleneck(s)
- Must analyze the workflow for patients arriving in the ED as well as those who become septic after hospitalization
- QI/PI teams are a great resource when available
- Multiple tools have proven successful
- Some examples of diagnostic tools used for analysis and the “therapeutic” tools developed out of the analysis

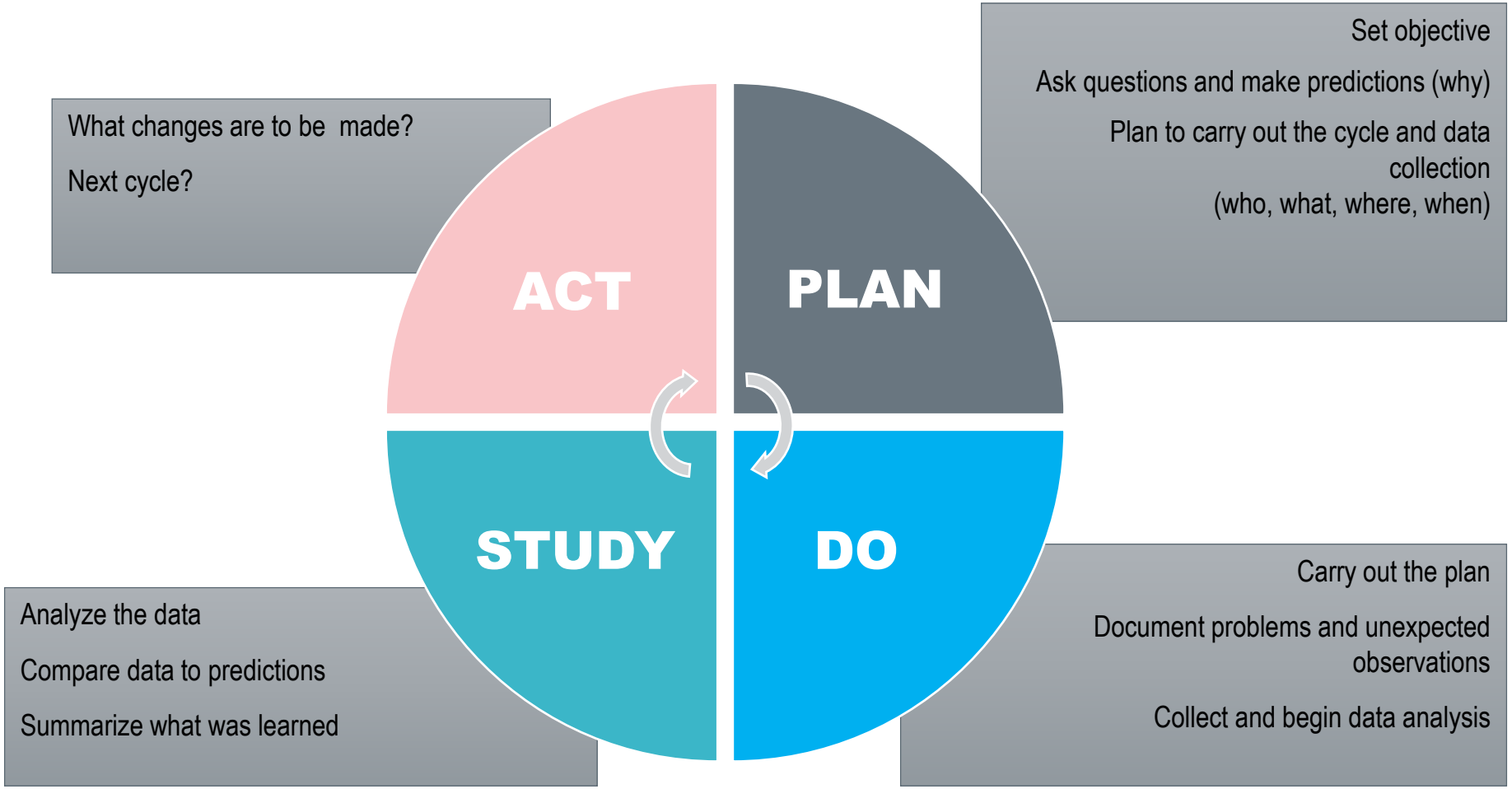
Sepsis Patient Flow Template: Walk Ins



Cause and Effect Diagram



The PDSA Cycle for Learning and Improvement[1]



Challenges

Challenges with the Bundles

- Timely antibiotics
- 30ml/kg fluid bolus
- Repeat lactate
- Sepsis reassessment

Antibiotics are Key

ORIGINAL ARTICLE

The Timing of Early Antibiotics and Hospital Mortality in Sepsis

Vincent X. Liu[1], Vikram Fielding-Singh[2], John D. Greene[1], Jennifer M. Baker[1], Theodore J. Iwashyna[3,4], Jay Bhattacharya[5], and Gabriel J. Escobar[1]

[1]Kaiser Permanente Division of Research, Oakland, California; [2]Department of Anesthesia and Perioperative Care, University of California San Francisco, San Francisco, California; [3]Center for Clinical Management Research, VA Ann Arbor Health System, Ann Arbor, Michigan; [4]Division of Pulmonary and Critical Care, Department of Internal Medicine, University of Michigan, Ann Arbor, Michigan; and [5]Primary Care and Outcomes Research, Stanford University, Stanford, California

American Journal of Respiratory and Critical Care Medicine Volume 196 Number 7 | October 1 2017

Each elapsed hour between presentation and antibiotic administration was associated with a 9% increase in the odds of mortality with sepsis of all severity strata

Increased Time to Initial Antimicrobial Administration Is Associated With Progression to Septic Shock in Severe Sepsis Patients

Bristol B. Whiles, BS1; Amanda S. Deis, MS1; Steven Q. Simpson, MD2
Critical Care Medicine. April 2017. Vol 45. Number 4

- Each hour until initial antimicrobial administration was associated with a 8% increase in progression to septic shock.
- Patients who progressed to shock had significant increase in hospital LOS (18.7 days vs 9.66 days) and mortality (30.1% vs 7%)

SSC-2021--Antibiotics

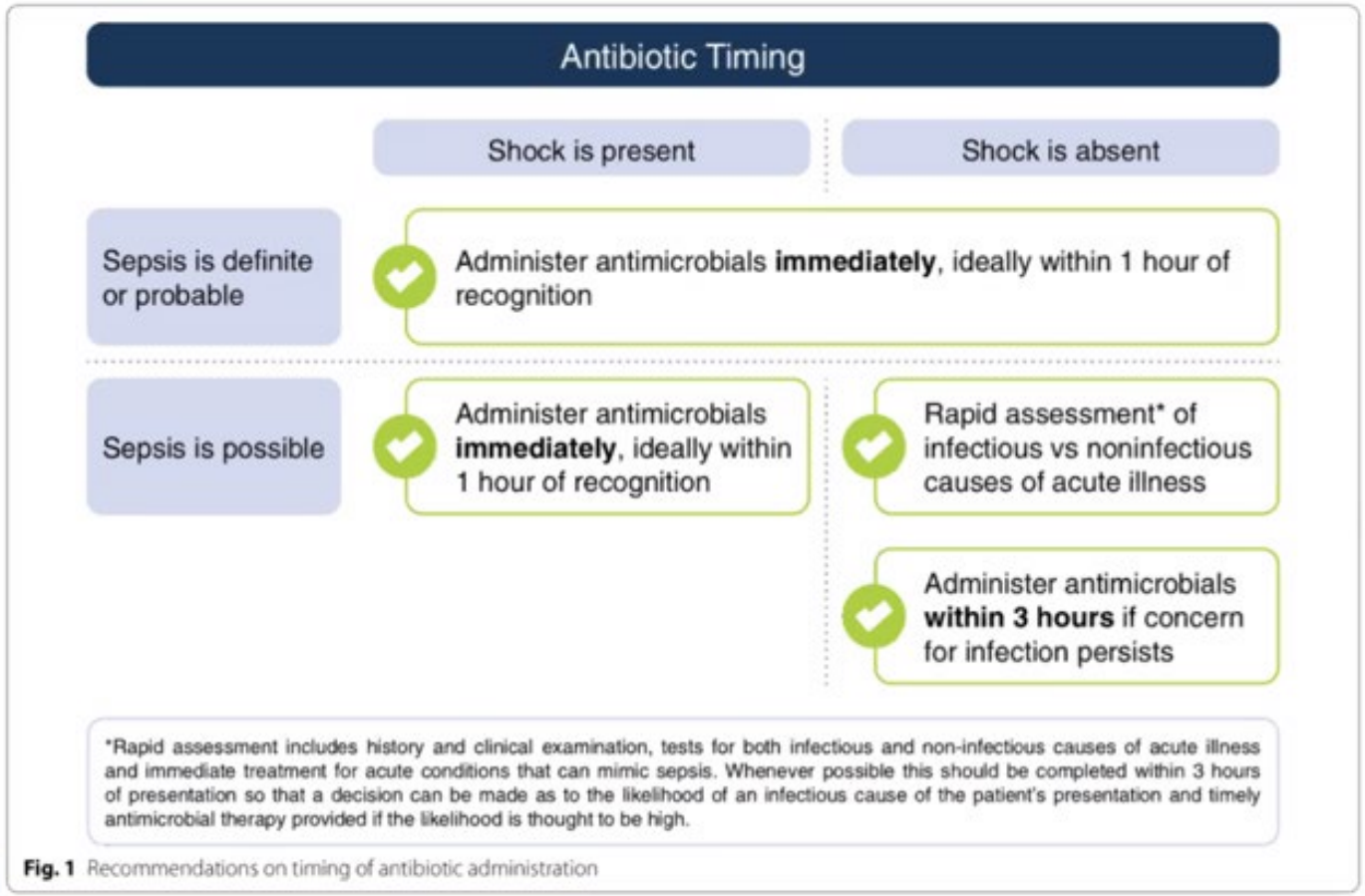


Fig. 1 Recommendations on timing of antibiotic administration

2016 STATEMENT

*"We **recommend** that administration of intravenous antimicrobials should be initiated as soon as possible after recognition and within one hour for both a) septic shock and b) sepsis without shock."*

Fluid Boluses

- How fast should they be given?
  - Gravity or pressure bag not by infusion pump
- What about dialysis patients?
- What about patients with CHF or low EF?

Fluid bolus is given rapidly, IV wide open, pressure bag if necessary; goal is 500ml every 15-30 minutes

SSC Guideline-2021

LOW

5 For patients with sepsis induced hypoperfusion or septic shock we **suggest** that at least 30 mL/kg of intravenous (IV) crystalloid fluid should be given within the first 3 hours of resuscitation.

Earlier SSC Guidelines (2004, 2008, 2012) recommended EGDT.
Based on PROMISE, PROCESS, and ARISE, simplified to 30 ml/kg in 2016.
There are no trials testing fluid volume.

Early, Goal-Directed Therapy for Septic Shock — A Patient-Level Meta-Analysis

The PRISM Investigators*

Volume administered per kilogram of body weight — ml	EGDT (N=1857)	Usual Care (N=1880)
Median	27.5	27.7
IQR	16.5–42.3	16.2–41.7

Multicenter Implementation of a Treatment Bundle for Patients with Sepsis and Intermediate Lactate Values

Vincent X. Liu[1,2], John W. Morehouse[2], Gregory P. Marelich[2], Jay Soule[2], Thomas Russell[2], Melinda Skeath[3], Carmen Adams[2], Gabriel J. Escobar[1,2], and Alan Whippy[2]

Conclusions: Multicenter implementation of a treatment bundle for patients with sepsis and intermediate lactate values improved bundle compliance and was associated with decreased hospital mortality. These decreases were mediated by improved mortality and increased fluid administration among patients with a history of heart failure and/or chronic kidney disease.

2016 STATEMENT

*"We **recommend** that in the initial resuscitation from sepsis-induced hypoperfusion, at least 30ml/kg of intravenous crystalloid fluid be given within the first 3 hours."*

Rowan, *et al. NEJM*, 2017.
Liu, *et al. AJRCCM*, 2016.

The majority of patients getting the 30ml/kg had a better improvement in mortality
Why the change in recommendation: because there is no trial telling us if 20ml/kg or 30ml/kg is better
Aortic stenosis or patient with low EF—might give slower or less

Munroe, E. Prescott, H. Understanding the 2021 guidelines on fluid recommendations Ann of Int Med 2022

Heart Failure—Going to Flood My Patient
Not Based in Evidence

- Rivers et al Study: % Ventilated Patients

	Hours after start of Therapy		
	0-6	7-72	0-72
Standard Therapy	53.8%	16.8%	70.6%
Early Goal Directed Therapy	53%	2.6%	55.6%
P Value		<.001	0.02

Chronic coexisting conditions-CHF:
Control 30.2%
EGDT 36.7%

N Engl J Med 2001;345:1368-1377

Early Fluid Resuscitation is Key

INFECTIOUS DISEASE/ORIGINAL RESEARCH

Association of Fluid Resuscitation Initiation Within 30 Minutes of Severe Sepsis and Septic Shock Recognition With Reduced Mortality and Length of Stay

Daniel Leisman, BS*; Benjamin Wie, BA; Martin Doerfler, MD; Andrea Bianculli, BA; Mary Frances Ward, RN, MS; Meredith Akerman, MS; John K. D'Angelo, MD; Jason A. Zemmel D'Amore, MD

*Corresponding Author. E-mail: deleisman@gmail.com.

[Ann Emerg Med. 2016;■:1-14.]

↑ mortality with later fluid administration 13.3% (30 minutes) versus 16.0% (31 to 60 minutes) versus 16.9% (61 to 180 minutes) versus 19.7% (>180 minutes)

Increased Fluid Administration in the First Three Hours of Sepsis Resuscitation Is Associated With Reduced Mortality
A Retrospective Cohort Study

Sarah J. Lee , MD , MPH ; Kannan Ramar , MBBS , MD ; John G. Park , MD , FCCP ; Ognjen Gajic , MD , FCCP ; Guangxi Li , MD ; and Rahul Kashyap , MBBS

CHEST OCTOBER 2 0 1 4]

After adjusting for confounders, the higher proportion of total fluid received within the first 3 hrs was associated with decreased hospital mortality

Early Fluid Resuscitation is Key

Multicenter Implementation of a Treatment Bundle for Patients with Sepsis and Intermediate Lactate Values

Vincent X. Liu[1,2], John W. Morehouse[2], Gregory P. Marelich[2], Jay Soule[2], Thomas Russell[2], Melinda Skeath[3], Carmen Adams[3], Gabriel J. Escobar[1,2], and Alan Whippy[2]

[1]Kaiser Permanente Division of Research, Oakland, California; [2]The Permanente Medical Group, Oakland, California; and [3]Kaiser Foundation Hospitals and Health Plan, Oakland, California

American Journal of Respiratory and Critical Care Medicine Volume 193 Number 11 | June 1 2016

Decrease in hospital mortality was observed primarily in patients with heart and/or kidney failure ($p<0.04$) who received at least 2 Liters fluid resuscitation for severe sepsis with lactate between 2.1-3.9.

Patterns and Outcomes Associated With Timeliness of Initial Crystalloid Resuscitation in a Prospective Sepsis and Septic Shock Cohort*

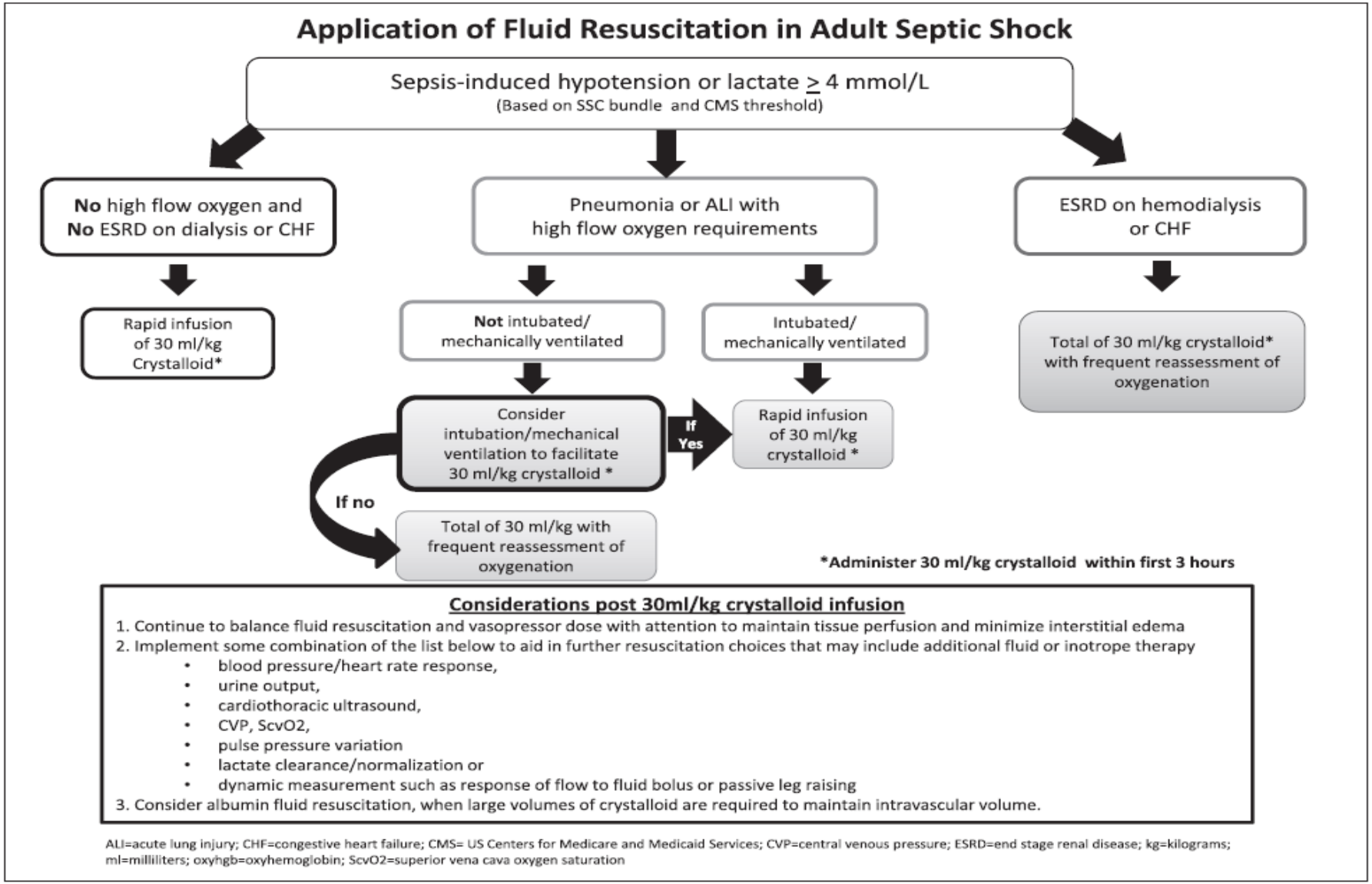
Daniel E. Leisman, BS[1,2,3]; Chananya Goldman, MD[4]; Martin E. Doerfler, MD[4,5]; Kevin D. Masick, PhD[6]; Susan Dries, RN, PhD[6]; Eric Hamilton, BA[6]; Mangala Narasimhan, DO[7]; Gulrukh Zaidi, MD[7]; Jason A. D'Amore, MD[1]; John K. D'Angelo, MD[1,2]

Critical Care Med

October 2017 • Volume 45 • Number 10

Early fluid initiation (30-120 minutes) was associated with significantly lower hospital mortality, mechanical ventilation, ICU admission, LOS and ICU days and no harm seen to the patients.

Application of Fluid Resuscitation in Adult Septic Shock



User's Guide to the 2016 Surviving Sepsis Guidelines Dellinger, CCM published ahead of print 1-2017

Use of lactate in guiding resuscitation

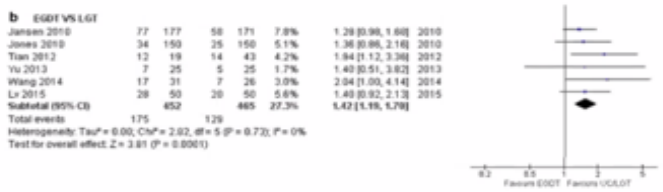
LOW

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.

LOW

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

Early goal-directed and lactate-guided therapy in adult patients with severe sepsis and septic shock: a meta-analysis of randomized controlled trials



JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of a Resuscitation Strategy Targeting Peripheral Perfusion Status vs Serum Lactate Levels on 28-Day Mortality Among Patients With Septic Shock

The ANDROMEDA-SHOCK Randomized Clinical Trial

34.9% vs 43.4% mortality, p=0.06

Gu, *et al. Intensive Care Medicine*, 2015.
Ding, *et al. J Translational Med*, 2018.
Hernandez, *et al. JAMA*, 2019.

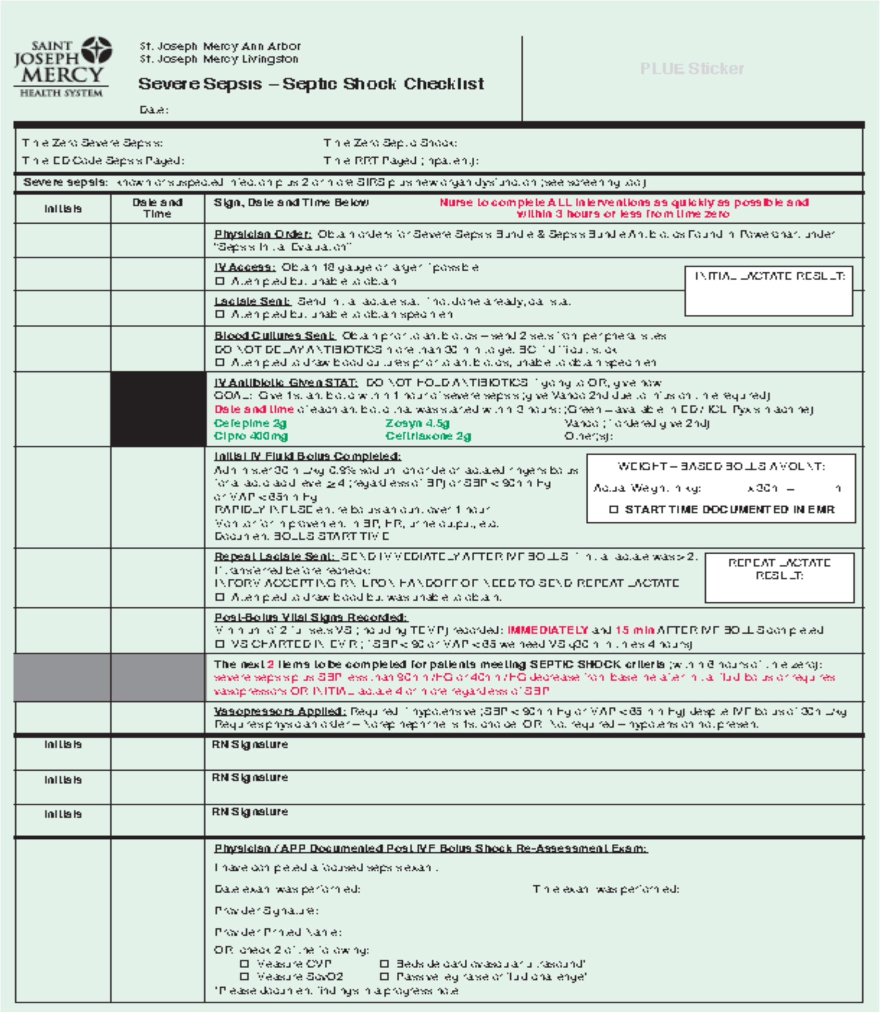
Made weak—cause it doesn't work for every patient

Repeat Lactate Strategies

- Repeat lactate can be drawn anytime after fluid bolus
- Reflex lactate for any initial lactate greater than 2
- 2nd lactate order included when first one is ordered

Reassessment

- Requirement changes in July, 2018 for CMS
  - Still a requirement for physician/APP to reassess volume status and tissue perfusion, just no requirement to state how that reassessment occurred or what the outcome of the assessment was
  - IE: " perfusion reassessed; "sepsis reassessment done"
  - Only need to do one out of 2 of the reassessment measurement (CVP, ScvO2, Echo, dynamic responsiveness)
- Strategies to comply with documentation requirements
  - Standard provider note or dot phrase
  - Expect that whoever orders the 30ml/kg fluid bolus is responsible for the reassessment documentation
  - Part of a sepsis checklist



GAP Analysis

COMPONENTS	YES	NO	NA	Action Steps
Physician and nursi				
action planning for				
Multidisciplinary te				
meetings (provider				
management, etc)f				
ICU, Med Surg, Peri				
Executive sponsor r				
and provides feedb				
Sepsis Team is part				
or quality structure				
Managing sepsis is				
quality, safety or or				
Baseline data colle				
and outcome data				

Identification/ Screening				
Early alert or warning system/process in place in the ED or describe triggers for sepsis screening:				
ED				
ICU				
INPATIENT UNI				
PERINATAL				
PEDIATRICS				
Is a screening p as designed?				
All ED patients sepsis in triage				
All ICU patients sepsis upon ad describe proce				
All med surg p for sepsis upor describe proce				
All OB patients				

Implementing the Bundles				
Sepsis order sets are in place and utilized by providers (CPOE/Paper)				
Sepsis provider documentation to place and utilized to meet SEP-1 re				
Communication between physician related to diagnosis and treatmen specific for sepsis; handoffs readily appropriate sepsis language				
Appropriate utilization of central li adequate skill and resource to plac when clinical criteria met				
Able to get lactate levels in one ho				
Able to get antibiotics in one hour hours for ED				
Process in place for reassessment status and tissue perfusion for sep patients				
Identify resistance/barriers to com bundles and developed solutions (blood cultures before antibiotics, r lactate, etc.)				

COMPONENTS	YES	NO	NA	Action Steps
Measurement/Continuous Improvement				
Define real time method for tracking patients (i.e., severe sepsis patient log)				
Define concurrent review process for core measure and core measure defect review process				
Sepsis Coordinator rounds in clinical areas to answer questions and ensure appropriate implementation of the bundles				
Provide a sample of topics for the team meeting				
Do you have a way to know your data elements that fall out each month and a process for follow up?				
Do you have a process to address deviations from evidence based care processes with physicians, nurses, and other clinical staff				
Education				
Provider Education completed – Define in status column				
Nursing Education completed – Define is status column				
General Sepsis Education – Define in column				
Tools to assist bedside staff have been implemented (i.e., algorithm, clinical pathway, pocket cards, etc.)				

Your Next Steps

- Complete Gap Analysis
- Review results of gap analysis with your sepsis committee/team
- Prioritize gaps and develop action plan to close the gap(s)
  - Complete key steps in TIER 1, if not already in place:
    - Establish a multidisciplinary sepsis committee
    - Identify physician and nurse champions
    - Meet with hospital leadership to review plan and identify sepsis as a priority for the hospital
- Use quality improvement tools –PDCA ect to help implement action steps

Questions/Discussion

Keys to Success

- Team in place with key stakeholders overseeing implementation
- Project coordinator with lead clinical staff on each unit
- Sepsis resource/coordinator rounds frequently on units
- Strong physician leadership on team
- Reminders to staff through use of bedside sepsis tools/checklist
- Empowerment of nursing staff to prevent errors
- Administrative support to help manage barriers
- Review data monthly to identify opportunities for improvement-real time follow up whenever possible
- Provider specific feedback or report cards related to performance
- Support from a collaborative
- EDUCATION, DATA, COACHING,EDUCATION…….

Contact Information

Pat Posa RN, BSN,CCRN-K, MSA, FAAN
Quality and Patient Safety Program Manager
E-mail: patposa07@gmail.com

Register for the Next HQIC Collaborative Event!

Keep Calm and Prevent CAUTI and CLABSI

Tuesday, September 27, 2022

2:00p.m. ET | 1:00 p.m. CT | 12:00 p.m. MT | 11:00 a.m. PT

Join this exciting presentation and discussion to learn how Northeast Alabama Regional Medical Center changed its healthcare-associated infection (HAI) review process from one person to a group of clinical and health care professionals, resulting in better outcomes in CAUTI and CLABSI prevention.

Register here (Link)

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Thank you for joining us today!

We value your input!

Please complete the brief evaluation after exiting the event.

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