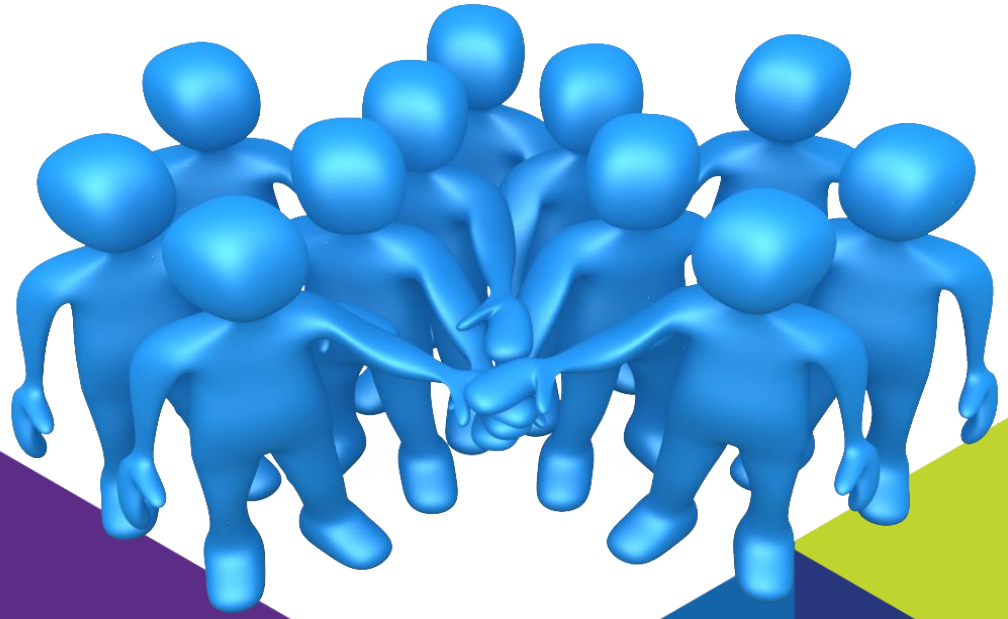

Translating Evidence into Practice: Strategies for Overcoming Barriers

Kathleen Vollman
ADVANCING NURSING THROUGH KNOWLEDGE & INNOVATION

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- Consultant-Michigan Hospital Association Keystone Center
- Subject matter expert HRET: CAUTI, CLABSI, HAPI, Sepsis, Safety culture for HRET
- Consultant and speaker bureau:
  - Stryker Sage
  - La Jolla Pharmaceutical
  - Potrero Medical
- Baxter Healthcare Advisory Board

Objectives

- Identify several team and organizational challenges to implementing the evidence for early recognition and management of sepsis patients
- Compare and contrast the different strategies to address team and organizational barriers when translating sepsis science into practice
- Describe how use of data and stories can impact engagement in translating of evidence into practice

Barriers to Translating Sepsis Evidence into Practice

Identification

- Screening: EMR, BPA, Routine Screening, Sepsis 2 and Sep 3 definitions

Time sensitive interventions

- Antibiotics
- Initial Fluids—
- Repeat lactate
- Reassessment

Inadequate program resources

- Lack of sepsis coordinator
- Lack of physician lead/champion

Timely Data

- Timely feedback

Early Recognition is Key

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.

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

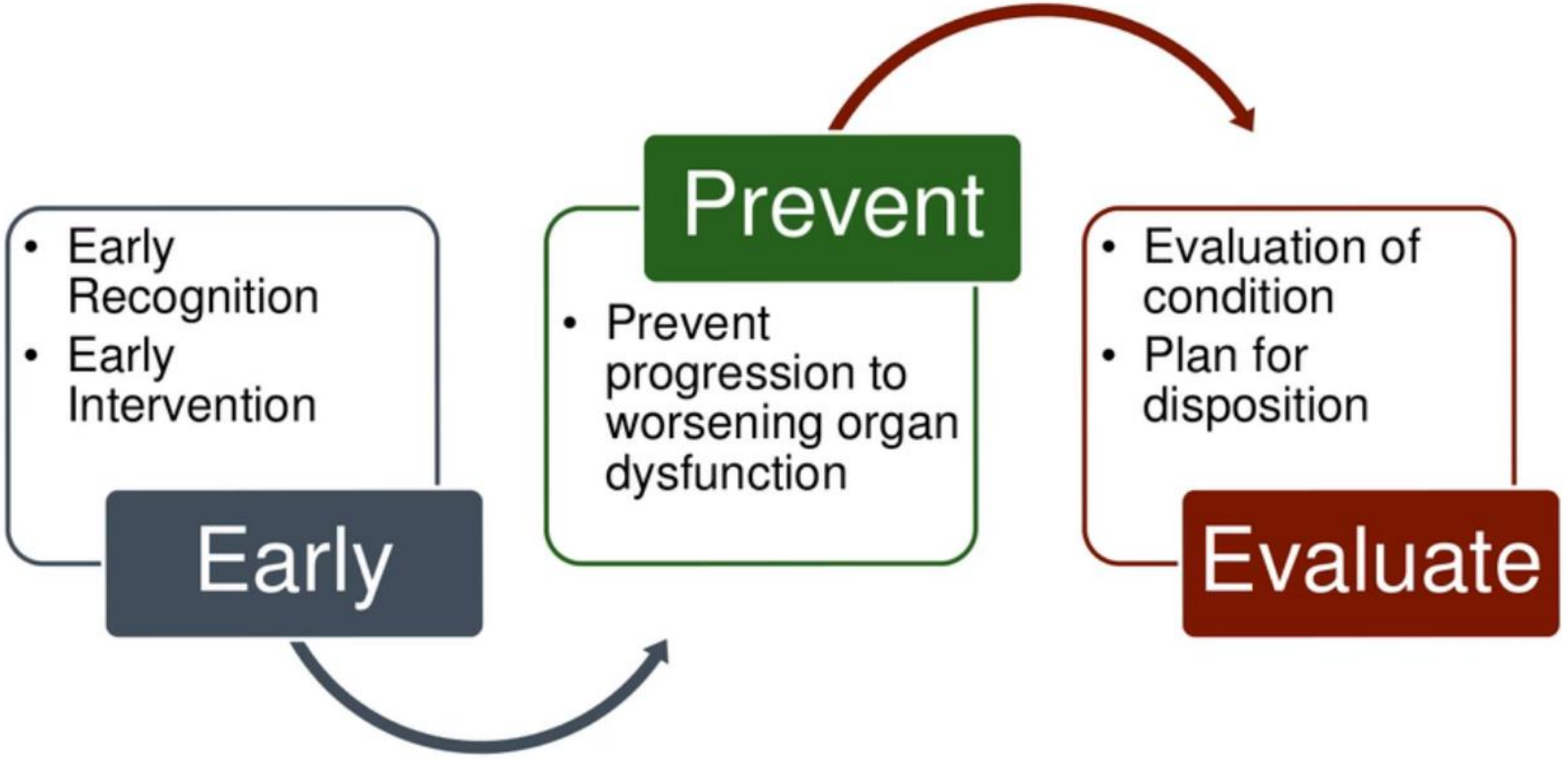
Screening for Severe Sepsis

- **Develop screening process for ED, rapid response team, ICU and house wide** (To screen effectively, it must be part of the nurses' daily routines— i.e., part of admission and shift assessment)
- Education beyond PowerPoint…case studies
- 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

Dellinger RP, Levy MM, Carlet JM, et al. 2008. Crit Care Med. 2008;36:296-327.
Schorr C. et al Journal of Hospital Medicine, 2016;11:S32-S39

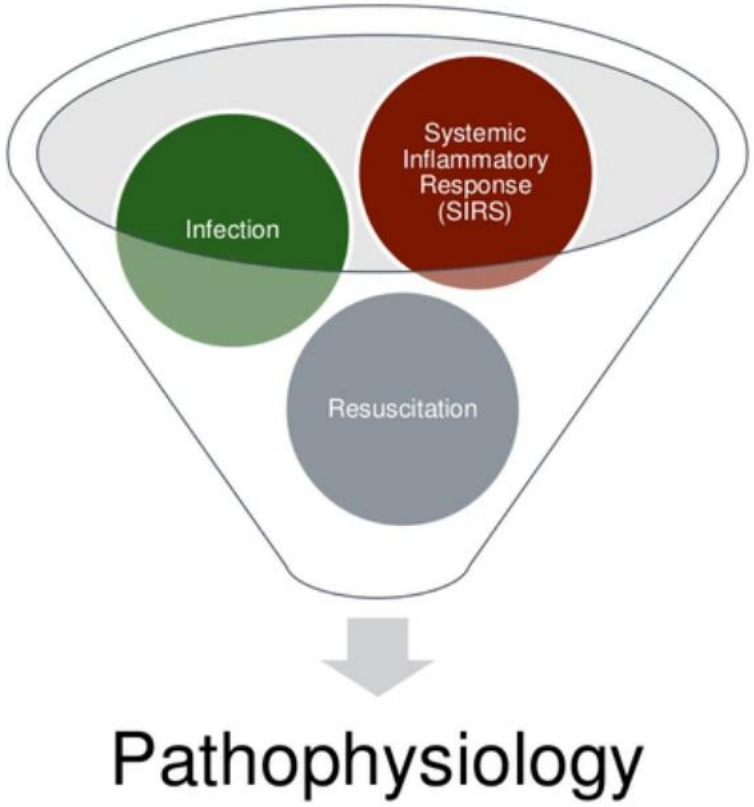
What is the Purpose of Nurse Screening



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

Understanding the Why: Sepsis Screening Not Just Another Task

- Pathophysiology connected to screening components
- Bundle elements
- Educational tools and reminders to help remember over time



Schorr C. et al. Journal of Hospital Medicine. 2016;11;S1: s32-s39

Sepsis 2 (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)

Sepsis 3

- **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

Singer et al, JAMA 2016. PMID: 26903338

SOFA

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

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

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.

- 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

PATIENT CARE UNIT SEVERE SEPSIS SCREENING TOOL

SEPSIS SCREEN (To be completed every shift) ✓ if response is yes.

A. Infection

D. P. N. D = Days P = PM's N = NOC's

☐☐☐ Patient has an infection or suspicion of infection

☐☐☐ Patient on antibiotics (not prophylaxis)

☐☐☐ If No, Stop Here

B. SIRS (Systemic Inflammatory Response Syndrome)

Patient has 2 or more of the following SIRS criteria

☐☐☐ T > 38.3 (101) or < 36 (96.8)

☐☐☐ HR > 90 BPM

☐☐☐ RR > 20 breaths/min

☐☐☐ WBC > 12,000, <
neutrophils

☐☐☐ New mental sta

☐☐☐ Glucose >120 m

Time:_____ +/-

If A & B are met, screen

If sepsis screen positive fo

➢ Rescreen Q 6 hours

➢ Suggest Q 6 h lactate X

Rescreen:

Time _____ ☐ negative ☐ sepsis ☐ severe sepsis

Time _____ ☐ negative ☐ sepsis ☐ severe sepsis

Time _____ ☐ negative ☐ sepsis ☐ severe sepsis

C. ACUTE Organ Dysfunction

Patient meets one or more of the following criteria

☐☐☐ SBP < 90 mmHG or MAP < 65 mmHG

☐☐☐ SBP decrease > 40 mmHG from baseline

☐☐☐ New (or increased) oxygen requirement to maintain SpO2 > 90%

☐☐☐ Bilateral pulmonary infiltrates with PaO2/FiO2 ratio < 300

☐☐☐ Urine Output < 0.5 mL/kg/hour for > 2 hours or Creatinine > 2 mg/dl

☐☐☐ Bilirubin > 2 mg/dl

☐☐☐ Platelet count < 100,000

evere sepsis

☐ Transferred to ICU

☐ Transferred to higher level of care.

Bonus: Screening Creates a Time Zero Every 12 hours

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						
Negative screen for severe						
if check two of the ab						
II. **Infection (one or**						
Suspected or						
Antibiotic Th						
If check no						in I-View
If check						ove to III
III. **Organ (one**						
Res						
Ca						
R 0						
C G						
H						
H						
M						
N						
If sep						
1. Ca						
2. Cal						
3. Initia						
4. Obtain 12 hrs						han
5. If patient is until hypoten						t as possible rt failure.

ERFUSION?
e or both of the following criteria)
itial fluid bolus (30 ml/kg)
OR
2. Lactic acid greater than or equal to 4 mmol/L with any BP

NO

For **Lactic acid 3-3.9 or initial hypotension that responded to the 30 ml/kg fluid bolus,** initiate transfer to IMC

Initiate **Intermediate Care Severe Sepsis Bundle** on back and complete interventions.

For **Lactic Acid 2-2.9**

Initiate **General Care Severe Sepsis Bundle** on back and complete interventions

YES

Activate CODE SEPSIS

Initiate transfer to ICU

Meanwhile, continue crystalloid resuscitation of 250-1000ml boluses if hypotensive after the initial bolus – per physician order

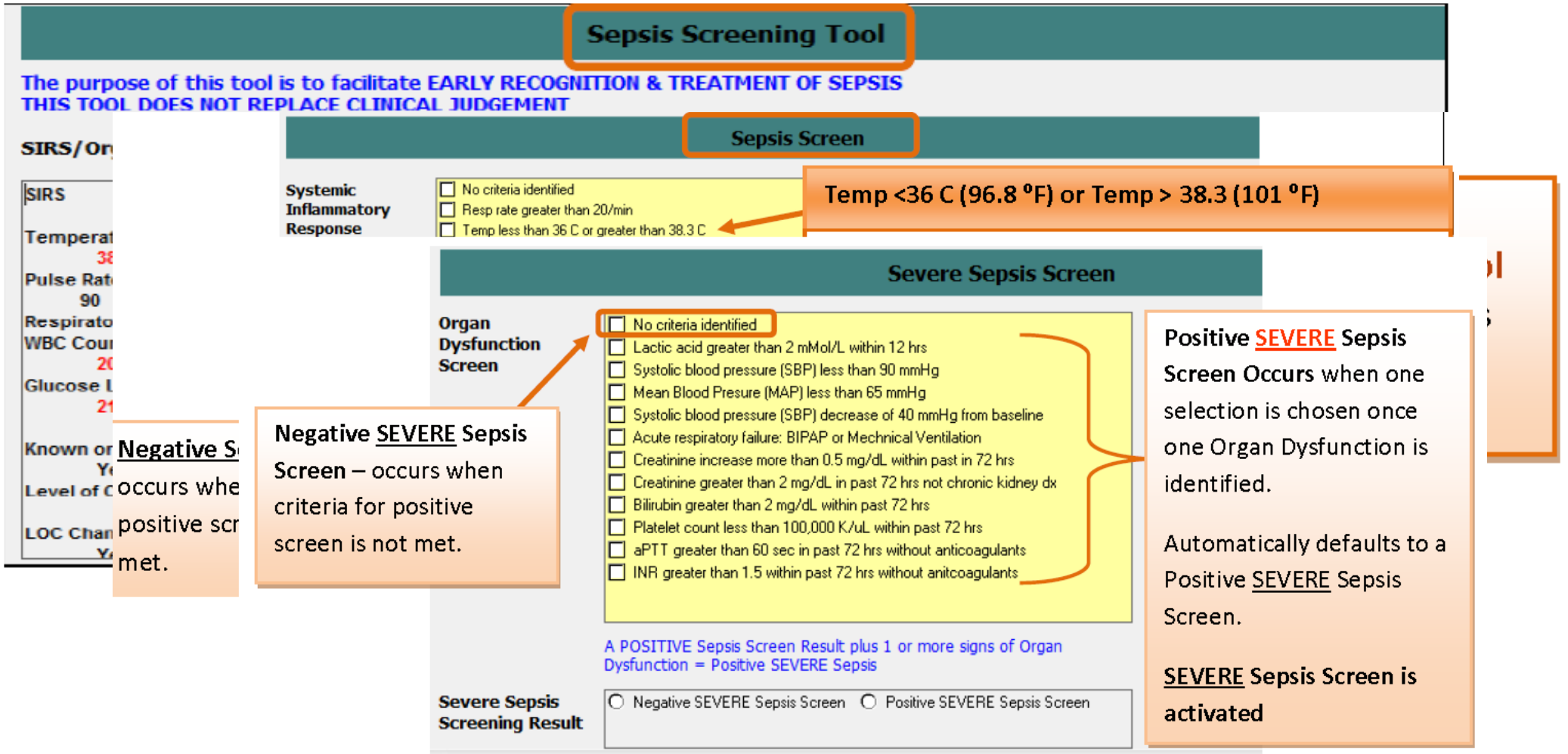
Initiate the **Septic Shock Pathway** and complete interventions

* A A 1 3 1 4 *

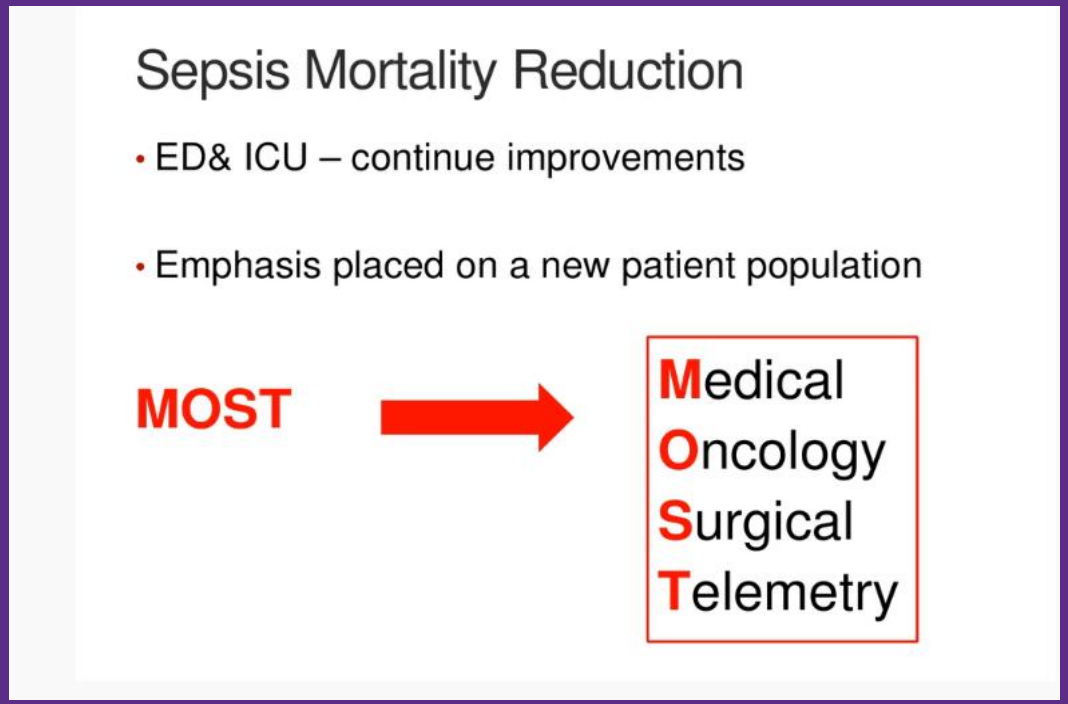
RN Signature, Initial Date & Time:

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

Electronic Routine Screening



7 Hospital Systems: Northern California

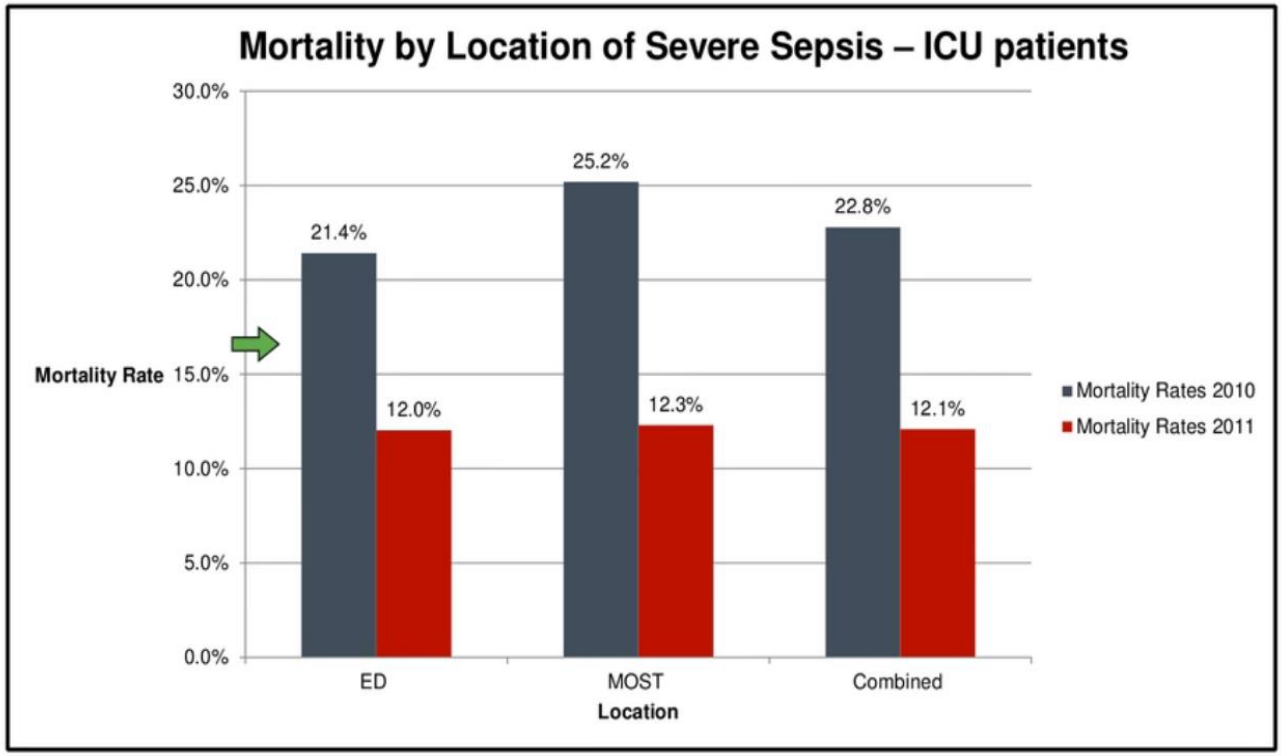


- Introduced screening as part of nurse's shift assessment on the floors
- Already occurring in ED and ICU's
- Started at 1 facility and spread to 6
- Measure impact on bundle compliance and morality

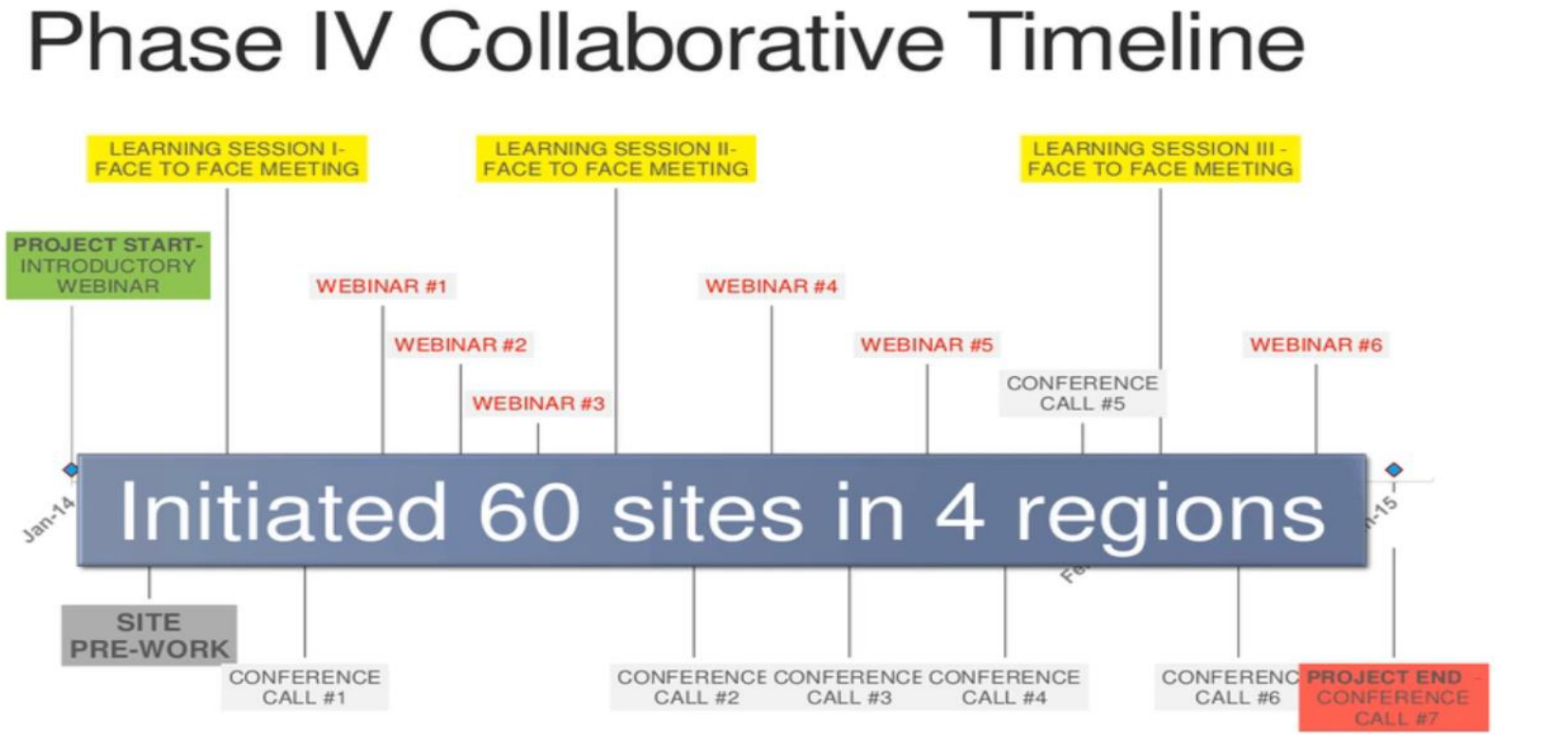
Empowering Nurses for Early Sepsis Recognition accessed on https://www.youtube.com/watch?v=s687VMj6iwo

Outcomes of Screening on the Floors

2010 Baseline and 2011 Outcomes Data



National Collaborative



Surviving Sepsis Campaign

shm Society of Hospital Medicine

Gordon and Betty Moore Foundation

Society of Critical Care Medicine

European Society of Intensive Care Medicine

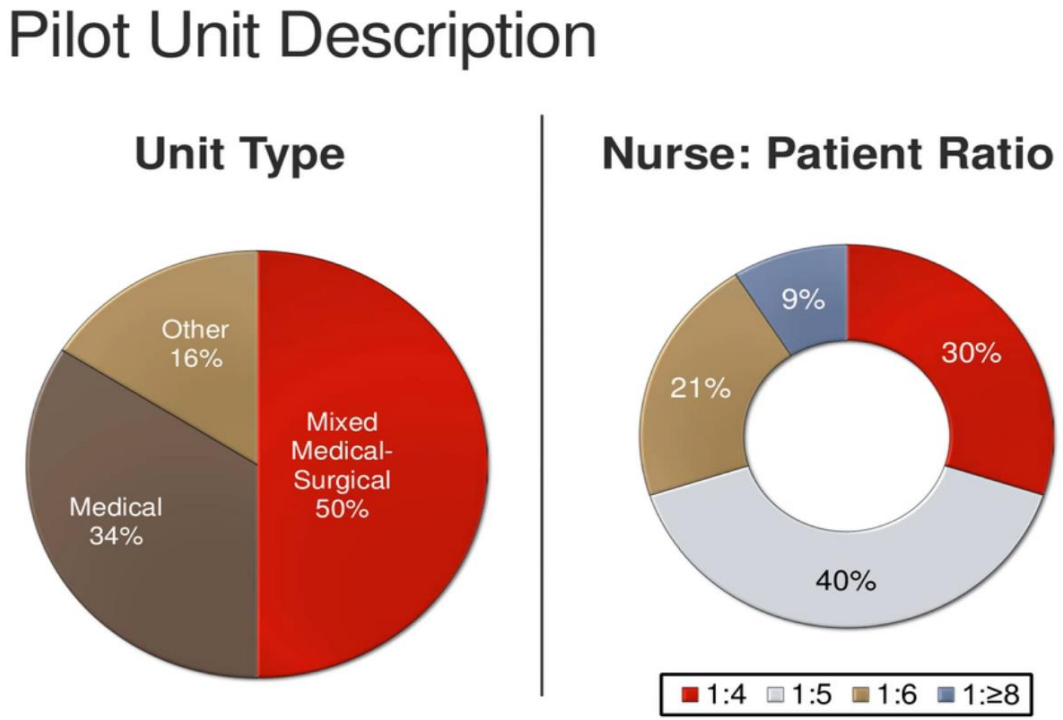
Schorr C. et al. Journal of Hospital Medicine. 2016;11;S1: s32-s39

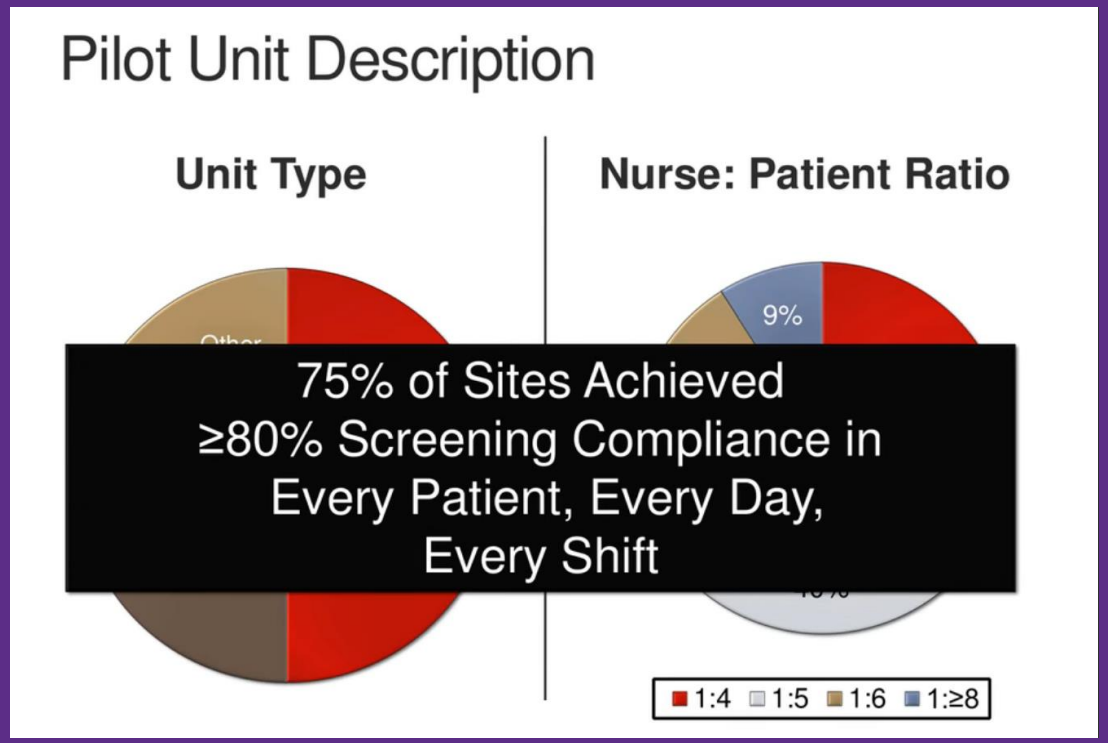
PDCA: Stepwise Approach

- Administrative and clinical leadership commitment
- Align with ED & ICU
- Identify 1 ward to pilot
- Unit based champions on each shift
- Review workflow and processes to support nurse staff's ability to evaluate and report severe sepsis screening results
- Develop screening tool/small test of change
- Provide education
- If available incorporate EHR continuous screening
- Track screening compliance process and outcome measures

Schorr C. et al. Journal of Hospital Medicine. 2016;11;S1: s32-s39

Do These Units Look Like Yours?





Schorr C. et al. Journal of Hospital Medicine. 2016;11;S1: s32-s39

Screening in the ED: The Impact

- 310 bed acute care hospital
- Development of an ER based screening tool
- Pre and post measurement
- Education and next steps provided

Table. Bundle Completion Time, Antibiotic Completion Time, LOS, and Mortality

Variable	Preintervention (n = 165) Mean (SD)	Postintervention (n = 145) Mean (SD)	*P*
Time to bundle complete	593 (1388)	135 (236)	<.001
Time to antibiotic administration	185 (337)	84 (150)	<.001
LOS	9.15 (10.77)	9.17 (8.97)	.663
Mortality	12.1%	6.2%	.074

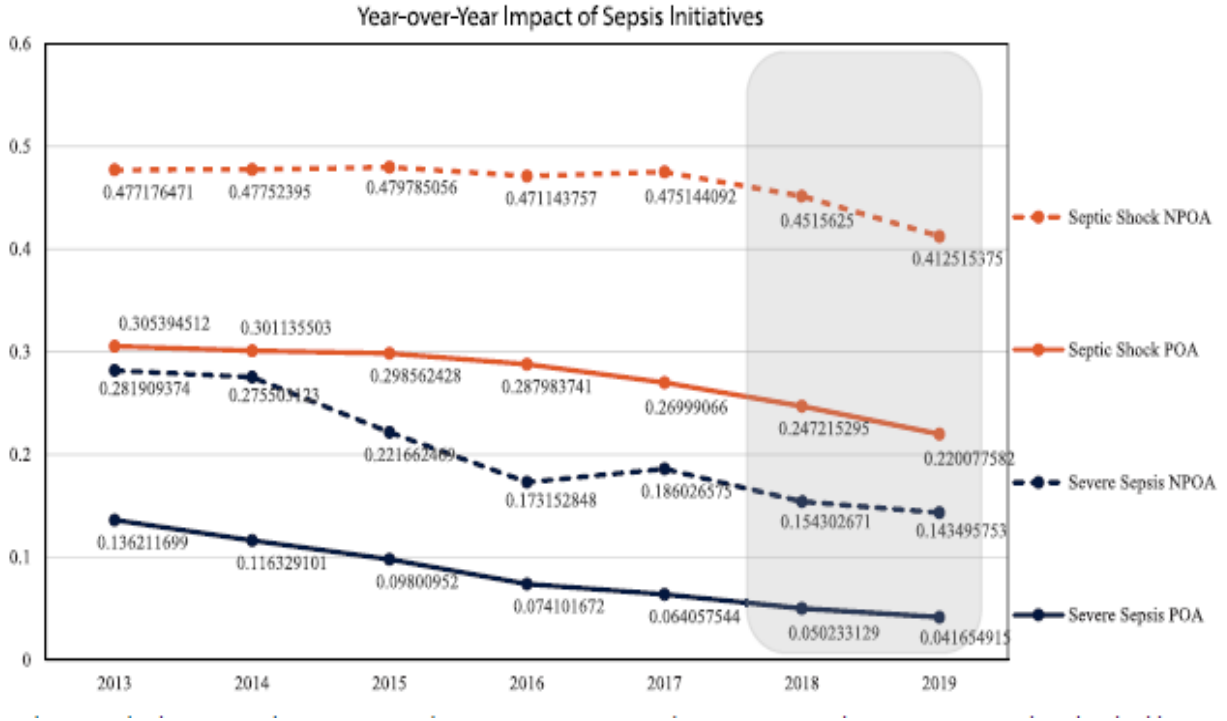
Threatt DL. J Nurs Care Quality, 2019;35(2):135-139

Screening

- Lesson Learned: Bedside nurse must do screening
- Background EHR screening during the shift is a support
- Education/Simulation/Education
  - Every 6 months initially until the new norm
  - Build into orientation
  - Must be part of their documentation structure
  - Practice-Practice-Practice

SPOTting Sepsis to Save Lives: HCA Computer Algorithm to Detect Sepsis

- SPOT Algorithm designed as rules-based detection of defined criteria in near real time
- Defines sepsis as presence of SIRS, documented suspected infection (BC or therapeutic antibiotic within 24hrs of SIRS)
- Transmitted alert through telemetry techs-relays to the nurse
- Nurse preforms a sepsis screen
- Near real time data for the sepsis coordinator
- Can be reproduced by any health system or EHR company



Perlin JB, et al. The Joint Commission Journal on Quality & Patient Safety. 2020;46:381-391

EPIC Sepsis Predication Model: External Validation

- Retrospective cohort study
- 27,697 patients > 18yrs of age who had 38,455 hospitalizations
- ESM (EPCI Sepsis Model) calculated every 15 min
- Evaluate area under the curve at hospital level/prediction horizons of 4, 8, 12, 24hrs

		Time horizons			
Model performance	Hospitalization	24 h	12 h	8 h	4 h
Outcome incidence, %	6.6	0.43	0.29	0.22	0.14
Area under the receiver operating characteristic curve (95% CI)	0.63 (0.62-0.64)	0.72 (0.72-0.72)	0.73 (0.73-0.74)	0.74 (0.74-0.75)	0.76 (0.75-0.76)
Positive predictive value (ESM score ≥6), %	12	2.4	1.7	1.4	0.92
No. needed to evaluate (ESM score ≥6)[a]	15	42	59	73	109

- Alert score ≥6 identified only 7% of patients whose sepsis was missed by the clinician
- EMS did not identify 67% of patients with sepsis despite generating alerts on 18% of all hospitalized patients-causing alarm fatigue

Wong A, et al. JAMA Internal Medicine, 2021; Published online June 2021

Early Recognition Challenges & Solutions

- Barriers/Contributing Factors
  - Time for nurses to do it (perception vs. reality)
  - Screening is not sensitive only for severe sepsis
  - Positive screen is not a diagnosis of severe sepsis
  - Nursing staff does not recognize when the patient is met sepsis criteria
  - Hesitant to call physician regarding possible sepsis patients or hesitant to question or recommend treatment

- Targeted Education/Solutions
  - Must assign responsibility and enforce accountability
  - Develop enhanced education to improve knowledge of risk and sepsis recognition
  - Develop and implement standardized sepsis screening tools and treatment protocols
  - Perform audits to measure compliance and identify problems
  - Round on unit and ask nurses how it is going and discuss issues
  - Implement scepsis tool/positive sepsis screen form to communicate with charge nurse

Strategies: Establish Trigger for Rapid Implementation of SSC Bundles

- Clearly define next steps for patients with positive screen for severe sepsis
  - Alert RRT/Med Team
  - Notify Physician
  - Begin 3 hour bundle: lactate, blood cultures, antibiotics, fluid

SBAR
Situation:
Screened Positive for Severe Sepsis
Background:
1. Positive Systemic Response to Infection
2. Known or suspected infection
3. Organ dysfunction: share which organs
Assessment:
Share any other clinical changes?
Recommendations:
1. I need you to come and evaluate the patient to confirm if they have severe sepsis
2. It is recommended that I get an ABG, lactate, blood cultures and a CBC (if > 12 hrs since last one). Can I proceed and get these?
3. Any other labs you would like me to obtain? Do you want to order antibiotics?
4. If patient is hypotensive: Can I start an IV and give a bolus of NS—30ml/kg
Date/time of call: _____
RRT called: Yes No

Role of Rapid Response

- Sepsis Screen on every call
- Sepsis coordinator or RRT evaluates house lactic draws every 12hrs
- Respond to all sepsis alerts/code sepsis

Barriers for Translating Evidence into Practice

Identification

- Screening: EMR, BPA, Routine Screening, Machine Learning
- Sepsis 2 and Sep 3 definitions

Time sensitive interventions

- Antibiotics
- Initial Fluids—
- Repeat lactate
- Reassessment

Inadequate program resources

- Lack of sepsis coordinator
- Lack of physician lead/champion

Timely Data

- Timely feedback

Bundle Challenges: Time of Antibiotic, Fluids and Reassessment

Mortality by Time to Antibiotics
Severe Sepsis: SSC Database

Time to Abx HOURS	OR	CI	CI	P value	Prob of Death	CI	CI
0	1.0	-	-	-	13.7	13.3	15.3
1	1.10	1.05	1.15	<0.001	14.9	13.7	16.1
2	1.21	1.10	1.32	<0.001	16.1	15.1	17.2
3	1.33	1.15	1.52	<0.001	17.4	16.2	18.7
4	1.46	1.22	1.75	<0.001	18.8	17.1	20.6
5	1.60	1.20	2.01	<0.001	20.3	18.0	22.8
6	1.76	1.34	2.31	<0.001	21.9	18.8	25.3

5% Increase in Mortality for Every Hour Delayed

Levy MM, et al. *Crit Care Med*. 2015;43(1):3-12.

Mortality by Time to Antibiotics Septic Shock: SSC Database

Time to Abx HOURS	OR	CI	CI	P Value	Prob of Death	CI	CI
0	1	-	-	-	22.2	20.7	23.8
1	1.03	1.00	1.06	<.046	22.7	21.4	24.5
2	1.06	1.00	1.12	<.046	23.2	22.0	24.5
3	1.09	1.00	1.19	<.046	23.7	22.5	25.1
4	1.12	1.00	1.26	<.046	24.3	22.7	25.9
5	1.16	1.00	1.33	<.046	24.8	22.9	26.9
6	1.19	1.00	1.41	<.046	25.4	23	27.9

5% Increase in Mortality for Every Hour Delayed

Levy MM, et al. *Crit Care Med*. 2015;43(1):3-12.

Antibiotics: Potential Solutions

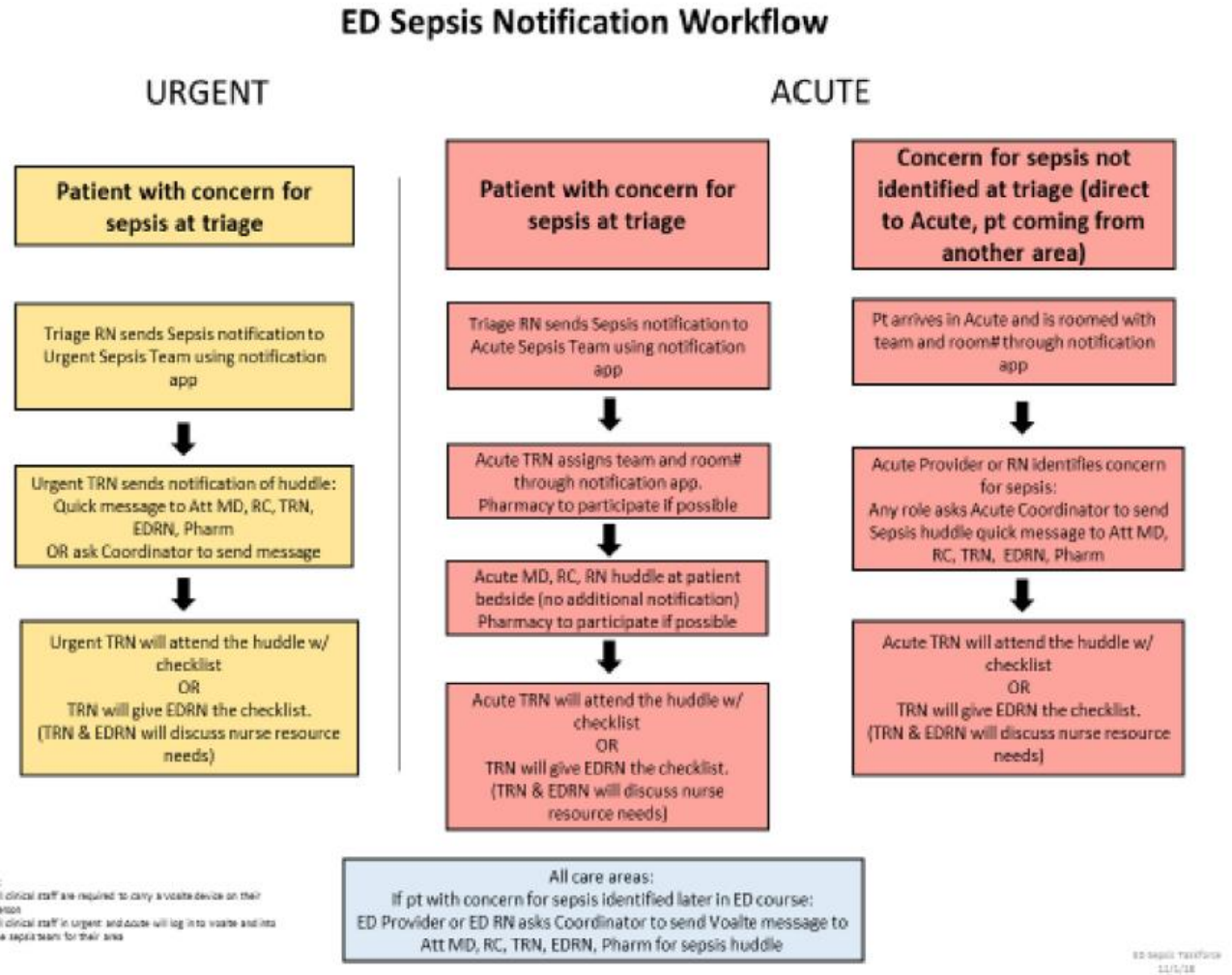
- Appropriate initial antibiotics
  - Guide for providers recommending the appropriate antibiotic based on whether hospital or community acquired, source and your hospitals antibiogram
- Measure turnaround time---from indication to hanging
  - ED vs ICU vs Floor
- Understand your current process and where the gaps are
- Make antibiotics rapidly available
- Factors that showed delay administration
  - Higher APACHE, older, presence of co-morbidities, HLOS before hypotension, dx of pneumonia, admin to academic hospitals & transfer from medical wards

What other strategies have you found to improve timely antibiotic administration?

Amaral ACKB, et al. Crit Care Med;2016;44:2145-2153

Antibiotics: Potential Solutions

- Initiated a Sepsis Huddle
- 41 min improvement in time to antibiotics when huddle was used



Sepsis Checklist

- ☐ Confirm patient has purple sepsis flag
- ☐ Patient to a monitored bed
- ☐ Notify Attending MD on arrival to treatment area
- ☐ Provider assessment within 10 minutes
- ☐ Initial lactate
- ☐ Blood cultures (before antibiotics)
- ☐ Antibiotics within 1 hour - broad spectrum first
  - ○ **Cefepime or Zosyn First**

  Identify any barriers to IV access or labs and work with provider to make a plan
- ☐ 30mL/kg fluid bolus (if SBP<90 or Lactate >4.0)

50kg (110lb)	75kg (165lb)	100kg (220lb)	150 kg (330 lb)
1500mL	2250mL	3000mL	Reassess after 3 L

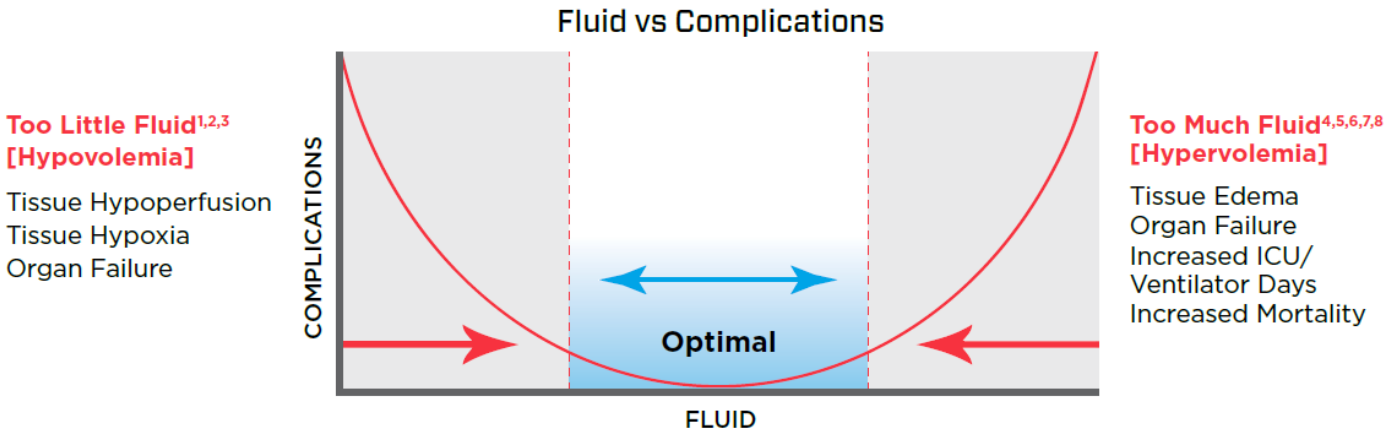
- ☐ Repeat lactate within 3 hours
- ☐ Reassess vital signs/volume status after fluid bolus and communicate with EM Attending MD.
  - ○ If patient still hypotensive consider additional IV fluid or vasopressors

Sonis JD,et al. *Am J Emerg Med*. 2020;38(11):2400-2404.

Fluids

We need to get the fluids just right

FLUID IMBALANCE can lead to SERIOUS CONSEQUENCES



SEPSIS/SHOCK VOLUME OVERLOAD IN SEPTIC PATIENTS IS ASSOCIATED WITH AN INCREASED RISK OF MORTALITY.[6,7]

SURGERY (ERAS) CAREFUL MANAGEMENT OF INTRAOPERATIVE FLUIDS CAN GREATLY ENHANCE PATIENT OUTCOMES.[5]

References:

1. Shoemaker W et al. Tissue oxygen debt as a determinant of lethal and nonlethal postoperative organ failure. Crit Care Med 1988; 16:1117-1120.
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3. Rivers E et al. Early goal directed therapy in the treatment of severe sepsis and septic shock. NEJM 2001; 345:1368-1377.
4. Gustafsson UO et al. Enhanced Recovery after Surgery Society. Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations. Clin Nutr. 2012; 31:783-800.
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6. Boyd J et al. Vasopressin in Septic Shock Trial (VASST). Critical Care Medicine 2011; 39:259-265.
7. Vincent JL et al. Sepsis in European ICU: Results of the SOAP Study. Critical Care Med 2006; 34:344-353.
8. Kelm D et al. Fluid overload in patients with severe sepsis and septic shock treated with early goal directed therapy is associated with increased acute need for fluid-related medical interventions and hospital death. Shock 2015; 43:680-73.

Results of 3 International Studies 2014-2015-Created Confusion

- 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 **2500ml of NS (equal to 30ml/kg),** had blood cultures and lactate drawn
- No statistically significant difference in mortality between groups
- Mortality rate 18% for ARISE & ProCess
- Mortality rate 30% for Promise

ProCESS Investigators, 2014; 370:1683-1693
ARISE Investigators et al. N Engl J Med 2014; 371:1496-1506
Mouncey PR, et al. N Engl J of Med, 2015; 372:1301-1311

Differences Between Treatment and Control Groups in the ProCESS, ARISE, and ProMISE Trials:

Clinical Trial	Cohort	Intravenous Fluids (milliliters)	Central Line Placement	Vasopressor Utilization
ProCESS May 2014	EGDT	2805 +/- 1957	411/439 (93.6%)	241/439 (54.9%)
	Usual Care	2279 +/- 1881	264/456 (57.9%)	201/456 (44.1%)
	Δ	526ml	35.7%	10.8%
ARISE October 2014	EGDT	1964+/-1415	714/793 (90%)	528/793 (66.6%)
	Usual Care	1713+/-1401	494/798 (61.9%)	461/798 (57.8%)
	Δ	251ml	28.1%	8.8%
ProMISE May 2015	EGDT	2000 (1150-3000)	575/624 (92%)	332/623 (53.3%)
	Usual Care	1784 (1075-2775)	318/625 (50.9%)	291/625 (46.6%)
	Δ	216ml	41.1%	6.7%

ProCESS Investigators, Yealy DM, N Engl J Med 2014; 370(18):1683-1693.
The ARISE Investigators and the ANZICS Clinical Trials Group.. N Engl J Med 2014; 371:1496-1506.
Mouncey PR,. N Engl J Med 2015: DOI: 10.1056/NEJMoa1500896.

Survey Question

- Do all patients that have screen positive for severe sepsis/ septic shock presenting with hypo tension or lactate > 4 mmol/L receive a 30mk/kg bolus within the first 3 hours of presentation?

What are the challenges or successes? Please place in the chat box!!

Heart Failure—Going to Flood My Patient

	Hours after start of Therapy % Intubated		
	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%

•From Rivers: *% Ventilated patients* N Engl J Med 2001;345:1368-1377

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

- Before and after implementation of the intermediate lactate bundle for patients with sepsis (POA) hospitalized at 21 community hospitals in northern California
- Sample: 18,122 with sepsis and intermediate lactate values
- Bundle included: after initial lactate obtained—antibiotics administered, repeat lactate (within 1-4 hrs from first lactate) and 30ml/kg fluid bolus or at least 2 Liters.

Liu, V. Amer J of Resp and Crit Care Med. 2016, 193(11):1264-1270

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

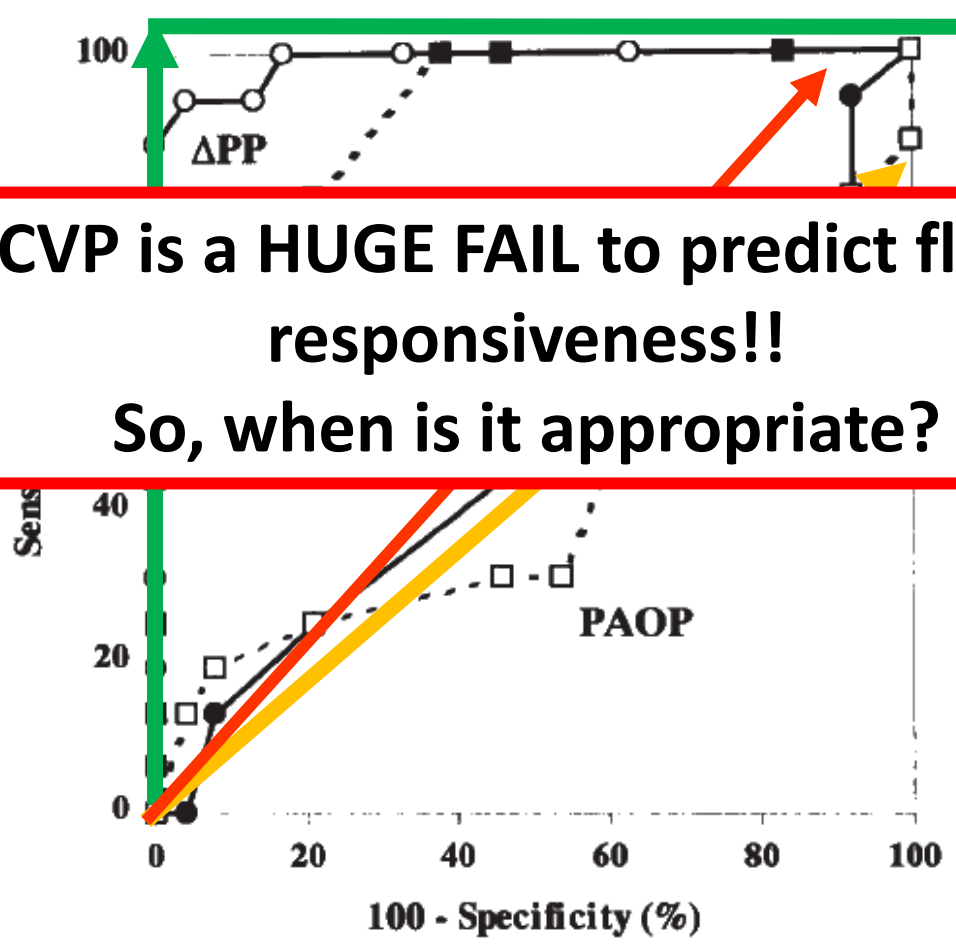
- Results:
  - Full bundle compliance increased from 32.1 to 44.9% (p<0.01)
  - Hospital mortality went from 9.3% to 7.9% (p=0.02)
  - **Decrease in hospital mortality was observed primarily in patients with heart and/or kidney failure (p<0.04)**

Table 4. Hospital Mortality in Heart Failure and Chronic Kidney Disease Subgroups

	n	Mortality (%)			*P* Value
		Prior (2011)	Prebundle (2012)	Postbundle (2013)	
All patients	18,122				
Hospital		8.8	9.3	7.9	0.02
30 d		13.7	14.1	12.6	0.03
History of heart failure	4,144				
Hospital		13.0	14.8	11.6	0.03
30 d		18.8	20.7	17.8	0.13
History of kidney disease	6,285				
Hospital		9.7	11.5	7.5	<0.01
30 d		15.9	17.7	13.3	<0.01
Heart failure or kidney disease	8,322				
Hospital		10.7	12.5	8.7	<0.01
30 d		16.8	18.3	14.5	<0.01
No heart failure or kidney disease	9,800				
Hospital		7.4	6.5	7.2	0.40
30 d		11.3	10.5	10.8	0.60

Liu, V. Amer J of Resp and Crit Care Med. 2016, 193(11):1264-1270

Is it time (past time) to move away from CVP to decide fluid responsiveness?



CVP is a HUGE FAIL to predict fluid responsiveness!!
So, when is it appropriate?

The ability of each parameter to predict fluid responsiveness:

Area under the curve (AUC):
1.0 = Perfect!
0.9 – 0.99 = Excellent!
0.8 – 0.89 = Good!
0.7 – 0.79 = Fair
0.6 – 0.69 = Poor
0.5 – 0.59 = Fail

AUC CVP = 0.56

Scholten EL, et al. *Chest.* 2017;151(1):215-224.

Is There a Practice Change Over Time: What Drives Administration a Fluid Bolus?

Indicator	SAFE 2000 (n = %)	SAFE TRIPS 2007 (n = %)	Fluids TRIPS 2014 (n = %)
BP	67.9	63.7	71.8
CVP	54.8	19.5	11.2
HR	59.8	52.3	30
UOP	54.8	30	41
Cap refill	55.2	12.4	20.1

BP is still most commonly used to make fluid decisions

Bihari S, et. al. *Int.Care Med* 2020; published online April 24th

What should we be measuring?

Something that reflects stroke volume!

Stroke Volume Optimization

Options:

- Ultrasound
- Bioreactance
- Digit continuous CO/BP devices
- Arterial line technologies
- $EtCO_2$

NOT Blood Pressure and HR!!

FRESH Trial

- 13 US and UK Hospitals
- Non-blinded RCT
- n = 124 patients
  - 83 treatment vs. 41 Usual Care
  - 2:1 enrollment
- Enrolled in the ER
  - Refractory septic shock
  - < 3L of fluid administered
- PLR with dynamic measure of SV change using Bioreactance
  - Used to guide decision of fluid vs. vasopressors for clinical hypoperfusion
  - Over the next 72 hours of care, or ICU discharge
- Hypoperfusion defined as:
  - MAP < 65
  - Persistent hyperlactemia
  - Cryptic shock – lactate > 4 without hypotension

Douglas I et al, *CHEST* 2020

Primary endpoint

- **Decreased 72-hour Fluid Balance** (p=0.02)
  - △ Treatment Group: 0.65 L +/- 2.85 L
  - △ Control Group: 2.02 L +/- 3.44 L
- Favoring Treatment Group: -1.37 L

- 43% fluid responsive on initial PLR
- 33% fluid responsive between 48 – 72 hours
- 18% never fluid responsive

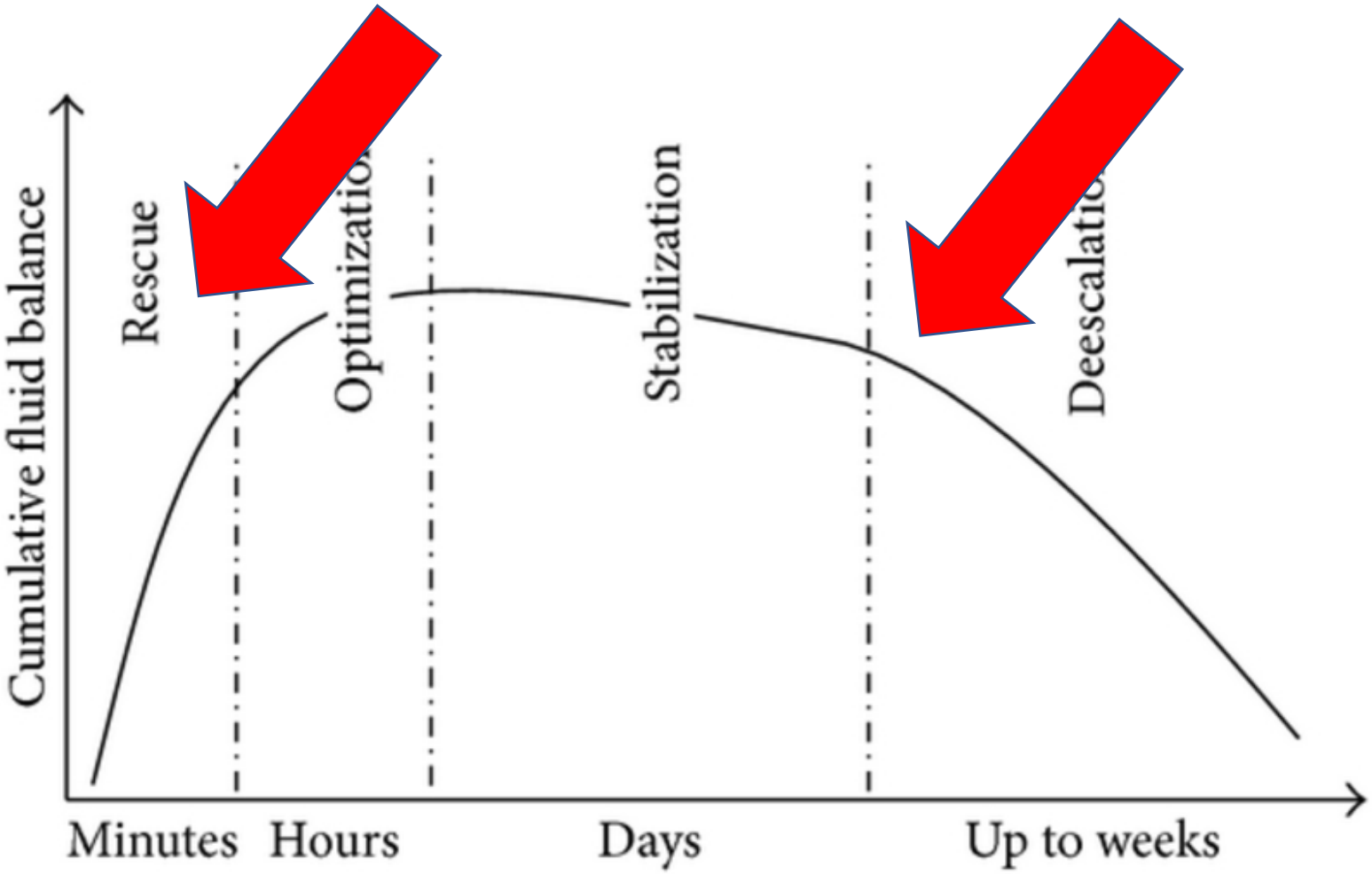
Douglas I et al, *CHEST* 2020

Secondary Endpoints

- **Renal Replacement Therapy (RRT)** p = 0.04
  - △ Treatment Group 5.1%
  - △ Control Group 17.5 %
- **ICU LOS** p = 0.11
  - △ Treatment Group 3.31
  - △ Control Group 6.22
- **Mechanical Ventilation** p = 0.04
  - △ Treatment Group 17.7%
  - △ Control Group 34.1%
- **Discharge Home** p = 0.035
  - △ Treatment Group 63.9%
  - △ Control Group 43.9 %

Douglas I et al., *CHEST* 2020

4 Phases of Fluid Resuscitation



Malbrain *et al. Ann. Intensive Care* (2018) 8:66

Overcoming Challenges of Fluid Administration

- Use dynamic tools to assess fluid status after initial bolus
- Use individual clinical data to drive compliance
- Journal clubs for fluid resuscitation specific studies
- Academic detailing
- Consider initial bundle protocol driven

Repeat Lactate Strategies

- Repeat lactate can be drawn anytime after fluid bolus
- Reflex lactate for any initial lactate > 2
- 2nd lactate order included when first order

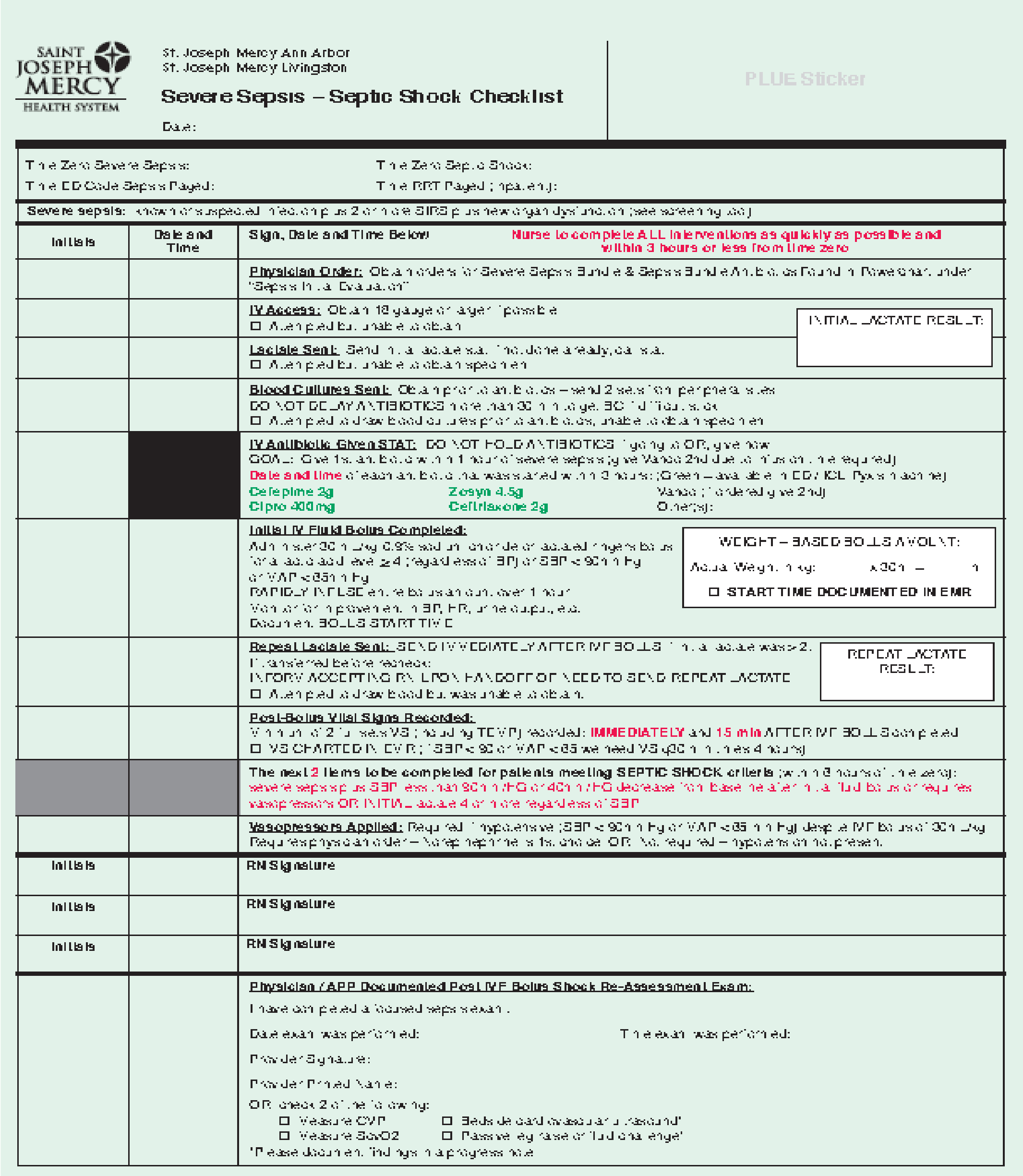
What other strategies have you found to improve getting the second lactate?

Reassessment for Volume Status and Perfusion

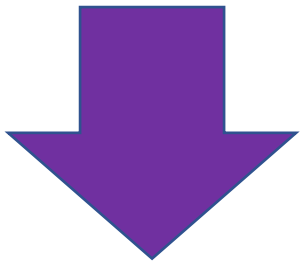
- Team decide how to support all options
- Focused exam—templated notes? Specific form? Making sure it is done between after fluid bolus and before 6 hours
  - Do you have all the correct equipment and tools and training for:
    - CVP (IJ, Subclav or femoral)
    - ScvO2 (intermittent vs continuous)
    - Bedside cardiovascular ultrasound
    - **Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge (must be able to monitor CI, SV—pulse contour technology, non-invasive or PA catheter)**

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



Physician Buy In to Early Management with Sepsis



What are the Issues?

Typical Barriers with Buy-in?

- Lack of consistency in following the sepsis protocol
- New hires are challenging to get on board early
- New evidence-based guidelines are released long before CMS criteria changes creates confusion
- Not having designated administrative time
- Increase physician turnover in the ED
- Challenges with documentation
- Busy and making rounds at other hospitals
- Education needed

What's Work to Get Engagement and Buy-in?

- Use hospital sepsis mortality data and national data to show it makes up the majority of deaths
- Training for ED and hospitalists are on sepsis requirements
- Meeting one on one with physicians after a missed sepsis case or a fall out
- Success driven by engaged sepsis physician chair and ED medical director or informal leaders.
- Identify whose opinion they would respect and provide discussion or feedback
- Case studies to help with physician buy in
- Quick turn around time on data to change behavior
- Medical executive team approval of the nurse driven protocol for rapid response to order labs if a patient screens positive
- Sepsis team providers (ID, Pulm & Ed) provide feedback to providers
- Sharing improvement in mortality with bundle compliance

Feedback to Individual Providers

- Someone they respect
- Make the process simple
- Consistency is key

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.

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:**
Severe Sepsis:	**Septic Shock Time (Time Zero):**
Severe Sepsis/Septic Shock Clinical Pathway:	**Code Sepsis Paged:**
Date/Time Criteria Infection:	
Date/Time Criteria SIRS:	
Date/Time Criteria Organ Dysf:	

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
Central Line Placed, If Requires Vasopressors				Placed within 2h of Vasopressor Start
6 Hour Measures				
Vasopressor Started for SBP < 90 or MAP ≤ 65mmHG After Fluid Bolus				Started 1 hr of Persistent Hypotension After Initial Fluid Bolus
CMS Requirement- Vasopressor Started for SBP < 90 or MAP ≤ 65mmHG After Fluid Bolus				CMS Requirement-Started within 6h of Septic Shock
Repeat Focused Exam by MD/AP (VS, Cardiopulm, Cap Refill, Pulse, AND Skin Findings) OR 2 Measures (CVP, ScVO2, Bedside Cardiovascular Ultrasound, SV Optimization with Fluid Challenge/Passive Leg Raise)				Documented within 6h of Time Zero
Repeat Lactic Acid				Repeat within 6h of Time Zero >2

Comments:

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

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
- Makes regular rounds on sepsis patients to evaluate appropriateness of orders, treatment plans, interventions and documentation and compliance with the Sepsis bundle
- Utilizes currently available reports to identify sepsis cases and facilitates data collection & 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
- 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.

What Outcome and Process Data Should be Collected & 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
  - Admission source
  - Sepsis severity
- Process Metrics
  - Overall SEP-1 compliance
  - 3 hour bundle compliance
  - Each individual element compliance

Score Cards

Clinical Measures - June 2020

Measure	Compliance	Previous Year	Nat'l	Trend
ED - DTA to ED departure	170	148	101 min.	
Sepsis : Early Mgmt Bundle Compliance Rate	50%	56%	60%	Top 10% -
Severe Sepsis Bundle - Blood C/S prior to ATB and w/in 3 hrs	94%	92%	N/A	
Severe Sepsis Bundle - Initial Lactate drawn w/I 3 hrs of Time ZERO	98%	88%	N/A	
Severe Sepsis Bundle- Broad Spectrum antibiotic w/I 3 hrs of TIME ZERO	91%	91%	N/A	
Severe Sepsis Bundle - Repeat Lactate w/I 6 hrs (if initial >2)	77%	93%	N/A	
Septic Shock Bundle- crystalloid fluid w/I 3 hrs.	55%	69%	N/A	
Septic Shock Bundle - Vasopressors for persistent hypotension w/I 6 hrs	100%	100%	N/A	
Septic Shock Bundle - Repeat Volume Status/ tissue perfusion assessment w/I 6 hrs	93%	91%	N/A	
SEPSIS - Readmission Rate	5%	9%	N/A	
SEPSIS - Survival Rate	95%	89%	N/A	

Performance Graphs

Role of Data

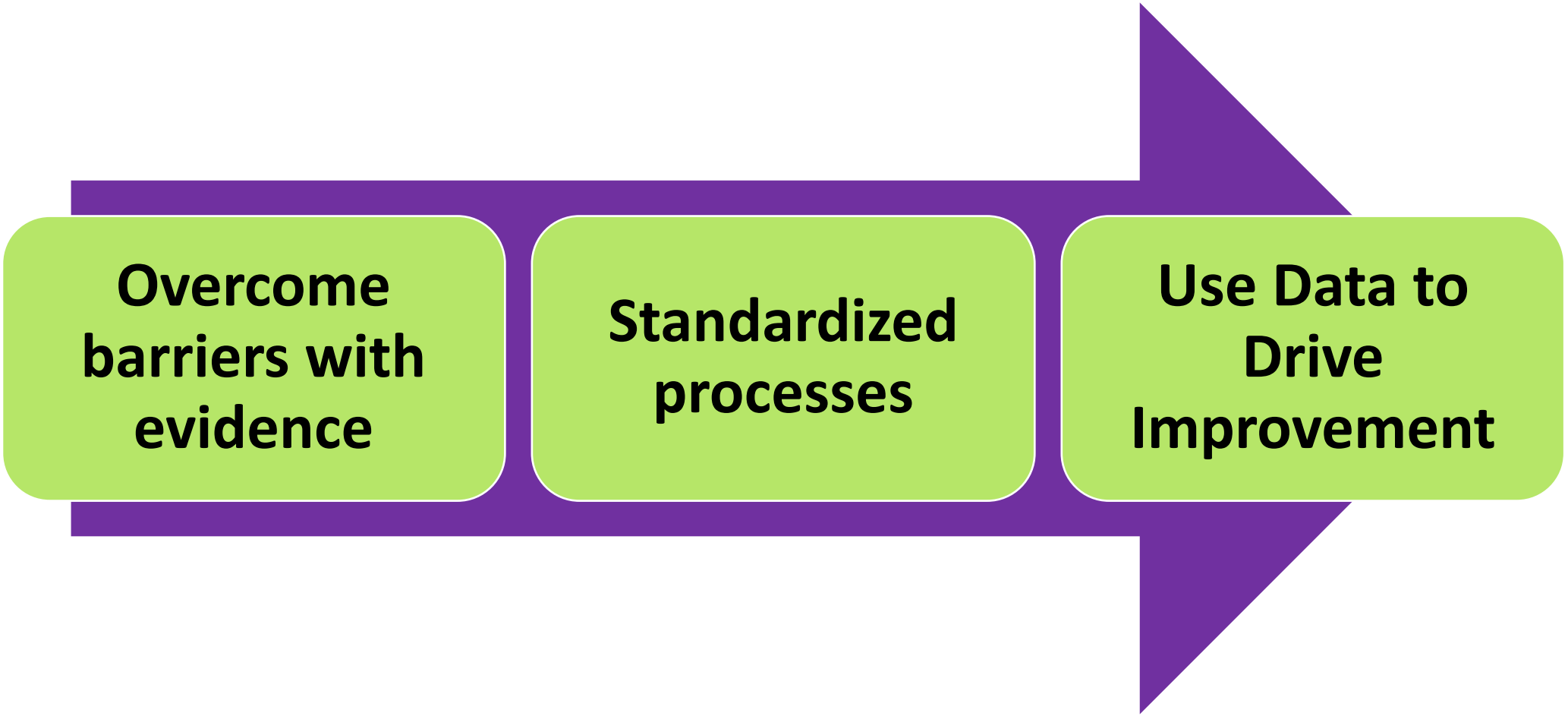
Outcome data

- Share with staff and administration to keep momentum going
- Helps convince/move skeptics

Process data

- Celebrate small successes
- Helps identify where opportunities for improvement still exist

The Journey to High Reliable Sepsis Care and Amazing Outcomes



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ADVANCING NURSING THROUGH KNOWLEDGE & INNOVATION

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