

Do You Measure Up: Hardwiring Sepsis Processes to Meet Core Measures

Kathleen M. Vollman RN, MSN, CCNS, FCCM, FAAN
Clinical Nurse Specialist/Educator/Consultant
ADVANCING NURSING LLC

kvollman@comcast.net

Northville, Michigan

www.vollman.com



Overview

- Discuss the four tier process for program development: I-Organizational Commitment II-Screening III-Sepsis Bundles Implementation IV-Measurement
- Understand the milestones to achieve in each of the Tiers
- Identify common barriers to program implementation and discuss strategies to overcome common barrier
- Design a measurement process to evaluate program and the SEP-1 measures

Severe Sepsis: A Significant Healthcare Challenge

- **Major cause of morbidity and mortality worldwide**
 - Leading cause of death in noncoronary ICU (US)¹
 - 10th leading cause of death overall (US)^{2*}
- **More than 750,000 cases of severe sepsis in the US annually³**
- **Sepsis occurs in just 10% of U.S. hospital patients, but it contributes to as many as half of all hospital deaths**
- **Most expensive condition treated in hospitals in 2013, 23.7 billion or 6.2% aggregate cost⁴**
- **In the US, more than 500 patients die of severe sepsis daily^{3†}**

Based on data for septicemia

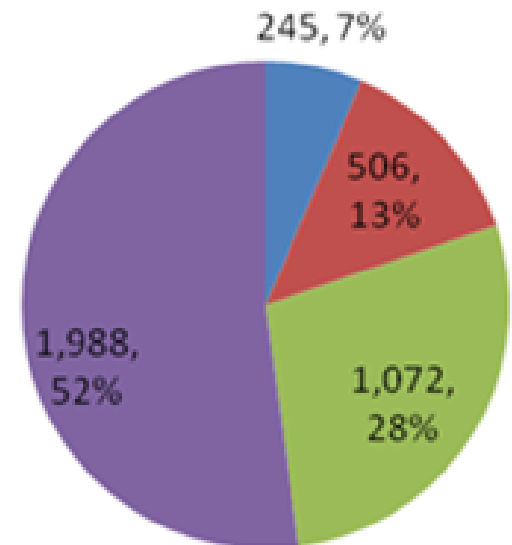
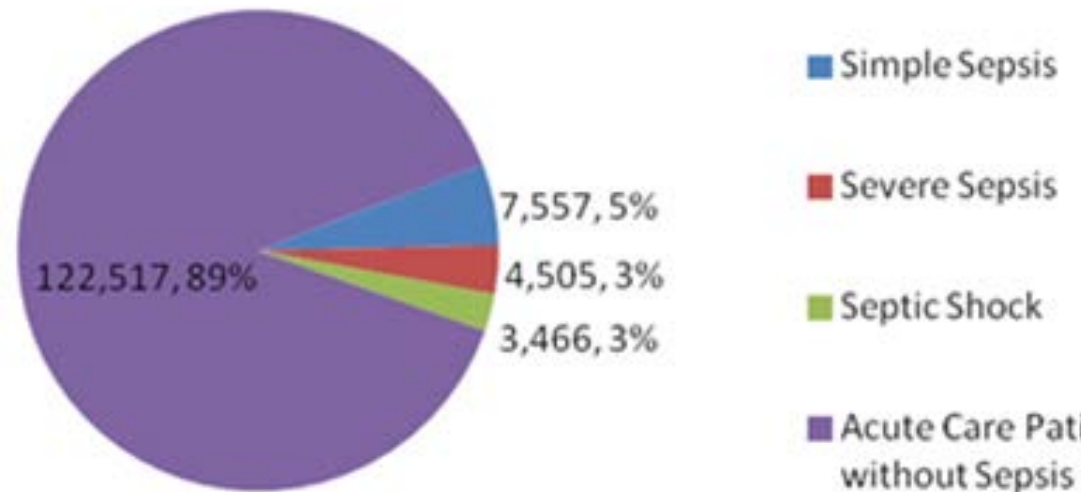
† Reflects hospital-wide cases of severe sepsis as defined by infection in the presence of organ dysfunction

1. Sands KE, Bates DW, Lanken PN, et al. Epidemiology of sepsis syndrome in 8 academic medical centers. *JAMA* 1997;278:234-40.
2. National Vital Statistics Reports. 2005.
3. Angus DC, Linde-Zwirble WT, Lidicker J, et al. Epidemiology of severe sepsis in the United States: analysis of incidence, outcome and associated costs of care. *Crit Care Med* 2001;29:1303-10.
4. AHRQ: accessed 06/27/2016 <http://www.healthcarefinancenews.com/news/septicemia-newborn-care-top-list-most-expensive-treatments-agency-healthcare-research-and>

Sepsis is #1 Cause of Inpatient Deaths

2014 Acute Care Discharges
11% of Pts Have Sepsis DX

2014 Acute Care Deaths
48% of Pts have Sepsis DX



Sepsis Impact on Mortality in Hospitals

Table 1. Inpatients With Sepsis Diagnoses in the Kaiser Permanente Northern California Cohort and the Healthcare Cost and Utilization Project Nationwide Inpatient Sample^a

	Inpatients With Sepsis Diagnoses ^b					
	Kaiser Permanente Northern California (2010-2012) (n = 21 Hospitals) (14 206 Deaths/482 828 Admissions)				Nationwide Inpatient Sample (2010) (n = 1051 Hospitals) (143 312 Deaths/6 555 621 Admissions)	
	Explicit	Explicit POA ^c	Implicit	Implicit POA ^c	Explicit	Implicit
Hospitalizations	55 008 (11.4) [11.3-11.5]	50 520 (10.5) [10.4-10.5]	80 678 (16.7) [16.6-16.8]	73 933 (15.3) [15.2-15.4]	280 663 (4.3) [4.3-4.3]	717 718 (10.9) [10.9-11.0]
Hospital mortality	6272 (11.4) [11.1-11.7]	5238 (10.4) [10.1-10.6]	7941 (9.8) [9.6-10.0]	7391 (10.0) [9.8-10.2]	49 664 (17.7) [17.6-17.8]	74 451 (10.4) [10.3-10.4]
% (95% CI) of all hospital deaths among patients with sepsis	44.2 (43.3-45.0)	36.9 (36.1-37.7)	55.9 (55.1-56.7)	52.0 (51.2-52.8)	34.7 (34.4-34.9)	52.0 (51.7-52.2)

1 out of 2-3 Deaths r/t Sepsis, Most POA

In KPNC 2012 subset, patient meeting criteria for EGDT comprised 32.6 percent of sepsis deaths & patients with sepsis, normal BP & lactate < 4 comprised 55.9% of sepsis deaths

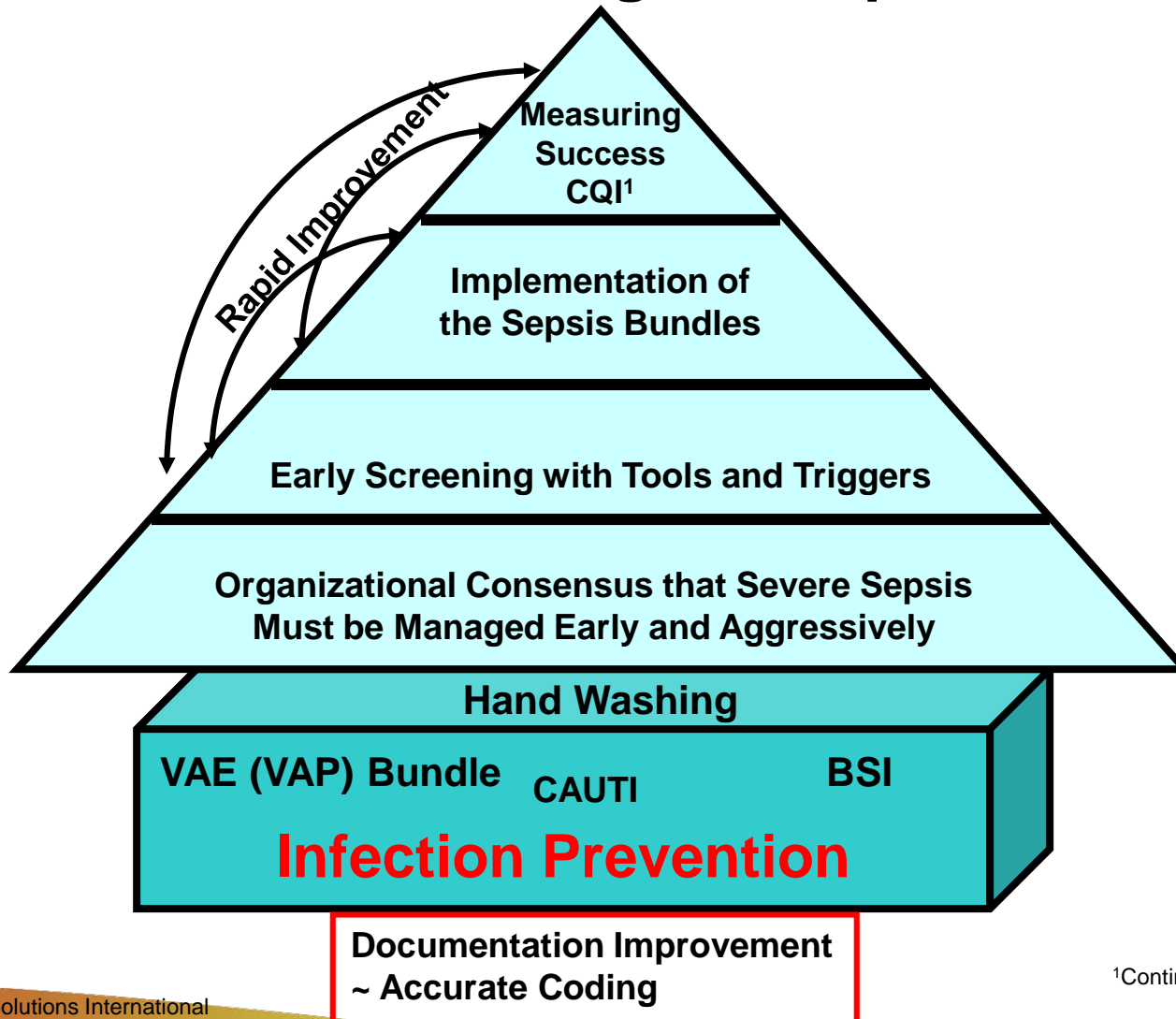
Table 2. Ten conditions with the most all-cause, 30-day readmissions for Medicare patients (aged 65 years and older), listed by total number of readmissions in descending order, 2011

Principal diagnosis for index hospital stay*	Number of readmissions		Cost of readmissions		Readmission rate (per 100 admissions)
	Number of all-cause, 30-day readmissions	Readmissions as a percentage of total Medicare readmissions	Total cost of all-cause, 30-day readmissions (in millions), \$	Readmission total cost as a percentage of total costs of Medicare readmissions	
Congestive heart failure; nonhypertensive	134,500	7.3	1,747	7.3	24.5
Septicemia (except in labor)	92,900	5.1	1,410	5.9	21.3
Pneumonia (except that caused by tuberculosis or sexually transmitted disease)	88,800	4.8	1,148	4.8	17.9
Chronic obstructive pulmonary disease and bronchiectasis	77,900	4.2	924	3.8	21.5
Cardiac dysrhythmias	69,400	3.8	835	3.5	16.2
Urinary tract infections	56,900	3.1	621	2.6	18.1
Acute and unspecified renal failure	53,500	2.9	683	2.8	21.8
Acute myocardial infarction	51,300	2.8	693	2.9	19.8
Complication of device; implant or graft	47,200	2.6	742	3.1	19.0
Acute cerebrovascular disease	45,800	2.5	568	2.4	14.5
Total	718,100	39.1	9,371	39.0	19.6

* Clinical Classifications Software (CCS) label

Sepsis Practice Collaborative Model

4 Tier Process for Program Implementation



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 ICU 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

Building a Severe Sepsis Tool Kit: Project Team Charter

Problem Statement:

Severe Sepsis is Common and Deadly

Team Members

ED, ICU, Patient Care Unit
Representatives, Administration,
Medical Staff, Nursing,
Pharmacy, Performance Improvement,
Case Management, Laboratory

Business Case

In comparison to other ICU patients,
severe sepsis patients have a higher
mortality rate, increased LOS, and an
increased need for a ventilator

Benefits

Potential to improve outcomes

Goals

Reduce severe sepsis mortality (make
the goal specific and measurable)

Scope

Severe sepsis patients in the ED, ICU,
and patient care units

Milestones

Implementation of Tiers 1, 2, 3, and 4

Tier I: Organizational Consensus and Support

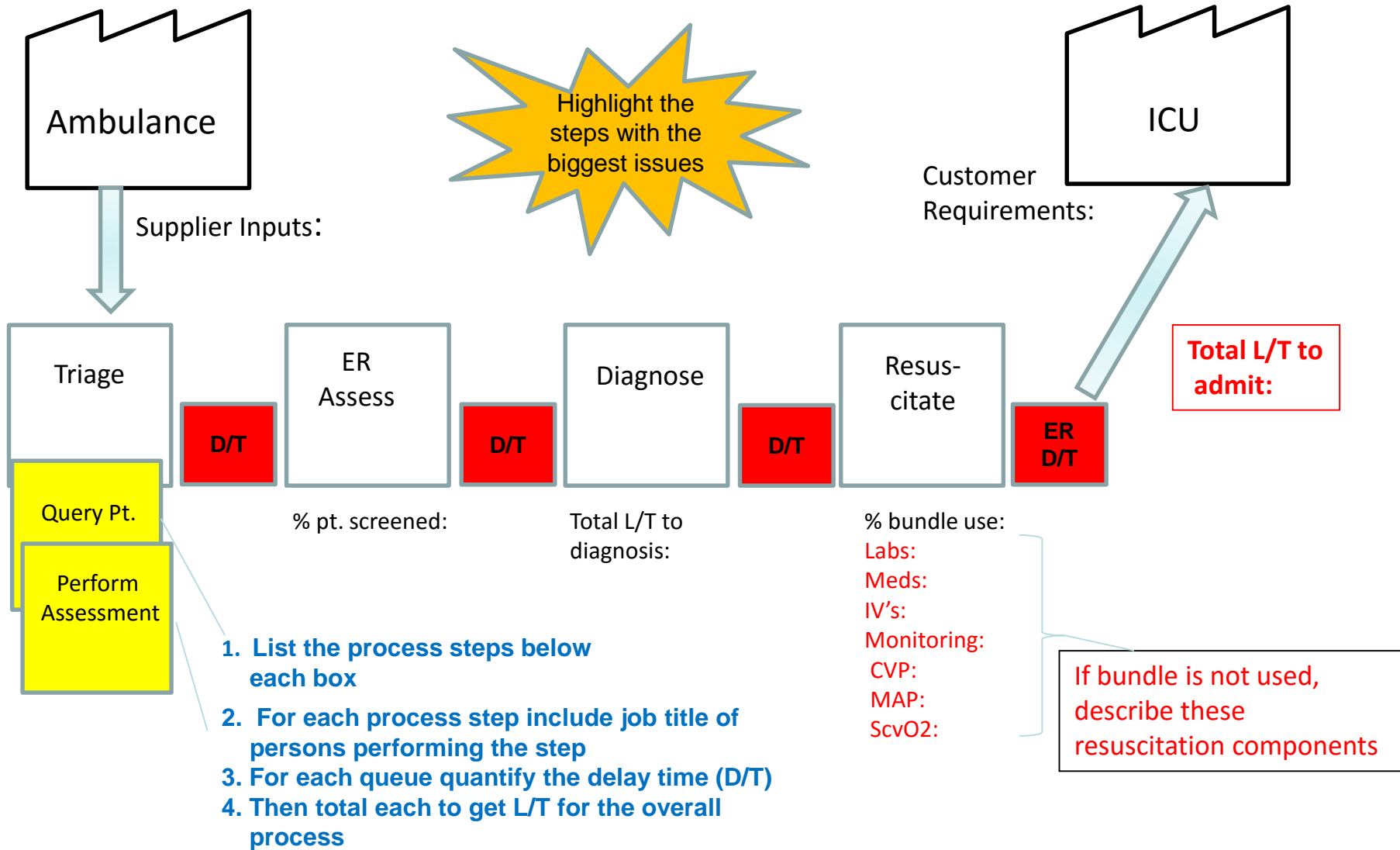
Milestones and Checklist

1. Define Sepsis Program Goal and aligned with organizational goals
2. **Identify Executive sponsor**
3. **Collect Baseline Data—essential step; understand your current process**
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 ICU and ensure champions attend team meeting
6. Begin to define action plan and timeline for program development and implementation

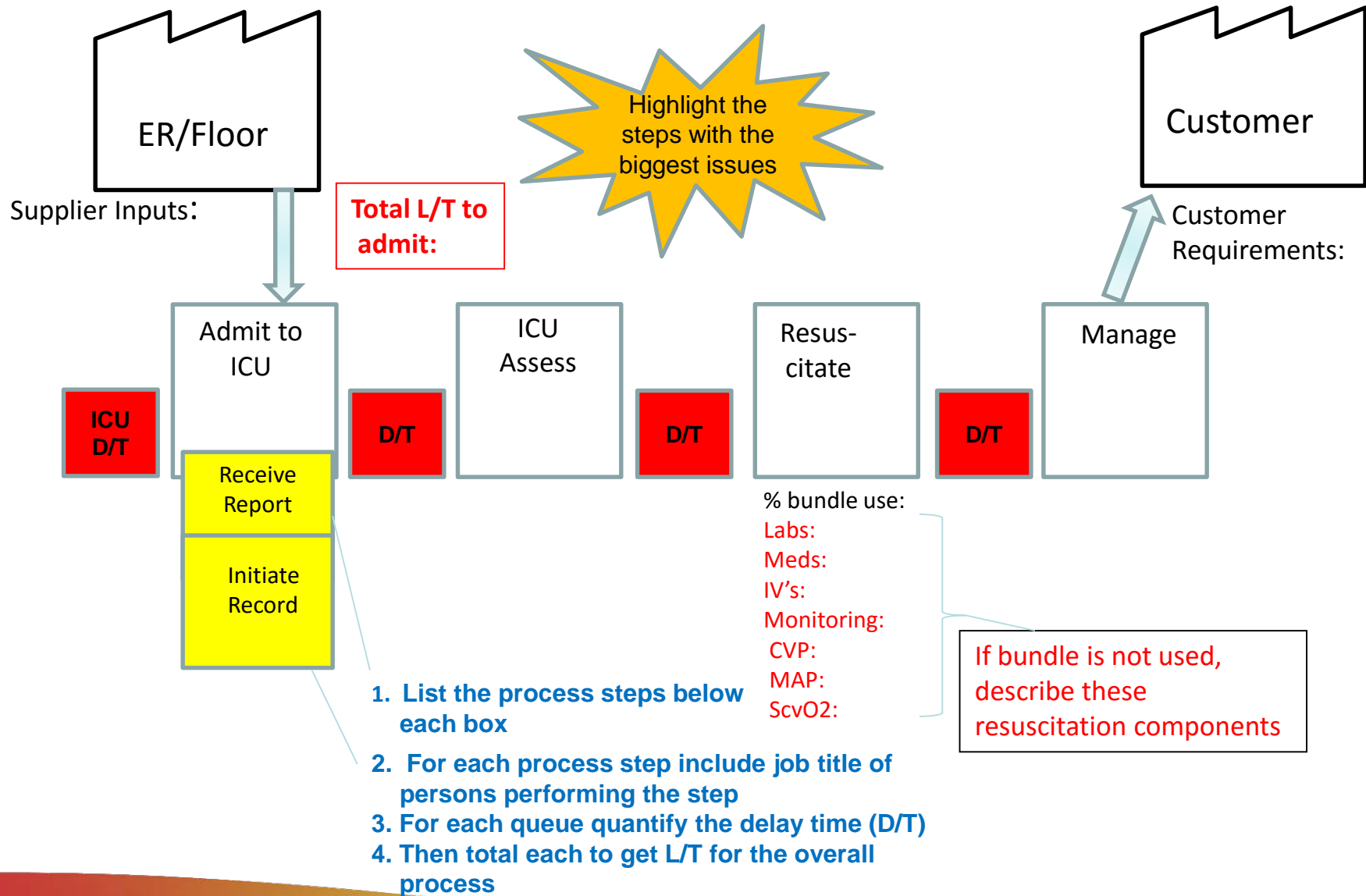
Baseline Data Collection Process

- Pick time period for medical record query
- Sample size: minimum of 20 pts per ICU
- Query strategies:
 - ICD 9 codes: 785.52 and 995.92 or DRG 870, 871, 872--- now also look at ICD-10 R65.20 and R65.21
 - Patients in ICU on 1-2 antibiotics, vasopressor (review charts to see if meet criteria for severe sepsis with lactate > 4 or septic shock before including in outcome data or process data)
- Select Data Collection Elements
 - Outcome
 - Process

Sepsis Patient Flow Template: Ambulance



Sepsis Patient Flow Template: ICU



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 ICU 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

The Team Is KEY!

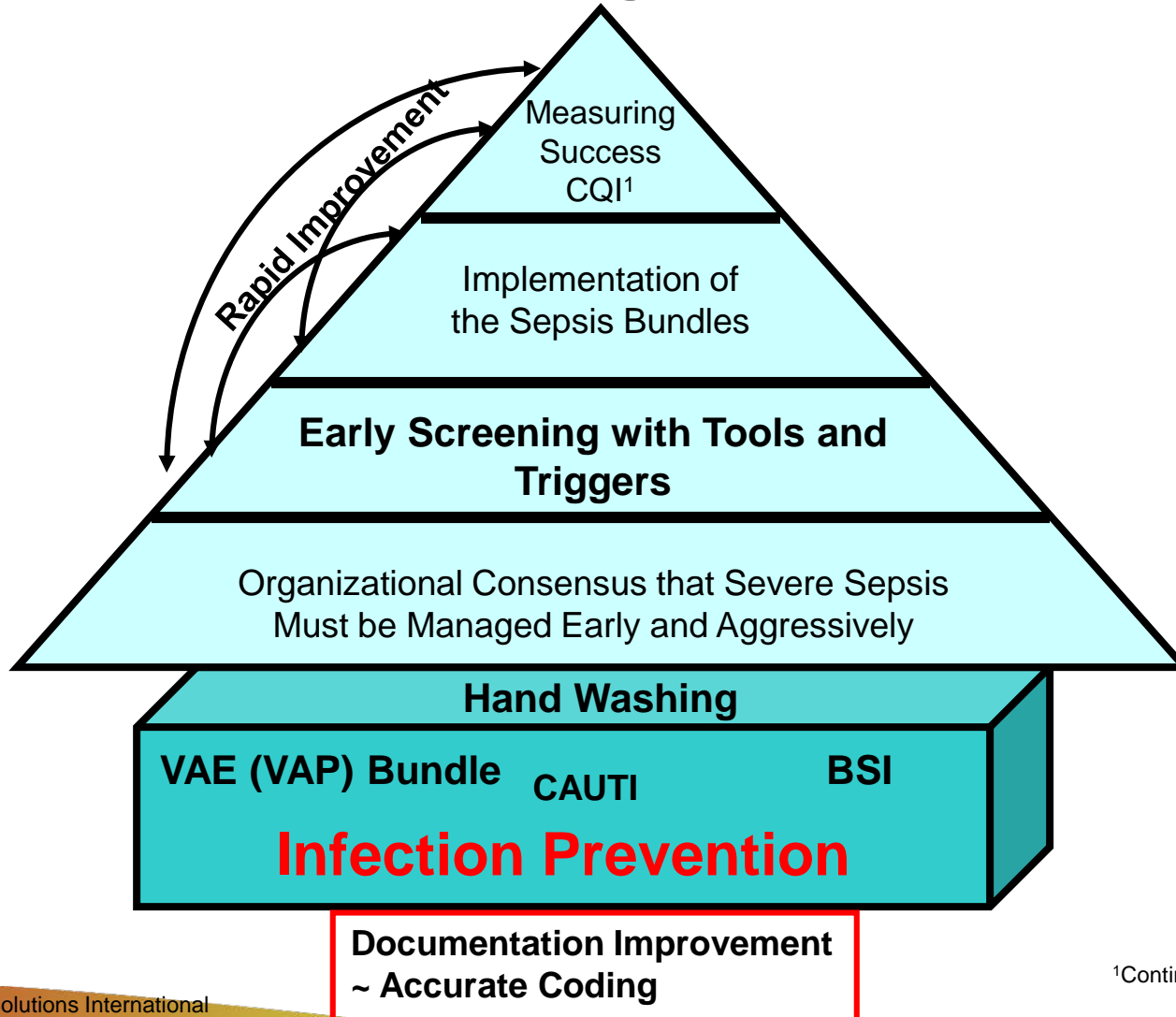
Can Be Major Barrier If Not Functioning Well

- **Must** have nurse and physician champions from ED and ICU (need at least one physician at all meetings)
- **Must** be linked in the organization's quality or operational structure— **Are you linked?**
- **Must** meet at least 1-2 times per month
- Team members **must** be well educated on the evidence and armed with tools and knowledge to change behavior at the bedside— **Does the team need more education?**
- **MUST** have bedside nurses on team—provide reality check and best knowledge of barriers— **Do you?**

Consider developing nurse champions on each patient care unit and shift

Sepsis Practice Collaborative Model

4 Tier Process for Program Implementation



Surviving Sepsis Campaign Guidelines: 2012

- Consensus committee of 68 international experts presenting 30 international organizations
- Used GRADE system to guide assessment of quality of evidence from high (A) to very low (D) and to determine the strength of recommendations as strong (1) or weak (2)
- Some recommendations were ungraded (UG)
- Guidelines included recommendations in 3 areas:
 1. Directly targeting severe sepsis
 2. Targeting general care of critically ill patient, considered high priority in severe sepsis
 3. Pediatric considerations

Old Definitions

- Sepsis is defined as the presence (probable or documented) of infection together with systemic manifestations of infection.
- Severe sepsis is defined as sepsis plus sepsis-induced organ dysfunction or tissue hypoperfusion; at least two SIRS criteria to be present in the setting of known or suspected infection
- Septic shock is a state of acute circulatory failure; severe sepsis plus hypotension not reversed with fluid resuscitation)

New Definitions

- Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection.
- Septic shock is defined as a subset of sepsis in which underlying circulatory and cellular metabolism abnormalities are profound enough to substantially increase mortality.

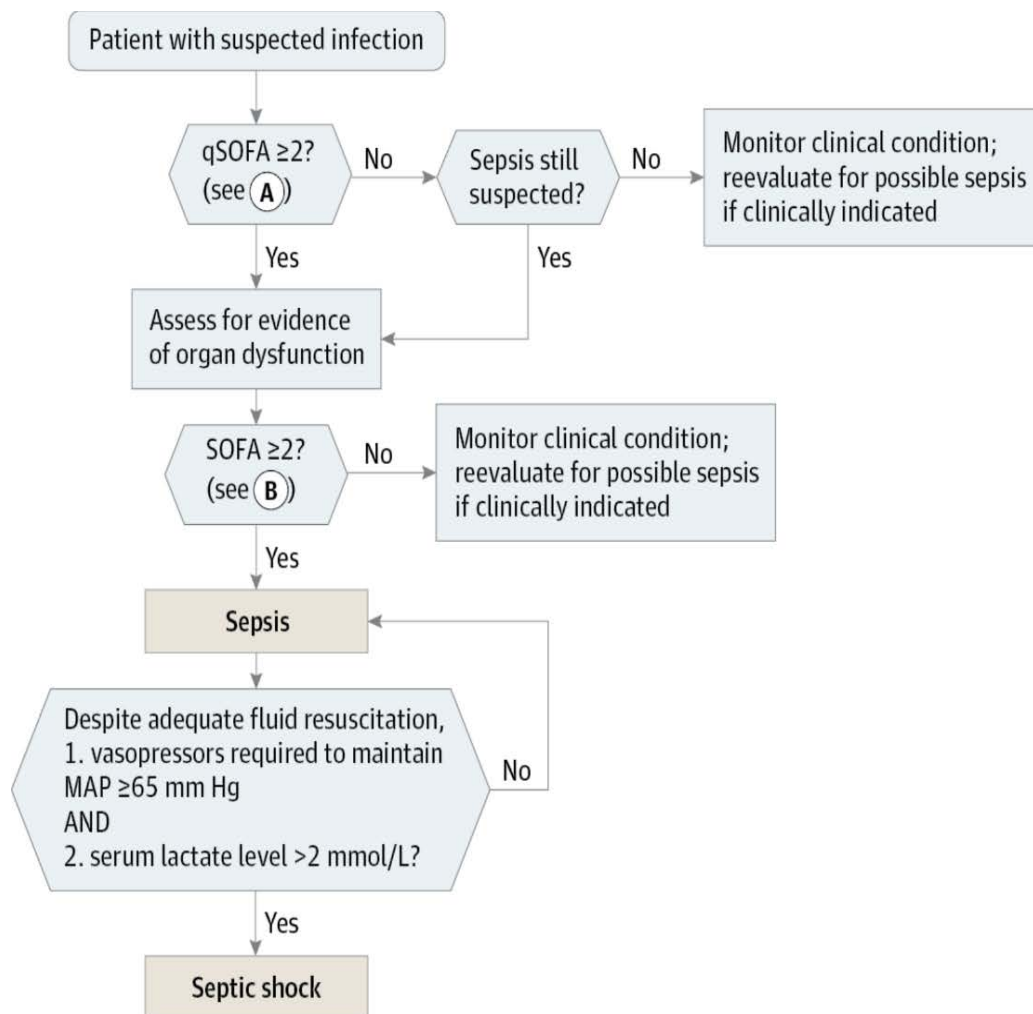
Sepsis 3:

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-3 codifies the quantification of organ dysfunction through the SOFA score (Sequential Organ Failure Assessment)
- Septic shock: vasopressor-dependent hypotension + lactate >2
- Sepsis-3 includes clinical criteria to predict life-threatening disease

Sepsis-3 Workflow

Singer et al, JAMA 2016. PMID: 26903338



- A** qSOFA Variables
- Respiratory rate
 - Mental status
 - Systolic blood pressure

- B** SOFA Variables
- PaO₂/FiO₂ ratio
 - Glasgow Coma Scale score
 - Mean arterial pressure
 - Administration of vasopressors with type and dose rate of infusion
 - Serum creatinine or urine output
 - Bilirubin
 - Platelet count

So, What Now

- There is no consensus among other professional organizations including ACEP and ACCP (CMS usually does not like to make changes unless all professional societies in agreement)
- CMS is reviewing these changes to determine what changes (if any) to make to the Sepsis measure
- The earliest changes can be incorporated would be for January 1, 2017 discharges – and even this date is highly unlikely

**Keep Following Current CMS
Definitions/Measurements**

SSC Guidelines

Screening

- We recommend routine screening of potentially infected seriously ill patients for severe sepsis to increase the early identification of sepsis and allow implementation of early sepsis therapy (1C)
- Performance improvement efforts in severe sepsis should be used to improve patient outcomes (UG)

Finding the Patients

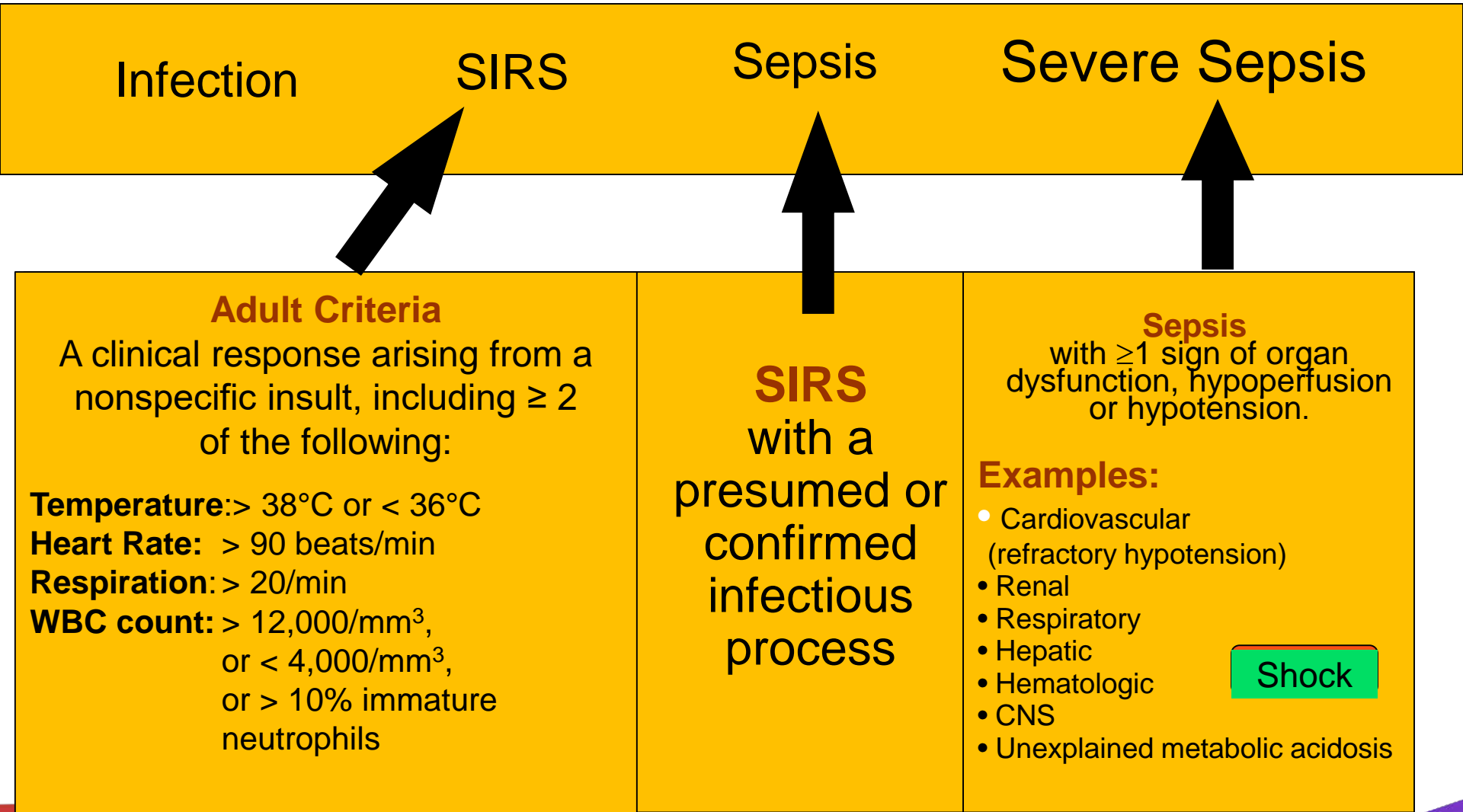
Redefining what a 'septic shock' patient looks like

Before	NOW
Supine in bed	Sitting up in bed
Ventilator	Nasal cannula
Fluids wide open	IV boluses
Increasing vasopressors	Weaning vasopressors
Minimally responsive	Awake

“Don't look sick enough to be in ICU or to have a central line”

Must correct this misperception

Severe Sepsis: Defining a Disease Continuum



SIRS = Systemic Inflammatory Response Syndrome
Bone et al. *Chest*.1992;101:1644-1654

Tier II: Screening for Severe Sepsis Milestones and Checklist

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

Why Do You Need to Have a Screening Process?

- **TIME IS TISSUE!!**
 - Similar to trauma, AMI, or stroke, the speed and appropriateness of therapy administered in the initial hours after severe sepsis develops are likely to influence outcomes.¹
- To screen effectively, it must be part of the nurses' daily routines— i.e., part of admission and shift assessment
- Must define a process for what to do with the results of the screen

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.

Paper or Electronic....That is the Question

Method	Pros	Limitations
Paper form	<ul style="list-style-type: none"> • Nurses critically think as they screen the patient • Easy and quick to develop • No cost 	<ul style="list-style-type: none"> • Screening is intermittent • Paper can be misplaced • Static—no ability to automate an alert
EMR form	<ul style="list-style-type: none"> • Nurses critically thinks as they screen the patient • Can automate alerts for positive screens 	<ul style="list-style-type: none"> • Screening is intermittent • Length of programming time • Cost
EMR—real time, continual screening	<ul style="list-style-type: none"> • 24 hour screening • Can automate alerts for positive screens 	<ul style="list-style-type: none"> • Nurse does not screen patient—potential loss of screening knowledge and critical thinking • Computer not reliably able to identify patients who have infection • Computer not able to discern if SIRS is valid or organ dysfunction is new
EMR—real time and scheduled	<ul style="list-style-type: none"> • Form fires and pre populates for nurse to screen upon admission and each shift—nurse critically thinks • 24 hour screening • Manual screen completed when EMR alert fires---nurse discerns/validates appropriateness/correctness of alert 	<ul style="list-style-type: none"> • Screening form needs to be developed in EMR—programing time and costs



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

Patient Units Severe Sepsis Screening Tool

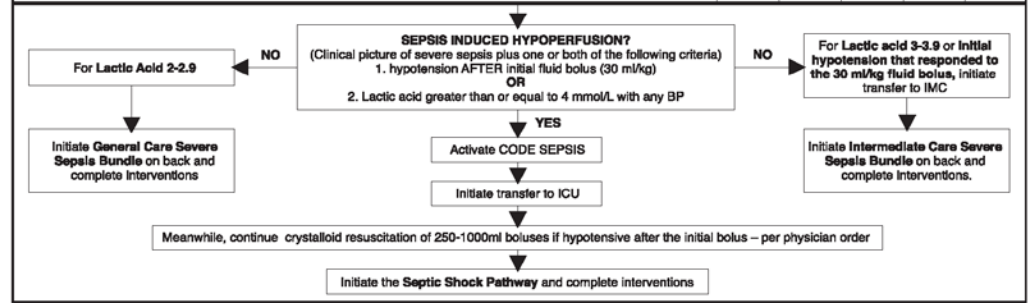
Severe Sepsis = Infection + SIRS + Organ Dysfunction

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/mm ³ or less than or equal to 4,000/mm ³ or greater than 0.5 K _A L bands					
Blood glucose greater than 140 mg/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 – answer 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: SaO ₂ less than 90% OR increasing O ₂ 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) Glasgow 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.					



RN Signature, Initial Date & Time:

--	--	--



PATIENT CARE UNIT SEVERE SEPSIS SCREENING TOOL

General Care Severe Sepsis Bundle

For patients with 2 or more SIRS + known/suspected infection + initial lactic acid 2-2.9 w/o additional organ dysfunction

- Blood cultures x 2
- Antibiotics w/in 1 hr of screening positive for sepsis. Ensure antibiotic is ordered STAT (call Rx and notify of STAT order)
- Vital signs: every 1 hr x 4, then every 4 hr x 2, then once per shift
- Lactic acid every 4 hr x 24 hr
- I & O every 2 hr (if no void w/in 4 hr, bladder scan- if greater than 200 mL perform intermittent straight cath), call MD if less than 0.5 mL/kg/hr
- Maintain/monitor for:
 - SBP greater than 90 mmHg
 - Urine output greater than 0.5 mL/kg/hr
 - Decrease in lactic acid x 3 results or normalization x2 within 12 hours
- ****If unable to maintain these parameters or if pt has additional organ dysfunction, call MD for possible transfer to IMC/ICU**
- Continue sepsis screen every shift and prn change in patient condition
- Complete 0 to 1 hour interventions, below

Intermediate Care Severe Sepsis Bundle

For patients with 2 or more SIRS + known/suspected infection + initial lactic acid 3-3.9 or had hypotension that responded to fluid bolus

- Blood cultures x 2
- Antibiotics w/in 1 hr of screening positive for sepsis. Ensure antibiotic is ordered STAT (call Rx and notify of STAT order)
- Vital signs: every 30 min x 4, then every 1hr x 2, then every 2hr x 4; then every 4 hr
- Lactic acid every 4 hr x 24 hr
- I & O every 2 hr (if no void w/in 4 hr, bladder scan- if greater than 200 mL perform intermittent straight cath), call MD if less than 0.5 mL/kg/hr
- Continue to administer fluid boluses per physician order to achieve/maintain the following goals:
 - SBP greater than 90 mmHg
 - Urine output greater than 0.5 mL/kg/hr
 - Decrease in lactic acid x 3 results or normalization x2 within 12 hours
- ****If unable to achieve these parameters or if pt has increase in lactic acid of 0.5 or more, increase in O2 requirements, mental status change, or additional organ dysfunction, call MD for possible transfer to ICU**
- Complete 0 to 1 hour interventions, below

Date/Time: _____ to _____
_____ If hypotensive, volume resuscitate: initial 30 mL/kg as fast as possible, then additional boluses as needed per order
_____ Time 30 mL/kg fluid bolus infused
_____ Broad spectrum antibiotic-start after obtaining blood culture
_____ Time antibiotic hung
_____ Initial Labs: serum lactate, additional labs as ordered by physician
Yes No Serum lactic acid drawn
Yes No Blood Cultures x 2
_____ Time 1: _____ Time 2: _____
_____ Other cultures:
_____ Establish IV access (2 large bore IVs)
Signature: _____ Date/Time: _____

Date/Time: _____ to _____
_____ If hypotensive, volume resuscitate: initial 30 mL/kg as fast as possible, then additional boluses as needed per order
_____ Time 30 mL/kg fluid bolus infused
_____ Broad spectrum antibiotic-start after obtaining blood culture
_____ Time antibiotic hung
_____ Initial Labs: serum lactate, additional labs as ordered by physician
Yes No Serum lactic acid drawn
Yes No Blood Cultures x 2
_____ Time 1: _____ Time 2: _____
_____ Other cultures:
_____ Establish IV access (2 large bore IVs)
Signature: _____ Date/Time: _____

Make Screening for Severe Sepsis Process-Dependent

- Weave into fabric of current practice
- Bedside nurse should do the screening—every shift and prn with condition changes
- Define expectation to screen during shift assessment and PRN with changes in patient's conditions
- Screen for severe sepsis with every rapid response or medical response team call
- Identify strategies for initiation of therapy once patient with positive screen for severe sepsis is identified

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

The background of the slide features a vibrant, multi-colored wavy pattern. The colors transition from red on the left, through orange, yellow, green, blue, and finally purple on the right. The waves are smooth and flowing, creating a dynamic and colorful backdrop for the text.

Audit Screening Process

What Do We Want to Learn?

- **Screening compliance** = all of the patients are being screened for severe sepsis
- **Screens are valid** = Are the screens being done correctly
- **Screens are reliable** = Screens are consistent from RN to RN

If patient screens positive for severe sepsis, were the appropriate interventions completed

Screening: Barriers/Strategies

- **Barriers**

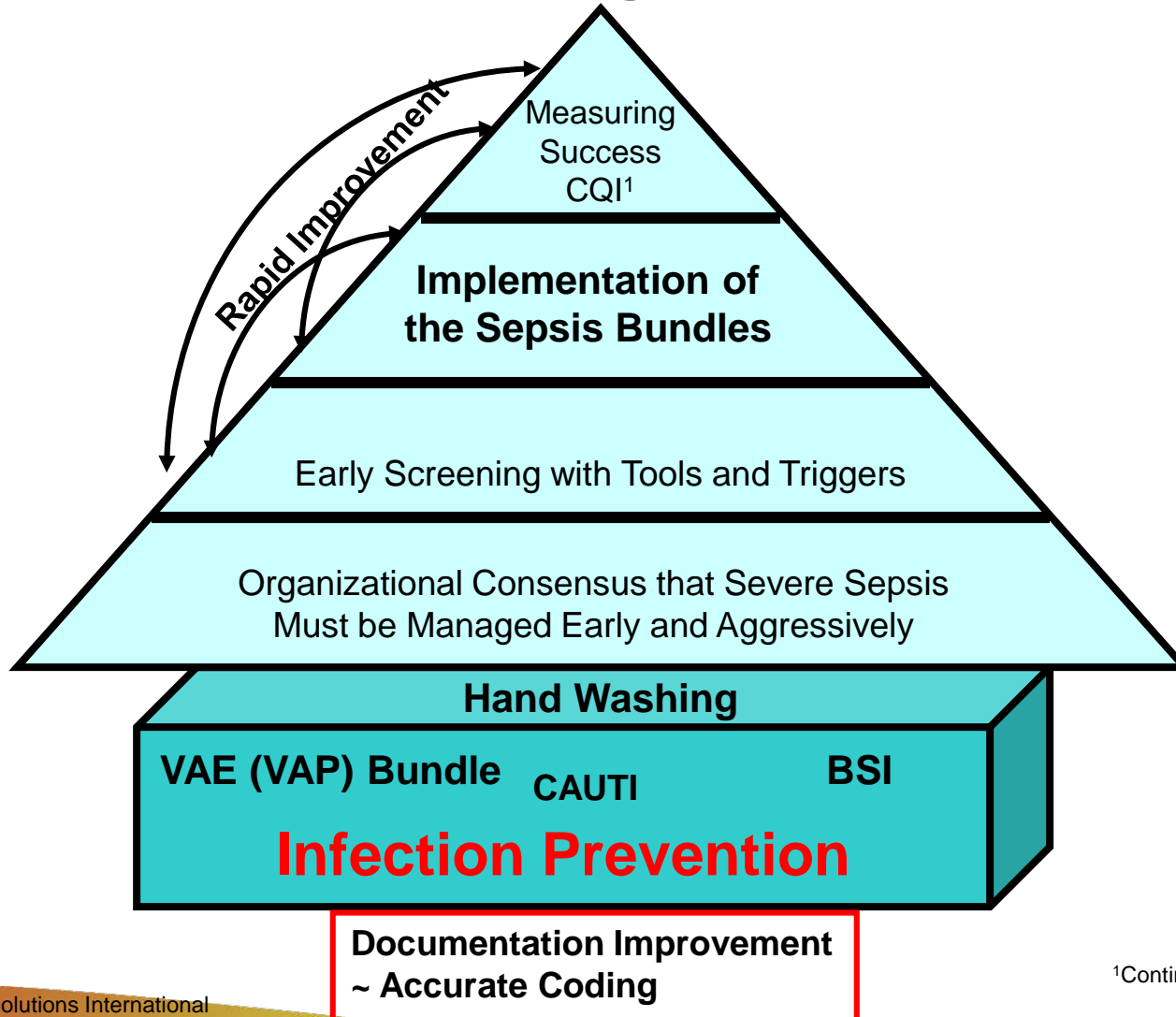
- Time for nurses to do it (perception vs. reality)
- Screening is not specific only for severe sepsis
- Positive screen is not a diagnosis of severe sepsis

- **Strategies**

- Must assign responsibility and enforce accountability
- Perform audits to measure compliance and identify problems
- Round on unit and ask nurses how it is going and discuss issues

Sepsis Practice Collaborative Model

4 Tier Process for Program Implementation

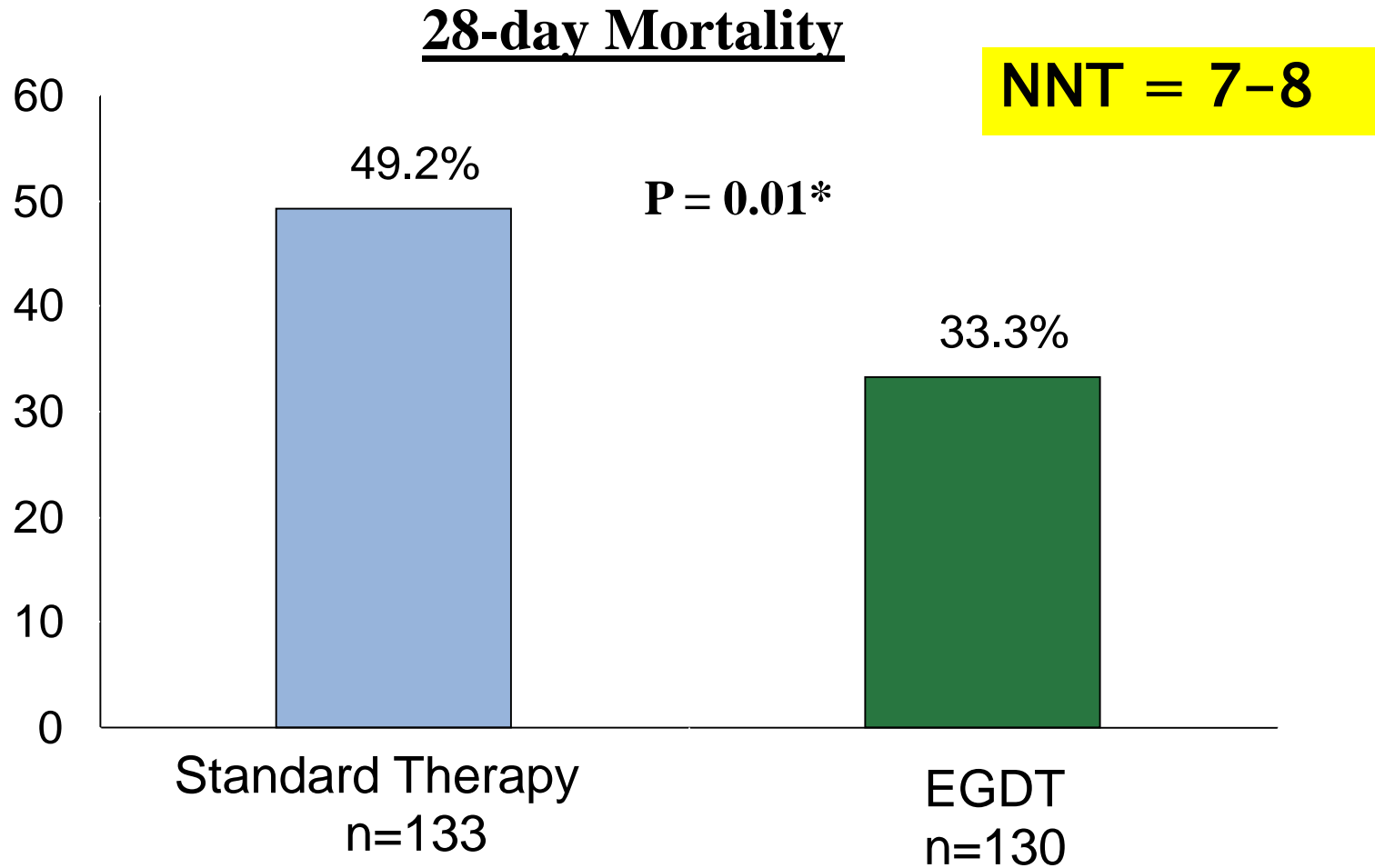


Early Goal Directed Therapy

Methodology: 263 severe sepsis patients

- Early Goal-Directed Therapy (EGDT)
 - Continuous ScvO₂ monitoring & tx with fluids, blood, inotropes &/or vasoactives to maintain:
 - ScvO₂ \geq 70%, SaO₂ \geq 93%, Hct \geq 30%, CI/VO₂
 - CVP \geq 8-12
 - MAP \geq 65
 - UO \geq .5ml/kg/hr
- Standard Therapy
 - CVP \geq 8-12
 - MAP \geq 65
 - UO \geq .5ml/kg/hr

Early Goal-Directed Therapy Results



***Key difference was in sudden CV collapse, not MODS**

The Changing Paradigm of Septic Shock Management

- ProCESS trial-randomized, 31 centers, 1341 patients
- ARISE trial- randomized, 51 centers(mostly Australia and New Zealand), 1600 patients
- Promise—randomized, UK, 56 centers, 1260 patients

Results of 3 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 **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

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 ≥ 4 mmol/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) ≥ 65 mmHg
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.

TABLE 1

DOCUMENT REASSESSMENT OF VOLUME STATUS AND TISSUE PERFUSION WITH:

Either

- Repeat focused exam(after initial fluid resuscitation) by licensed independent practitioner including vital signs, cardiopulmonary, capillary refill, pulse and skin findings.


Or two of the following:

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


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



**Which Components
of the Bundle Did You Find
Gaps in Performance During
“Go and See” and From
Baseline Data Collection?**



Common Barriers/Issues

- Lactate
- Antibiotics
- Fluid boluses
- Reassessment for volume status and perfusion
- Consistency in bundle application

Lactate measurement

- Lab vs POC
- Venous vs arterial
- Turnaround time
- Repeat lactate if initial greater than 2

Antibiotics

- **Appropriate initial antibiotics**
 - Guide for providers recommending the appropriate antibiotic based on whether hospital or community acquired, source and your hospitals antibiogram
- **Turnaround time---from indication to hanging**
 - ED vs ICU vs Floor
- **Understand your current process and where the gaps are**
- **Make antibiotics rapidly available**

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

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

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

Impact of Early Fluid & Amount

- Prospective, observational cohort of all ED severe sepsis or septic shock patients during 13 months
- 90,000 average ER visits
- 1,866 subjects; 53.6% were men, 72.5% were white, mean age was 72 years (SD 16.6 years),
- Mean initial lactate level was 2.8 mmol/L.
- 86% received intravenous antibiotics within 180
- 64% had intravenous fluid initiated within 30 minutes

Leismann D, et al. Annals of Emerg Med, 2016 online

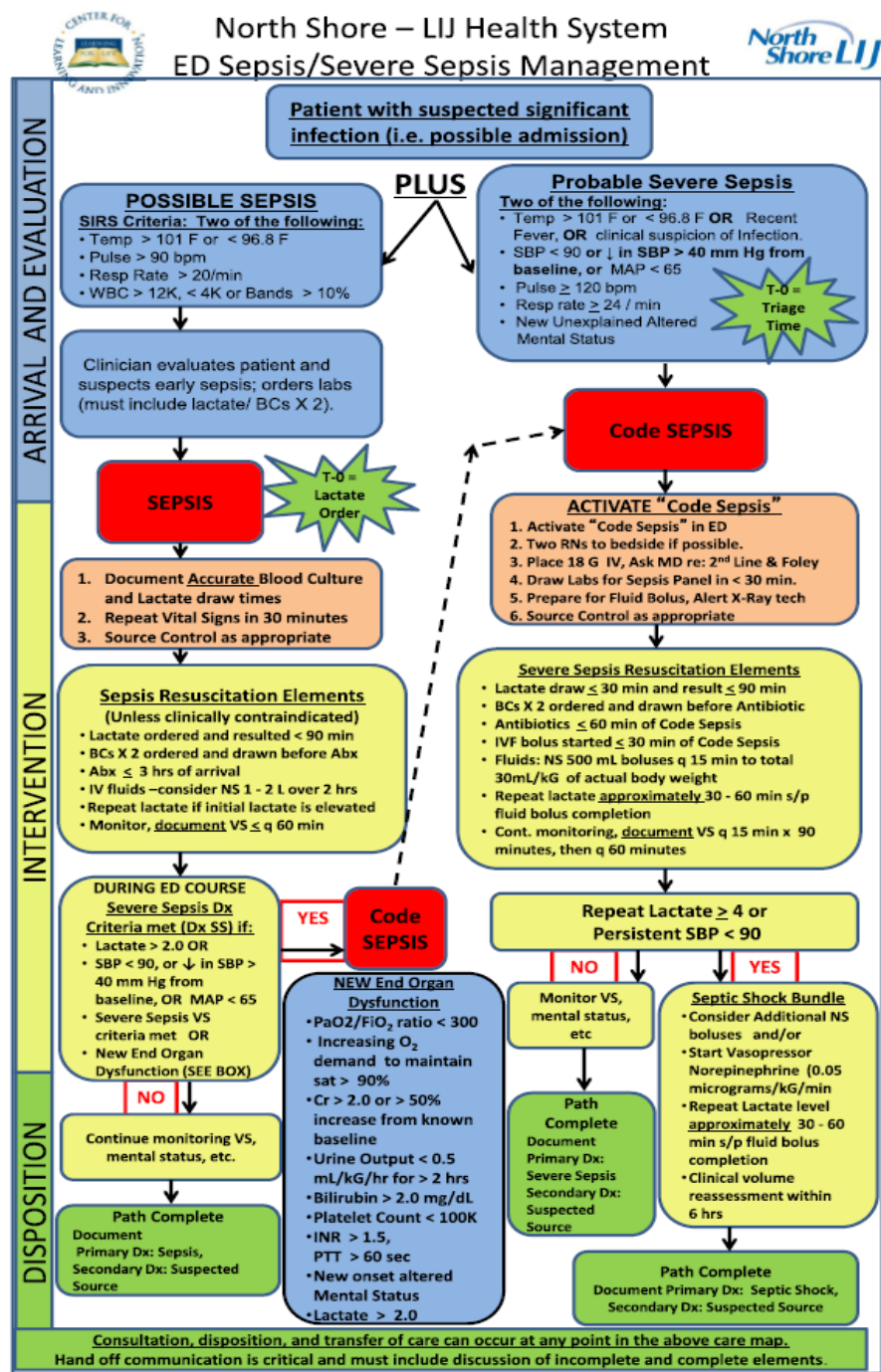


Figure 1. Sepsis algorithm and 3-hour bundle.

Impact of Early Fluid and Amount

- **Results**

- ↓ Mortality in 30 minutes group (159 [13.3%] versus 123 [18.3%])
- ↓ median hospital length of stay (6 days versus 7 days)
- Adjustment for age, lactate, hypotension, acute organ dysfunction, and Emergency Severity Index score, intravenous fluid within 30 minutes was associated with lower mortality
- ↑ 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)

Reassessment for Volume Status and Perfusion

- Team decide how to support all options in table 1
 - 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,)

Focused Examination

- Vital Signs
 - Temp, HR, BP, RR
- Cardiopulmonary
 - Rhythm, S1/2/3/4, presence of murmur and lung sounds
- Peripheral Pulses
 - 1+, 2+ or absent
- Capillary Refill
 - Brisk, <2 sec, >2 sec
- Skin
 - Mottled vs no mottling, to what level. Warm vs cold, etc

Sepsis Reassessment Note to assess volume status and tissue perfusion

Reassessment of Volume Status and Tissue Perfusion Note

Patient: **HNAMTEST, AAFIVE** MRN: (aac)-037325766 FIN: 016661038-4076
Age: 35 years Sex: Female DOB: 1/1/1980
Associated Diagnoses: None
Author: Anderson, Colby J

Reassessment of Volume Status and Tissue Perfusion

Comments

Time Septic Shock Criteria Met: Date: Time:

Time 30ml/kg Fluid Bolus Given: Date: Time:

Physical Examination

Vital Signs

Temperature: 98.6 (04/08 11:56)
Pulse: 78 (04/08 11:56)
Respiration: 16 (04/08 11:56)
BP: 130/84 (04/08 11:56)
Pulse Ox: 98 (04/08 11:56)
Oxygen Delivery: Room air (04/08 11:56)
Pain Score: Not Charted

Cardiopulmonary

Heart regular rate and rhythm, S1, S2, S3, S4, no murmur, no lower extremity edema
Lungs clear to auscultation, breath sounds equal, no wheezing, no rhonchi, no crackles

Peripheral Pulses

Right
1+ [] 2+ [] 3+ [] 4+ []

Left
1+ [] 2+ [] 3+ [] 4+ []

Capillary Refill

[] Brisk [] Greater than 2 seconds [] Less than 2 seconds

Skin

[] No mottling present [] Mottling present

OR two of the below values:

CVP: (From CVC in SVC vs Swan-Ganz)

Scvo2: (From CVC in SVC)

Bedside Cardiovascular Ultrasound: (Cavial index from TTE, TEE or IVC US)

[] Passive Leg Raise or [] 500-1000 mL fluid bolus
Findings: [] Fluid Responsive [] Not Fluid Responsive

Passive Leg Raise: (With patient seated at 45 degrees, lower to horizontal and raise legs to 45 degrees. A 10% increase in SV on the cardiac output monitor or 10% increase in pulse pressure via the arterial line is a positive test at 30-90 seconds.)

Type: Progress Notes
Date: 03 November 2015 08:11 EST
Status: Auth (Verified)
Title: Reassessment of Volume Status and Tissue Perfusion Note
By: Anderson, Colby J on 03 November 2015 08:12 EST
Verified By: Anderson, Colby J on 03 November 2015 08:12 EST
Encounter info: 016661038-4076, (AA) SJMH, Inpatient, 3/17/2014 - 4/28/2014

If Using CVP and ScvO₂

- Provider confidence/competency in placing central lines
- Defined who will place central line when pt has lactate > 4 mmol/L or still hypotensive after initial fluid bolus
 - ED or ICU?
 - What happens on off shifts and weekends?
- Adequate equipment in ED/ICU to insert and monitor CVP
- Educate nurses in ED/ICU on hemodynamic monitoring and ScvO₂
 - Is there sufficient nursing staff to handle the acuity and intensity of these patients in the ED?
- Why do I need a CVP?
 - Research shows that CVPs don't accurately reflect volume status.

Tools to Assist with Consistent Application of the Evidence

- Identify tools to assist bedside staff to implement bundles
 - algorithm, pathway, checklist, pocket cards, green folder etc
- Create protocols
 - For positive screen: lactate, blood cultures and fluids
 - When patients need ICU level care
- Multidisciplinary Rounds
- Handoffs
- Real time review and feedback

Sepsis Reassessment Note to Assess Volume Status and Tissue Perfusion

Reassessment of Volume Status and Tissue Perfusion Note

Patient: **HNAMTEST, AAFIVE** MRN: (aac)-037325766 FIN: 016661038-4076
Age: 35 years Sex: Female DOB: 1/1/1980
Associated Diagnoses: None
Author: Anderson, Colby J

Reassessment of Volume Status and Tissue Perfusion

Comments

Time Septic Shock Criteria Met: Date: Time:

Time 30ml/kg Fluid Bolus Given: Date: Time:

Physical Examination

Vital Signs

Temperature: 98.6 (04/08 11:56)
Pulse: 78 (04/08 11:56)
Respiration: 16 (04/08 11:56)
BP: 130/84 (04/08 11:56)
Pulse Ox: 98 (04/08 11:56)
Oxygen Delivery: Room air (04/08 11:56)
Pain Score: Not Charted

Cardiopulmonary

Heart regular rate and rhythm, S1, S2, S3, S4, no murmur, no lower extremity edema
Lungs clear to auscultation, breath sounds equal, no wheezing, no rhonchi, no crackles

Peripheral Pulses

Right
1+ [] 2+ [] 3+ [] 4+ []

Left
1+ [] 2+ [] 3+ [] 4+ []

Capillary Refill

[] Brisk [] Greater than 2 seconds [] Less than 2 seconds

Skin

[] No mottling present [] Mottling present

OR two of the below values:

CVP: (From CVC in SVC vs Swan-Ganz)

Scvo2: (From CVC in SVC)

Bedside Cardiovascular Ultrasound: (Cavial index from TTE, TEE or IVC US)

[] Passive Leg Raise or [] 500-1000 mL fluid bolus
Findings: [] Fluid Responsive [] Not Fluid Responsive

Passive Leg Raise: (With patient seated at 45 degrees, lower to horizontal and raise legs to 45 degrees. A 10% increase in SV on the cardiac output monitor or 10% increase in pulse pressure via the arterial line is a positive test at 30-90 seconds.)

Type: Progress Notes
Date: 03 November 2015 08:11 EST
Status: Auth (Verified)
Title: Reassessment of Volume Status and Tissue Perfusion Note
By: Anderson, Colby J on 03 November 2015 08:12 EST
Verified By: Anderson, Colby J on 03 November 2015 08:12 EST
Encounter info: 016661038-4076, (AA) SJMH, Inpatient, 3/17/2014 - 4/28/2014

Tools to Assist with Consistent Application of the Evidence

- Identify tools to assist bedside staff to implement bundles
 - algorithm, pathway, checklist, pocket cards, green folder etc
- Create protocols
 - For positive screen: lactate, blood cultures and fluids
 - When patients need ICU level care
- Multidisciplinary Rounds
- Handoffs
- Real time review and feedback

Badge or Pocket Card

ADULT SEPSIS CRITERIA	
SIRS	<ul style="list-style-type: none"> * Tempa $\geq 100.9^{\circ}\text{F}$ (38.3C) or $< 96.9^{\circ}\text{F}$ (36C) * HR > 90 * RR > 20 * WBC $\geq 12,000$ or $\leq 4,000$ or $\geq 10\%$ bands
Sepsis	* Known or suspected infection PLUS 2 or more SIRS criteria
Severe Sepsis	<p>Organ Failure Criteria:</p> <ul style="list-style-type: none"> * Cardiovascular: SBP < 90 or ≥ 40 from baseline or MAP < 65 [(2 x diastolic)+systolic]/3 or a * Respiratory: SaO₂ $< 90\%$ or \uparrow in O₂ requirements * Renal (Urine output < 0.5 mL/kg/ hour) or (Creatinine ≥ 2 or $\uparrow 0.8$ mg/dl from baseline) * Metabolic: Lactic Acid ≥ 2 mmol/L * CNS: Change in mental status (new) * Platelets $< 100,000$ * INR > 1.5 (unrelated to anti-coagulant therapy) * Hepatic: Serum total bilirubin ≥ 2
Sepsis PLUS New Organ Failure	
Septic Shock	<ul style="list-style-type: none"> * Severe sepsis PLUS hypotension (SBP < 90 or MAP less than 65) despite 30mL/kg fluid bolus and/or * Lactate ≥ 2 or equal to 4mmol/L

Sepsis Bundles

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

1. Measure lactate level
 2. Obtain blood cultures prior to antibiotics
 3. Administer broad spectrum antibiotics
 4. Administer 30mL/kg crystalloid for hypotension or lactate ≥ 4 mmol/L
- † "time of presentation" is defined from earliest chart annotation consistent with severe sepsis/shock

TO BE COMPLETED WITHIN 6 HOURS

5. Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain (MAP) ≥ 65 mmHg
 6. In the event of persistent hypotension after initial fluid administration (MAP < 65 mmHg) or if initial lactate was ≥ 4 mmol/L, re-assess volume status and tissue perfusion.
 7. Re-measure lactate if initial lactate > 2
- DOCUMENT REASSESSMENT OF VOLUME STATUS AND TISSUE PERFUSION BY LIP:**

Either

- Repeat focused exam (after initial fluid resuscitation) by LIP including VS, cardiopulmonary, cap refill, pulses and skin findings.

Or two of the following:

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

Severe Sepsis / Septic Shock Clinical Pathway

Room # _____ ICU admission Date: _____ Time: _____

Please complete the following:

- **Time severe sepsis criteria met:** Date: _____ Time: _____
- **Time septic shock criteria met:** (Time Zero): Date: _____ Time: _____

- 1) Severe sepsis criteria: known or suspected infection plus 2 or more SIRS plus new organ dysfunction (see screening tool for organ dysfunction criteria)
- 2) Septic shock criteria: severe sepsis plus SBP less than 90mm Hg or 40mmHg decrease from baseline after initial fluid bolus or requires vasopressors or initial lactic acid is greater than or equal to 4 MEq/L

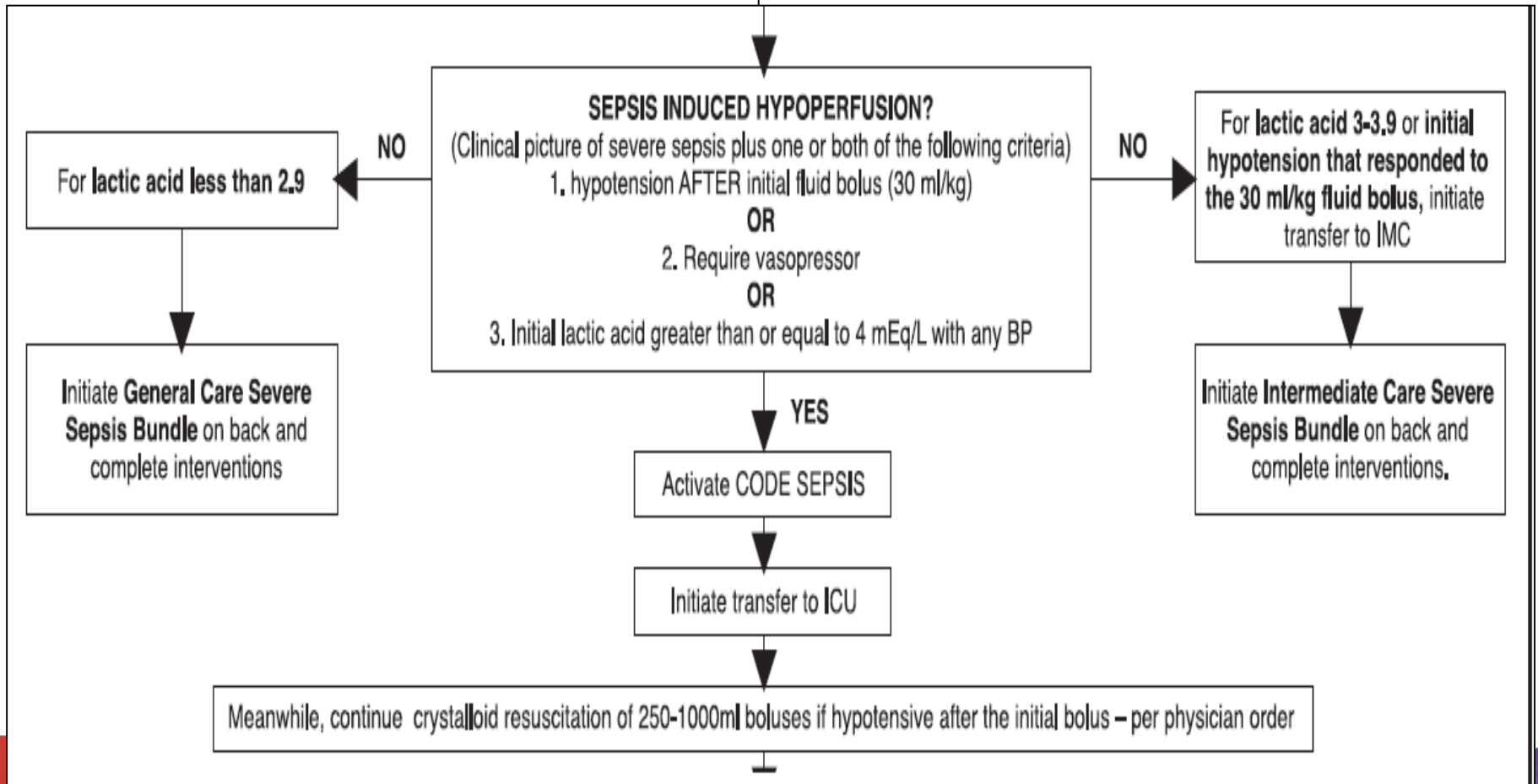
	Decision Grid	Date _____ to _____ 0-6 Hours	Date _____ to _____ 6-24 Hours
<p>Patient with severe sepsis-Implement interventions below within 1 hour:</p> <p><input type="checkbox"/> Initial Labs: serum lactic acid, additional labs as ordered by physician</p> <p>_____ Serum lactic acid drawn</p> <p>Yes No Blood Cultures X 2 Time 1: _____ Time 2: _____</p> <p><input type="checkbox"/> Establish IV access</p> <p><input type="checkbox"/> Broad Spectrum Antibiotic-start after obtain blood culture (see Infonet under Pharmacy Guide to Antimicrobial Therapy)</p> <p>_____ Time antibiotic hung</p> <p><input type="checkbox"/> Source Control</p> <p>If lactic acid greater than or equal to 4 MEq/L or SBP less than 90mmHg or 40mmHg less than baseline or MAP less than 65mm Hg administer:</p> <p><input type="checkbox"/> 30ml/kg fluid bolus over 1 hour or as fast as possible, unless know EF is less than 35% or active treatment for heart failure (if present, consult physician for speed of bolus)</p> <p>_____ Time 30ml/kg fluid bolus infused</p> <p>Proceed to decision grid.</p>	<p>Yes No Patient with hypotension after initial fluid bolus and/or lactic acid greater than 4mEq/L</p> <p>If No, and initial lactic acid greater than 2mEq/L: Repeat lactic acid within 4 hour of meeting severe sepsis criteria <i>Continue screening</i></p> <p>If Yes: Patient meets septic shock criteria <i>Continue to next column (6 hour septic shock bundle)</i></p> <p>_____ Septic shock criteria met (Time Zero)</p>	<p>Septic Shock Bundle</p> <p>_____ Apply vasopressor immediately for hypotension after fluid bolus</p> <p>_____ Re-measure lactic acid if initial lactic acid is greater than 2mEq/L within 4 hours of meeting severe sepsis criteria At _____ (next planned draw time)</p> <p>In the event of persistent hypotension after initial fluid administration (MAP less than 65mm Hg) or if initial lactic acid greater than or equal to 4mEq/L, reassess volume status and tissue perfusion and document finding according to below. Between hours 3-6 (at a minimum)</p> <p>_____ Repeat focused exam-including vital signs, cardiopulmonary, capillary refill, pulse and skin findings by physician or APP</p> <p>OR two of the following</p> <p>_____ Measure CVP</p> <p>_____ Measure ScvO2</p> <p>_____ Bedside cardiovascular ultrasound</p> <p>_____ Stroke volume optimization with passive leg raise or fluid challenge (500 ml over 15 min)</p> <p><input type="checkbox"/> Volume replete</p> <p><input type="checkbox"/> Needs more volume</p>	<p><input type="checkbox"/> Reassess for volume status/tissue perfusion at least every 4 hours</p> <p><input type="checkbox"/> Consider additional vasopressors as necessary</p> <p><input type="checkbox"/> Repeat lactic acid every 4 hours until normalized (less than or equal to 2mEq/L)</p> <p><input type="checkbox"/> Ensure adequate source control</p> <p>Yes No Assess for risk factors for abdominal compartment syndrome (fluid resuscitation greater than 5 L in 24 hours or less)</p> <p>In patients with ARDS (P/F ratio less than 300):</p> <p>Yes No Patient on mechanical ventilator</p> <p>Yes No Is the tidal volume 6ml/kg of ideal body weight in the first 24 hours</p> <p>Yes No Are the static or plateau inspiratory pressures less than 30 cmH2O in the first 24 hours</p> <p>24-72 Hours</p> <p><input type="checkbox"/> Re-assess need for broad spectrum antibiotics based on culture reports</p> <p><input type="checkbox"/> Re-evaluate need for invasive lines and tubes</p> <p><input type="checkbox"/> Resume screening after 72 hours</p>
Nurse			
Nurse			
Physician			
Signature, Date & Time			

Develop a Protocol Based on the SSC Guidelines

- Obtain lactate when have 2 SIRS and suspected infection
- When screen positive for severe sepsis:
 - Nurse protocol to draw labs and give fluid bolus
 - Protocol done by RRT/Medical Response Team or all nurses
- Get medical staff approval

Severe Sepsis Algorithm

Screened Positive for Severe Sepsis



CODE SEPSIS: WHAT IS IT?

- Notify through paging the ICUs about septic shock patient
- RRT come to the bedside (for floor code sepsis)
- Urgently assess a patient with severe sepsis
- Assist the primary physician in achieving the goals of care
 - fluid resuscitation
 - expediting antibiotic delivery
 - movement to a higher level of care as indicated

Excluded from Code Sepsis

- Comfort Care only
- Patient who doesn't wish to have care escalated
- No evidence of suspected or actual infection

Role of ICU team in a Code Sepsis

- After each team member has received report from ED or Floor—implement a Code Sepsis Pre-admission Huddle (bedside nurse, resident, attending and charge nurse if possible)
- Purpose of huddle:
 - Ensure all team members have same knowledge of the patient
 - Know what treatment has been already provided
 - Establish and agree on time zero for severe sepsis and septic shock
 - Identify the priority interventions to be provided when patient arrives (these should be written on the white board)

Interdisciplinary Rounds: Nursing Objective Card

Interdisciplinary Rounds – ABCDEF Bundle & Nursing Objectives

Pain,
Agitation and
Delirium

VAE

Mobility

SEPSIS

CAUTI/CLABSI

1. **Assess Pain:** What is the current score? What is the pain goal and current scale?
2. **Breathing:** Both SAT and SBT
 - Were they coordinated? Pass or Fail?
3. **Choice of Sedation:** Name of medication, route and dosage
4. **Delirium:** What is the CAM-ICU result?
If +, possible causes & interventions?
5. **Exercise:** Mobility Level?
 - What level is pt progressing to?
 - PT/OT consult?
6. **Family:** Patient/Family questions? Goals for the day?
Who will update pt/family? When? *(Continued on back)*
7. **Severe Sepsis** screen result? + or –
 - On the bundle? What goals have not been met?
8. Vasoactive Infusions
9. **Skin:** Pressure Ulcer? POA?
 - Current description of PU
10. **Foley:** Can it be removed?
 - Renew Order
11. **Lines / Tubes:**
 - Other Tubes?
 - Vascular Access?
12. **Patient Diet / Tube Feeding / Bowel Regimen:** Nutrition concerns?
13. **Restraints:** Type? Time of Order Expiration?
14. Time of scheduled procedures today? Expected labs / tests
15. **Other:** Nursing concerns

SICU Huddle Board

Quality/Safety

SEPSIS

Resuscitation goals met
≤ 4 hours

2 # of pts recus
≤ 4°

GOAL 80% 3 # of septic pts.
66%

SICU Huddle Board

Patient Satisfaction

Improve Pain Reassessment
Reassessment after pain meds

11 # of episodes
reassessed 1° after
med° (PRN)

24 # of episodes
audited

78% Goal 100%

Operations

Decrease Length of Stay in SICU
Early recognition of delirium
using CAM-ICU

20 # of pts ≤ 2 completed
CAM-ICU for last
24°

38 # of patients

52% Goal 100%

Daily Critical Communications

• Please complete Safety attitude
Questionnaire → See Nurse Coordinators

• Please document
CAM-ICU CRASS as
a comment # on all patients

Skin

7
of days since last
pressure ulcer developed in
SICU

Unit Incidence Rates
Jan: 13.3%

Dec: 0% Nov: 0%

Ideas in Motion

- 1 Re-education for staff → PreSep cath
- 2 Education for families about delirium prevention
- 3 Use RObjective Cards during RN-RN handoffs
- 4

Tier III: Develop and Implement the Education Plan

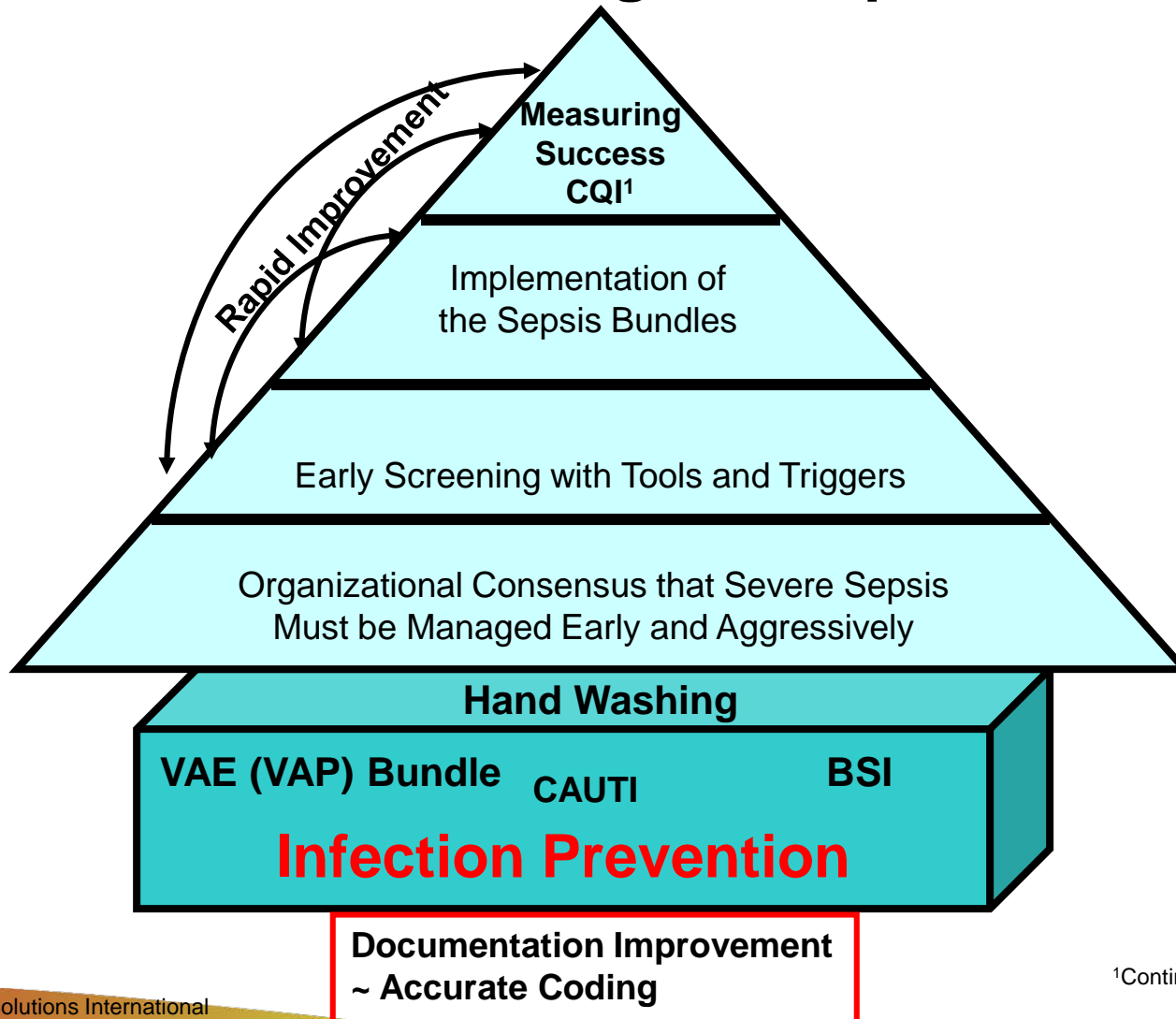
- Content: (present to physicians, nurses and RTs)
 - Significance of problem
 - Sepsis continuum
 - Pathophysiology of severe sepsis
 - Prevention and management (share the evidence)
 - Case studies for staff to practice with bedside tools
- Methods:
 - Self learning modules
 - Classroom and/or small groups of staff on unit
 - Web-based: IE: clinicaledonline.com
- Ongoing:
 - build into orientation,
 - monthly for residents,
 - every 6 months for all staff,
 - one-on-one during rounds

TIER III: Develop Implementation Plan

- Identify who will oversee the implementation and the expectations of that person (sepsis nurse or program coordinator)
- Define ICU/ED resources for staff that they can call at any time for questions and assistance
- Create rounding schedule and process
 - Should begin as daily in the ICU and ED
 - Keep master list of all patients who go on the bundles (and those who should have but didn't if possible)
 - Do real time interventions to ensure patients get the evidence based practices
 - Define follow up process for review and evaluate missed opportunities

Sepsis Practice Collaborative Model

4 Tier Process for Program Implementation



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

Data Collection

- Patient Log
 - Define how will find all patients that receive the bundles
 - Real time data collection is optimal—then used as checklist to ensure patient receives all appropriate interventions
- Outcome
 - Mortality (ICU and Hosp)
 - Hosp LOS
 - Cost per case (total and direct)
- Process
 - Core Measures
 - Data elements that measure implementation of 3 hour and 6 hour bundle

Common Challenge: Insufficient Feedback, Data and Accountability

Strategies:

Sepsis Team (core group)

- Monthly multidisciplinary sepsis team meeting with consistent attendance
 - nursing and physician champions
 - lab, pharmacy, and radiology as needed
- Accountable executive understands the role, holds team accountable and assists with problem-solving and removing barriers
- Timely feedback (data) to the team providing care to the sepsis patients

Common Challenge : Insufficient Feedback, Data and Accountability

Strategies:

- Set goals/expectations for sepsis program
- Use examples of hospital patients in case studies for education of staff (good outcomes and bad)
- Review data at:
 - Sepsis team meeting
 - Quality meeting
 - Patient safety meeting
 - Unit based meetings
 - Medial staff/department meetings
 - Board meeting
- Provider specific data on compliance with bundle elements *and* patient outcomes, compared to the goal
- Individual case feedback based on case reviews

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:	PRI SM Scores:
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:	

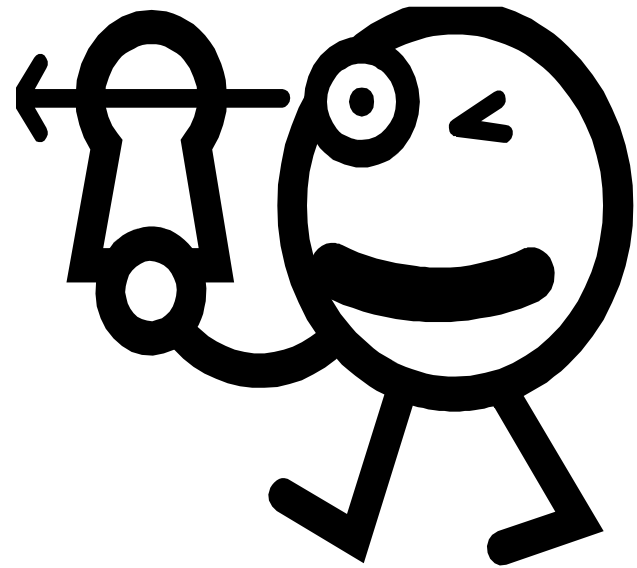
Sepsis Quality Indicators

	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 1hr 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, Capillary Refill, Pulse, AND Skin Findings) OR 2 Measures (CVP, ScVO ₂ , Bedside Cardiac Output) Ultrasound, SV Optimisation with Fluid Challenge/Passive Leg Raise)				Documented within 6h of Time Zero
Repeat Lactic Acid				Repeat within 6h of Time Zero >2

Comments:

Feedback to Individual Providers

**I HAVE ALL THIS DATA,
WHAT'S NEXT ??**



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

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

Cause and Effect Diagram

Why is the initial 30ml/kg fluid bolus not being given

Communication

Poor between residents and nursing staff
Responses from physicians
Physician aware and don't respond and RN just accept it

Communication breakdown RN-RN shift report

Not sure what they received on another unit
Takes too long for physician to come and see the patient

Policy

- Appropriate labs not drawn/ordered
- Appears cardiogenic not septic
- "his BP has been low before" accept low BP as normal
- Unsure of baseline BP
- Delay in identifying change in condition
- Infection not suspected-other causes pursued
- Blame hypotension on other conditions or source (ie: sedation)
- Physician pushback
- Nurse/doctor hesitant because being diuresised
- Patient who hover or have unclear presentation

Process/ critical thinking

Environment/ EMR

Staff busy with more than one patient

Getting orders in and charting in MAR (should treat like a code and chart later)

Physical support especially on off shift

Lack of documentation when fluid actually given

- New interns
- Staff not aware of sepsis protocol- doesn't require physician order
- Unassertive RN staff—at advanced beginner stage
- Not properly using screening tool
- Fear of fluid overload of renal or CHF patients (RNs and doctors)
- Lack of education on appropriate fluid needed
- Physician not familiar with protocol and not consulting with senior
- Give fluid over long period of time or just increase IV rate

People/knowledge

Themes:

1. Knowledge and comfort in using protocol
2. Accepting when physician doesn't want to do protocol without going up chain of command
3. Fear of fluid in elderly, ESRD and CHF
4. Blame hypotension on other conditions
5. Unassertive RN staff

Lack of IV access

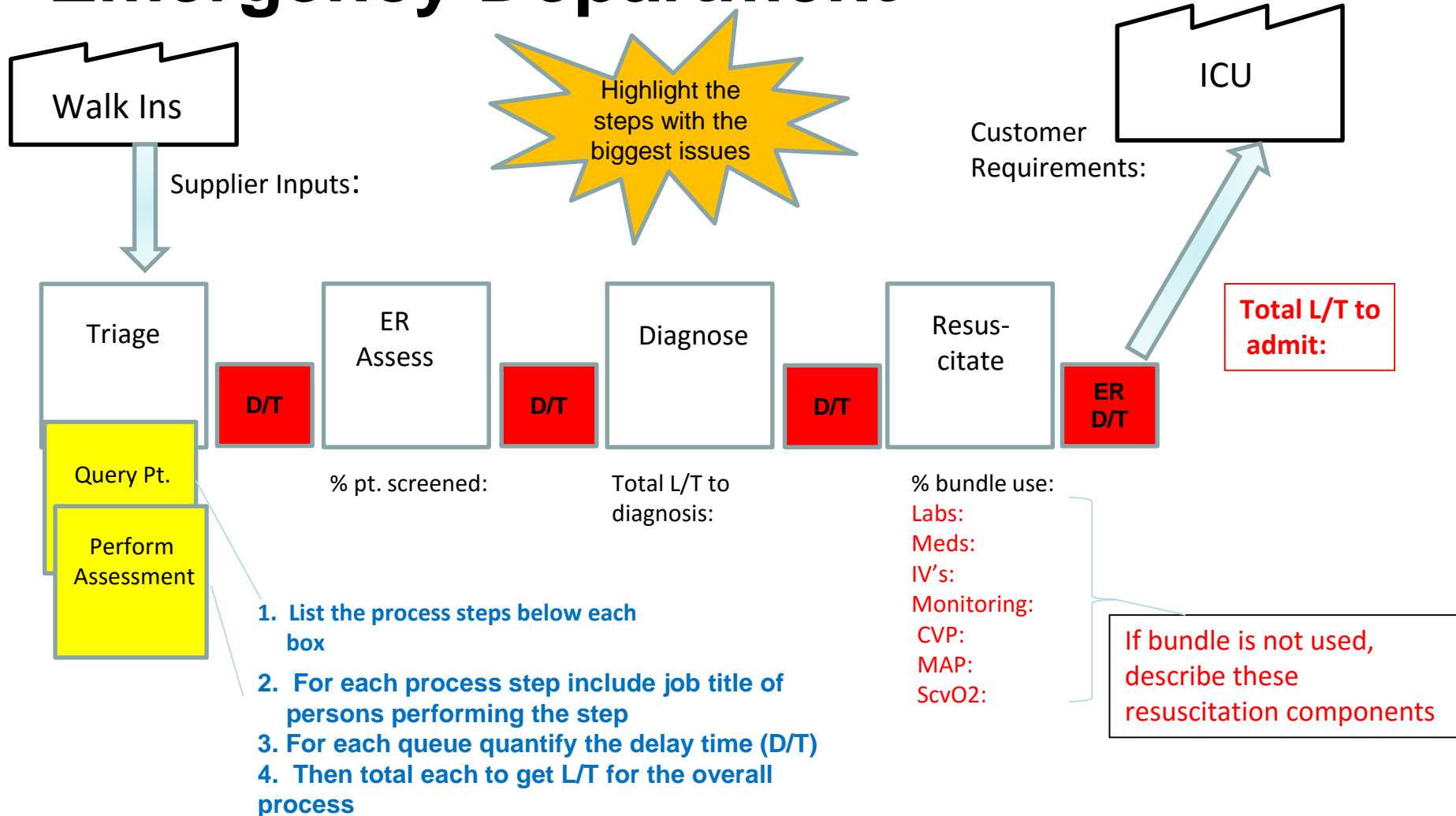
Material

Need to elicit support of CNL and charge nurse/nurse coordinators

Initial Fluid bolus (30ml/kg) not given in 3 hrs

- Not trusting high lactate and continue to recheck
- Patient not symptomatic with low BP
- RN not sure where pt is on pathway
- SBP >90 but MAP < 65—RN doesn't know pt might be in shock
- New RN afraid of starting fluids on someone where no fluids are running
- Doctors order small amt of fluid
- Staff knowledge deficit
- Nurse like exact orders in EMR before starting interventions—causes delays

Sepsis Patient Flow Template: Emergency Department



Errors Provide Useful Information

- We can learn more from our failures than from success
- Our processes can be improved when studied

“Give me a fruitful error anytime, full of seeds, bursting with its own corrections. You can keep your sterile truth to yourself.”
Vilfred Pareto





Severe Sepsis Bundle Implementation Results

Surviving Sepsis Campaign Results (28,150 patients) 218 Hospitals

Entry Point	Subjects	Mortality (hosp)
ED	55.8%	26.0
ICU	32.2%	40.3
Ward	11.9%	44.2

Mortality over 7 year period

36.7% to 27.5% ARR: 7% RRR: 25% p= 0.005

ICU & Hos LOS 4% for every 10% ↑ in compliance

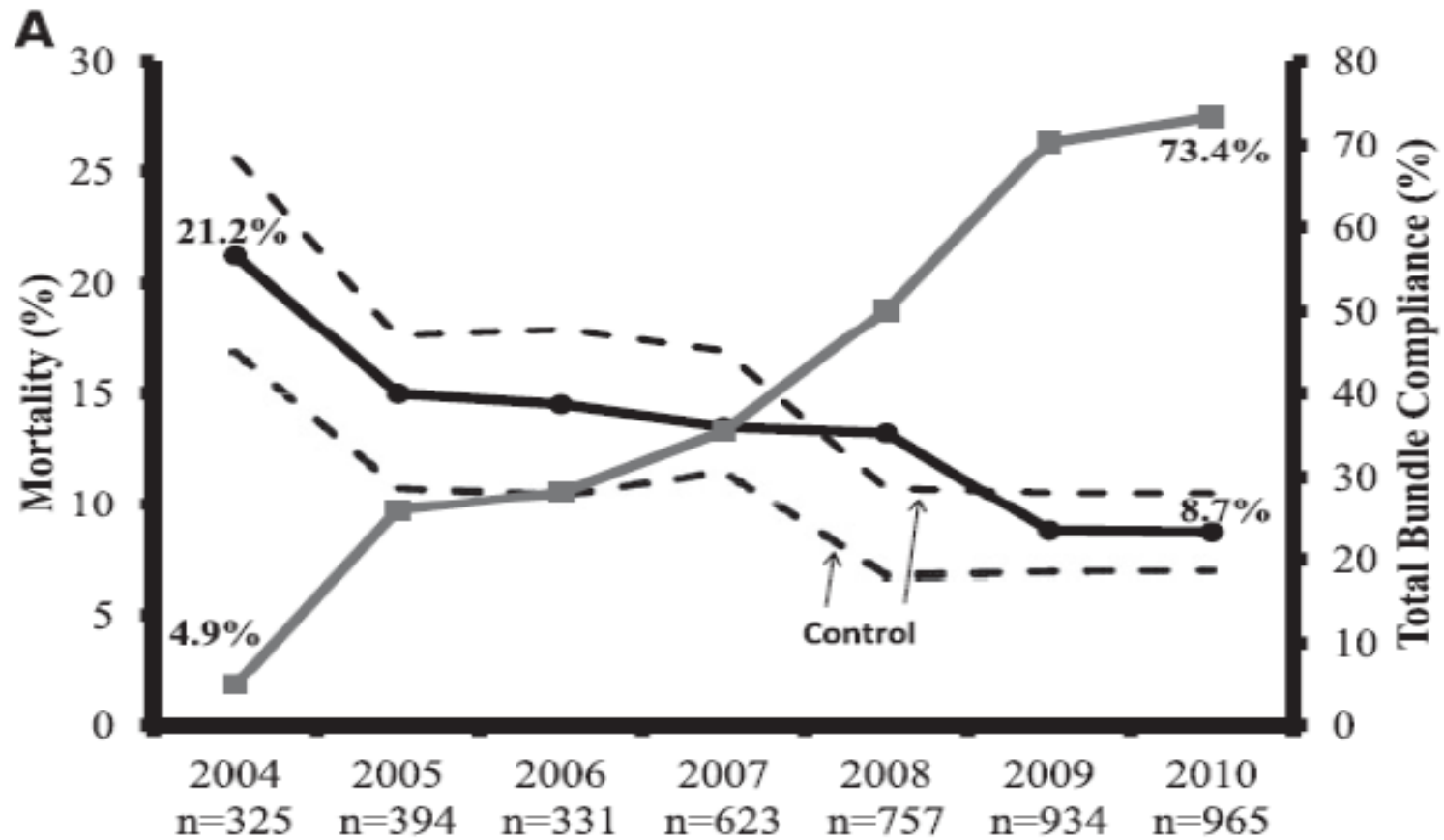
Surviving Sepsis Campaign

Bundle Element	Mortality Odds Ratio	95% CI	P value
Lactate <2	0.80	0.73-0.89	<0.001
Lactate 2 to <3	0.67	0.59-0.76	<0.001
Lactate \geq 3	0.69	0.63-0.75	<0.001
Blood Cultures	0.82	0.77-0.87	<0.001
Antibiotics	0.85	0.81-0.90	<0.001
Fluid Administration	0.86	0.73-1.01	<0.07
CVP	0.84	0.78-0.91	<0.001
ScvO ₂	0.83	0.76-0.90	0<.001

Dose Effect: High vs. Low Compliance

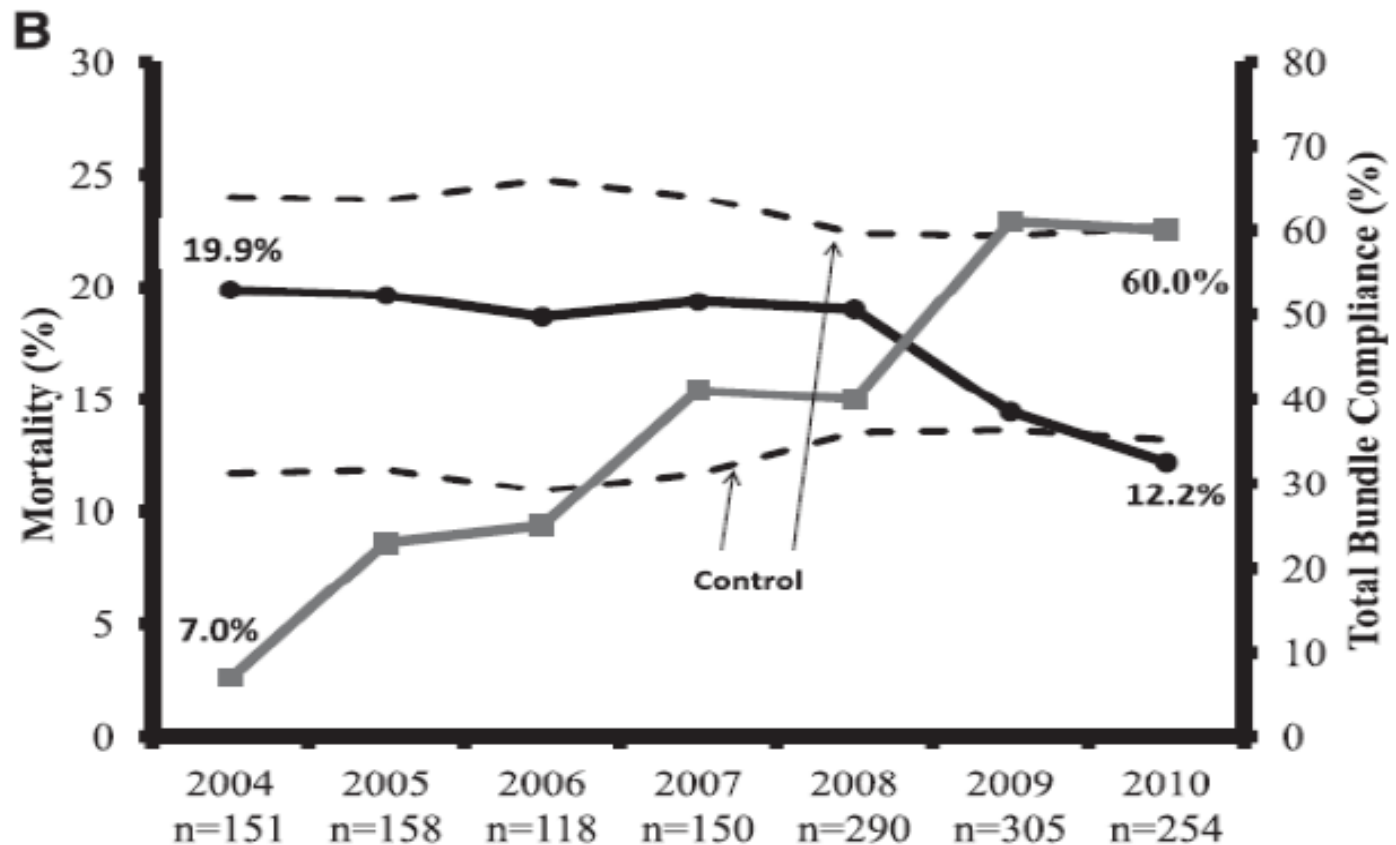
Characteristic	Low resuscitation compliance			High resuscitation compliance			Total			p-value ¹
	Total	Died	Percent	Total	Died	Percent	Total	Died	Percent	
Overall	11,609	4,475	38.6	17,861	5,185	29.0	29,470	9,660	32.8	< 0.001
Location of severe sepsis identification										< 0.001
ED	5,984	1,850	30.9	10,465	2,421	23.1	16,449	4,271	26.0	
Ward	3,970	1,800	45.3	5,532	2,032	36.7	9,502	3,832	40.3	
ICU	1,655	825	49.8	1,864	732	39.3	3,519	1,557	44.2	
Site duration										< 0.001
< 2 years	4,960	1,896	38.2	3,352	992	29.6	8,312	2,888	34.7	
2 to < 3 years	1,611	600	37.2	6,557	1,895	28.9	8,168	2,495	30.5	
≥ 3 years	5,038	1,979	39.3	7,952	2,298	28.9	12,990	4,277	32.9	

Intermountain Health: SS and Shock



Miller, Dong, Nelson, *et al.*: Sepsis Bundle and Mortality
Am J Respir Crit Care Med Vol 188, Iss. 1, pp 77-82, Jul 1, 2013

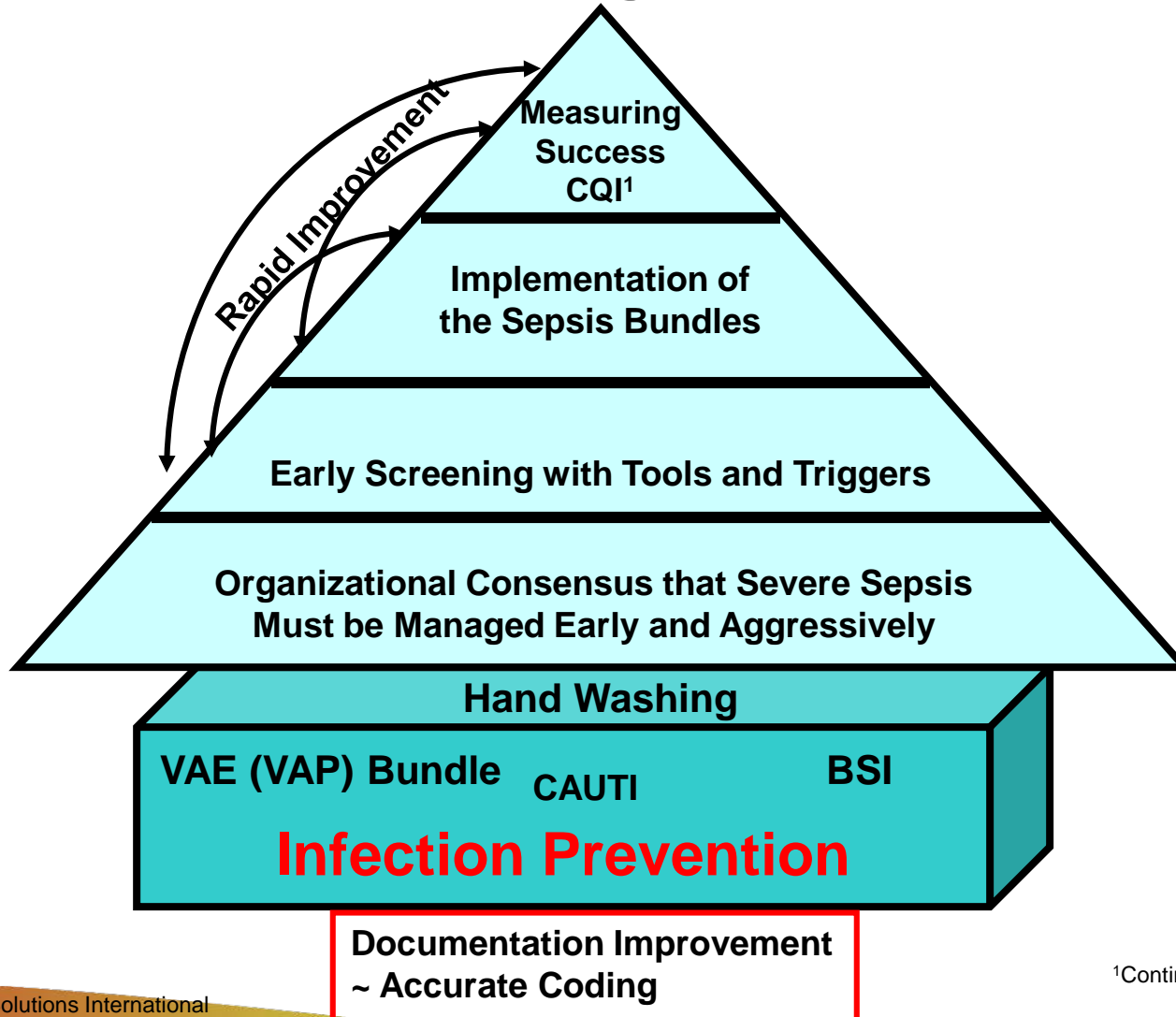
Intermountain Health: Shock



Miller, Dong, Nelson, *et al.*: Sepsis Bundle and Mortality
Am J Respir Crit Care Med Vol 188, Iss. 1, pp 77-82, Jul 1, 2013

Sepsis Practice Collaborative Model

4 Tier Process for Program Implementation



Sepsis Program Action Plan

Item	Responsibility	Due Date	Status
1. Assemble team			
2. Identify executive sponsor			
3. Educate team on evidence			
4. Project Charter			
5. Baseline data			
6. Define screening tool and process— for ED, ICU, Floor, RRT			
7. Define screening audit process			
8. Develop triggers/processes to alert staff when time to move from first 3 hrs to shock bundle			
9. Develop & implement an educational plan for all staff:			
10. Develop an implementation plan			
11. Data measurement & feedback			

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.....

Questions?

