

# The SEPSIS challenge

Developing processes and educating staff  
lead to reduced mortality.

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**WHEN** 35-year-old Tom Jenkins\* arrives by ambulance at the emergency department (ED), he's lethargic. His medical history indicates idiopathic thrombocytopenia purpura (ITP) that hasn't required treatment since age 18. He takes no medications or supplements. Yesterday, Mr. Jenkins had episodes of vomiting and diarrhea that increased overnight. His wife reports that 2 weeks before he was sluggish but had no other symptoms.

Initial vital signs are blood pressure 70/40 mmHg, no fever, sinus tachycardia of 160 beats/minute (bpm), and respiratory rate of 32 breaths/minute. The ED physician identifies that Mr. Jenkins is hypovolemic and orders an I.V. fluid bolus of 1,000 mL of 0.9% normal saline followed by a maintenance rate of 100 mL per hour. After the bolus is infused and the maintenance rate is started, Mr. Jenkins' blood pressure drops to 68/38 mmHg. The physician orders a second bolus of 1,000 mL of normal saline. The ECG moni-

tor alarms, showing ventricular fibrillation. Mr. Jenkins has no pulse, and a cardiac arrest is called. ED staff members begin advanced cardiac life support measures, but their efforts aren't successful. The death certificate documents septic shock from asymptomatic infection as the cause of death.

Sepsis requires the same rapid intervention that's been successful for patients having a heart attack or a stroke. Because the clinical signs and symptoms of sepsis can vary depending on the type of infection and because symptoms may mimic other health conditions, diagnosis can be difficult, especially in the early stages. However, the key to recovery is early intervention. (See *Sepsis facts*.)

The Surviving Sepsis Campaign and Centers for Medicare & Medicaid (CMS) have developed bundles to encourage early treatment, but these need to be fully operational at the clinician level. (See *Cam-*

*paigning for change*.) Our work to do so resulted in a significant reduction in sepsis mortality.

## The situation

Our hospital used sepsis awareness campaigns to encourage rapid treatment based on established protocols, but we experienced resistance to the CMS sepsis quality bundle, which is outlined in its core measures. Clinicians voiced concerns about the aggressive time frames and the amount of fluids demanded by guidelines. Physicians said the approach didn't give them time to consider the potential for triggering pulmonary fluid overload. However, the sepsis time clock doesn't allow time for this kind of consideration.

Although education, data collection, and outcomes were being shared with clinicians, we needed to take additional action to change practice and improve mortality.

## Steps for improvement

In September 2015, the hospital established an interprofessional sepsis team led by the nursing director of emergency and critical care and supported by the department of performance improvement. The team included frontline nurses, respiratory therapists, pharmacists, physicians, and informatics and quality management staff.

Using the "plan, do, study, act" performance improvement method, the team identified its aim statement—to increase compliance with the CMS sepsis core measure to 80% by June 1, 2018—and gathered baseline statistics. We determined that our severe sepsis mortality was 25% with poor bundle compliance.

## Sepsis facts

Sepsis is a syndrome of physiologic, pathologic, and biochemical abnormalities caused by infection. Here are some other things you should know.

### What does sepsis cost?

According to the Healthcare Cost and Utilization Project and the Agency for Healthcare Research and Quality, sepsis accounts for nearly \$24 billion in annual cost, making it the most expensive condition to treat in the entire U.S. healthcare system.

### Who gets sepsis?

More than 1.5 million people get sepsis each year in the United States. People at increased risk are those with weakened immune systems and those with chronic medical conditions, such as diabetes, lung disease, cancer, and kidney disease. Age is also a risk factor for adults 65 years or older and children younger than 1.

### What's the mortality rate?

Centers for Disease Control and Prevention data published in 2016 show that the sepsis mortality rate ranges from 28% to 50%.



## Campaigning for change

Two initiatives for improvement in sepsis management come from the Surviving Sepsis Campaign and the Centers for Medicare & Medicaid (CMS).

In 2002, the Surviving Sepsis Campaign began with a goal to reduce mortality from severe sepsis and septic shock worldwide. It was a joint collaboration of the Society of Critical Care Medicine and the European Society of Intensive Care Medicine. The campaign focused on using bundles (a selected set of elements used together within a specified time frame) to improve the treatment and survival of patients diagnosed with sepsis. Here are the current recommendations.

### To be completed within 3 hours of presentation\*:

- 1 Measure lactic acid level.
- 2 Obtain blood cultures before administering antibiotics.
- 3 Administer broad-spectrum antibiotics.
- 4 Administer 30 mL/kg crystalloid for hypotension or lactic acid  $\geq 4$  mmol/L.

### To be completed within 6 hours of presentation:

- 5 Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP)  $\geq 65$  mmHg.

- 6 In the event of persistent hypotension after initial fluid administration (MAP  $< 65$  mmHg) or if initial lactic acid was  $\geq 4$  mmol/L, reassess volume status and tissue perfusion and document findings.

- 7 Remeasure lactic acid if initial level elevated.

\*Time of presentation is the time of triage in the emergency department or, if presenting from another care venue, from the earliest chart annotation consistent with all elements of severe sepsis or septic shock ascertained through chart review.

The CMS Severe Sepsis/Septic Shock Early Management Bundle (SEP-1) took effect in 2015. The bundle consists of core measures that must be completed within 3- and 6-hour time frames. Hospitals are required to achieve 100% compliance with all the bundle elements. The CMS bundle has been criticized by clinicians; Aaronson and colleagues note its “ambiguous definition of severe sepsis and septic shock, prescriptive fluid volume requirements, rigid reassessment, and complex abstraction logic.”

Sources: Surviving Sepsis Campaign. Updated bundles in response to new evidence. April 2015. [survivingsepsis.org/SiteCollectionDocuments/SSC\\_Bundle.pdf](http://survivingsepsis.org/SiteCollectionDocuments/SSC_Bundle.pdf); Aaronson EL, Filbin MR, Brown DF, Tobin K, Mort EA. New mandated Centers for Medicare and Medicaid Services requirements for sepsis reporting: Caution from the field. *J Emerg Med*. 2017;52(1):109-116.

The team identified several barriers to compliance, including varied physician practice, inconsistent use of the guidelines, and lack of knowledge about the sepsis bundle.

### Tools for success

The team developed a sepsis algorithm, a sepsis tracking tool that helps document the bundle elements, and a nurse-driven sepsis policy. (See

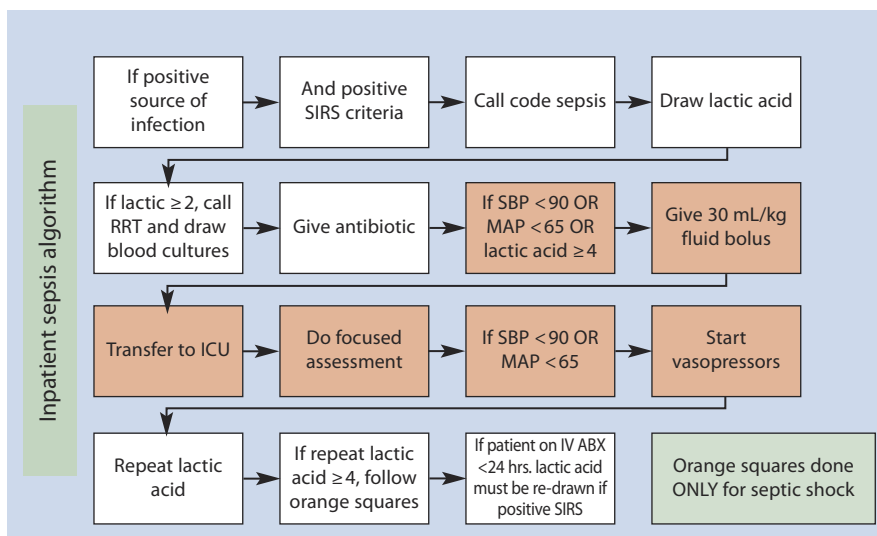
*Sepsis algorithm* and *Sepsis tracking tool*.) The sepsis policy gives nurses the autonomy to initiate treatment based on the bundle elements. In addition, a new Code Sepsis Team was launched, composed of an intensive care unit (ICU) nurse and phlebotomy and respiratory therapists. The respiratory therapist provides bedside point-of-care lactic acid testing for immediate results.

Initial sepsis education for all inpatient nursing staff was conducted using a computer-based learning module. The course objectives focused on sepsis recognition and treatment. Nursing staff from the ICU and ED participated in an advanced course focused on early identification of signs and symptoms of sepsis and early implementation of interventions using the bundle elements. To improve engagement, critical thinking, and awareness of desired outcomes, the course included case studies to present organizational statistics and process gaps.

As part of the sepsis algorithm, every ED patient at initial triage is screened for sepsis and all inpatients are screened (including vital signs

## Sepsis algorithm

Staff use the algorithm below to manage patients with sepsis.



ABX = Antibiotics  
ICU = Intensive care unit  
MAP = Mean arterial pressure

RRT = Rapid response team  
SIRS = Systemic inflammatory response syndrome  
Source: Amita Health\*

# Sepsis tracking tool

The sepsis tracking sheet aids in documentation of the sepsis bundle elements.



team is working on improving adherence to the weight-based requirements of 30 mL/kg boluses and reducing clinician resistance to 1,000 mL boluses.

## The key takeaways

Collaborative practice, diligent surveillance, and continued education are the key takeaways from this performance-improvement initiative. The result is a reduction in sepsis mortality and increased clinician engagement.

*Anna Thompson, age 83, presents with nausea and vomiting. Her medical history includes diastolic heart failure and pyloric channel ulcers. Both the cardiology and pulmonology providers are hesitant to administer fluids because her signs and symptoms of sepsis are similar to what would occur with pyloric channel ulcers.*

*Ms. Thompson's temperature is 100.5° F (38° C), she has an elevated white blood cell count, and her lactic acid is 4.1 mmol/L. Despite the patient's medical history, the ED nurse quickly implements the sepsis bundle interventions, obtaining blood cultures, initiating empiric antibiotics, infusing 0.9% normal saline I.V. fluids at 30 mL/kg, and monitoring lactic acid levels. Ms. Thompson is admitted to the ICU, where her blood pressure improves, the nausea and vomiting subside, and her appetite improves.*

The healthcare team's quick action to implement the sepsis bundle interventions resulted in a positive outcome. ★

*\*Names are fictitious.*

Visit [americanursetoday.com/?p=36677](http://americanursetoday.com/?p=36677) for a list of selected references.

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DATE:

ROOM#

Sepsis Tracking Sheet		
Source of Infection?		Yes / No
		IF YES, WHAT IS THE SOURCE?
2 SIRS Criteria Met?		Yes / No
		IF YES, WHAT ARE THE 2 SIRS CRITERIA?
If yes to source and yes to 2 SIRS call CODE SEPSIS		Code Sepsis Called? YES / NO
Elements to be completed within 3 hours of arrival	Walk In/1st Documented Time (Clock Starts)	
	Lactate Level Drawn (Initial)	TIME RESULT
	Blood cultures Drawn	TIME
	ABX administered	TIME
	Repeat lactate level drawn w/in 6hr (if 1st lactate level >2)	TIME
	Draw Lactate Level prior to OR	RESULT
Elements to be completed within 6 hours of arrival	If 1st or 2nd Lactic ≥4 or SBP<90 or MAP<65 give 30ml/kg CF ≥ 126ml/h	Patient Weight: Start Time of CF: <input type="checkbox"/> Yes <input type="checkbox"/> No
	Hypotension X 2 within the 1hr after CF administered	<input type="checkbox"/> Yes <input type="checkbox"/> No
	If YES administer vasopressors	Start Time:
	If CVC/PICC CVP and SVO2 results	CVP _____ SVO2 _____
	OR	
	If NO CVC/PICC available Focused Exam completed by provider ** (see below for mandatory elements)	Time Completed:
** Focused Assessment Element		Patient label
1. Vital signs AND		
2. Cardiopulmonary exam AND		
3. Capillary refill exam AND		
4. Peripheral pulses exam AND		
5. Skin exam		
OR Statement		
"Sepsis Focused Assessment Performed"		

and lab values) at the beginning of every shift. If a patient has a source of infection and meets at least two systemic inflammatory response syndrome (SIRS) criteria (temperature < 96.8° F [35° C] or >100.9° F [38° C], tachycardia > 90 bpm, respiratory rate > 20 breaths/minute, white blood cell count > 12,000 mcg/L or < 4,000 mcg/L or > 10% bands) a code sepsis is activated.

In addition, daily monitoring and surveillance processes have been implemented, including reviewing screening tools with leadership and pharmacy staff at daily huddles. Pharmacy support is vital to the success of early identification and treatment to ensure appropriate

antibiotics are ordered. Wins and misses are shared with staff, and real-time feedback is provided.

## Outcomes and implications for practice

By March 2017, our compliance with the CMS sepsis core measures had risen to 78% and our year-to-date severe sepsis mortality had dropped to 13%. Our results show that decreasing the sepsis mortality rate is possible with implementation of a process for meeting the 3-hour and 6-hour bundles as defined by CMS and the Surviving Sepsis Campaign.

Our efforts to reduce sepsis mortality continue. For example, the sepsis performance improvement