Improved Sepsis Outcomes

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Executive Leader Support:

I am proud of the work that our hospital and our region have done to help ensure each of our patients gets the best possible care – especially our patients that are septic. Our efforts for clinical effectiveness are focused on reducing variation and applying consistent best practices with the goal of improving outcomes and improving our affordability. The progress in sepsis over the past year has definitely shown this to be true as we saved 231 lives across the region and saved over $5 million dollars. The multidisciplinary collaboration has been effective and a great example of how we can come together to make a difference for our patients.

Jeremy Zoch
Executive Vice President and Chief Operating Officer
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Executive Summary

Sepsis, a common infection complication, is the top driver of mortality in critical care units and the 10th leading cause of death in the United States. Anyone can get sepsis, but some are at higher risk than others.

Sepsis, including severe sepsis and septic shock, is our top driver of mortality at St. Joseph Hospital, Orange. We found that approximately 90% of patients admitted for severe sepsis and septic shock were admitted through the emergency department. The critical status of these patients necessitates early identification, implementing timely goal directed therapies, and admission to critical care or stepdown for further monitoring and treatment. For inpatients, deterioration in the patient's condition and the ability to recognize signs of early sepsis is crucial to initiating early treatment. A sepsis team was formed to review literature and best practices. This multidisciplinary team, led by a critical care RN, identified gaps in early sepsis identification, allocated resources, created patient care tools, and used evidence to develop education for nurses and physicians that led to a decrease in sepsis mortality.

Background and relevance of the problem being addressed

According to the Centers for Disease Control and Prevention (CDC), "Sepsis is the body's overwhelming and life-threatening response to an infection that can lead to tissue damage, organ failure, and death." Severe sepsis is a leading cause of death in the United States and the most common cause of death in intensive care units (ICU). According to the US National Library of Medicine and National Institutes of Health, the annual cost of care for patients with sepsis in the US is $14 billion dollars. The incidence is estimated at 300 cases per 100,000 population; about half of these cases are in the ICU. Severe sepsis can progress to septic shock, with a mortality rate of approximately 50%.

Sepsis can happen to anyone, anytime, with any kind of infection (no matter how minor), and to any part of the body. Though sepsis can affect anyone, some are more at risk than others. At risk populations include the very old, the very young, the immunocompromised, those with chronic illnesses, and burn victims.

The Surviving Sepsis Campaign (a group with direction from representatives of the Society of Critical Care Medicine and the European Society of Intensive Care Medicine) developed bundles in an effort to simplify the treatment of sepsis. Implementation of the entire bundle favorably impacts sepsis mortality outcomes more than elements of the bundle individually. The 3-hour sepsis bundle includes lactate measurement, blood cultures prior to antibiotics, broad spectrum antibiotics, and 30 mL/kg crystalloid IV fluid resuscitation for hypotension or a lactate $\geq$ 4 mmol/L. The 6-hour sepsis bundle includes administration of vasopressors for hypotension that does not respond to the initial fluid resuscitation to maintain a mean arterial pressure of $\geq$ 65 mmHg, reassessment of volume status and tissue perfusion for persistent hypotension after initial fluid administration or if initial lactate was $\geq$ 4 mmol/L, and repeat lactate if the initial lactate was $\geq$ 2 mmol/L.

Effort description

A Southern California Regional St. Joseph Hoag Health Sepsis Collaborative began in July 2015. This multidisciplinary team representing nursing, physicians, quality, and information technology from five hospitals and specialties including emergency care, critical care, and medical-surgical care focused primarily on order sets and documentation. Best practices were identified and reviewed. The regional collaborative reviewed clinical practice guidelines from the Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012. These evidence-based recommendations for best practice of patients with sepsis are derived from 68 international experts representing 30 international organizations and were utilized as a resource to guide their work in developing the sepsis tools. The regional collaborative also proposed sepsis screening of all patients by the bedside nurse on each shift, activation of a critical care nurse to further assess and initiate treatment for those patients with positive sepsis screens, and creation of standardized order sets for both nursing and physicians.

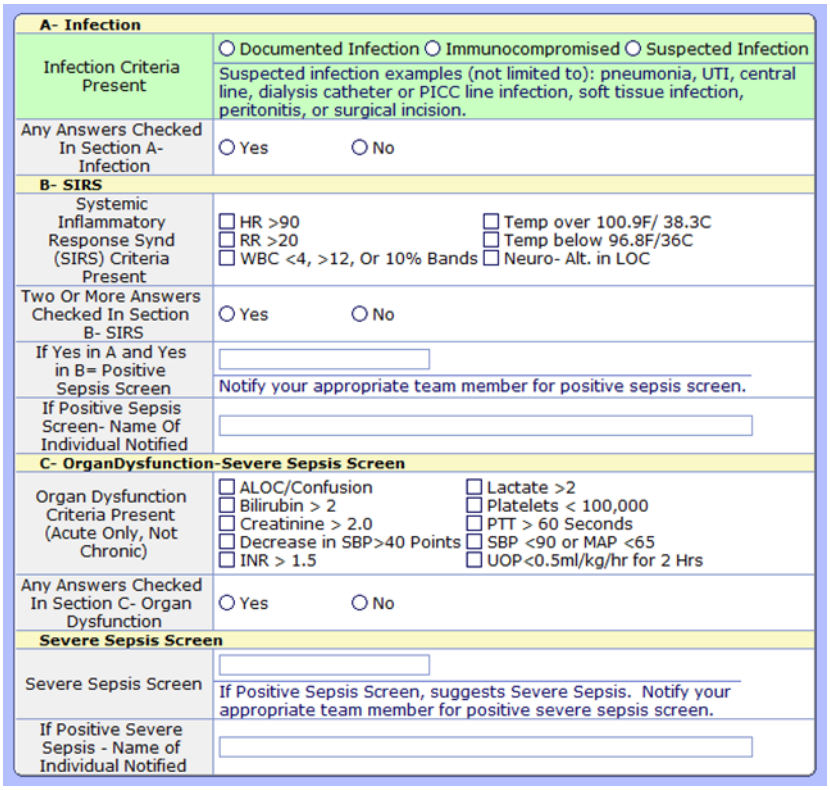
The regional collaborative ultimately developed one standardized, evidence-based order set for use in the emergency department and one for inpatient. This was particularly challenging because there was a wide variation in practice not only between those clinicians on the team, but the clinicians not on the team as well. Additionally, electronic physician documentation and nursing screening assessments were developed and included similar challenges. One change in particular, accurate documentation of fluid resuscitation required working with MediTech, our EHR vendor, to develop the capability within the EHR itself.

In addition to the regional collaborative efforts, St. Joseph Hospital Orange implemented interventions including Code Sepsis, a standardized procedure for nurses, 24/7 sepsis RN, self-learning modules, and one to one physician to physician education.

Two gaps identified in the Emergency Department were delays and low compliance with the existing sepsis guidelines. The manager from St. Joseph Hospital's Burlew Medical Library performed a literature search for sepsis research studies and evidence-based articles using the extensive medical database, the 600+ medical journals, and authoritative web links. Furthermore, nurses conducted interviews with their peers to identify opportunities to improve compliance. It became evident after speaking with their peers that education was needed. Members of the collaborative utilized the results of this search to create the bedside sepsis assessment.

All inpatients are screened every shift by the primary care nurse. (See figure 1.) If the nurse assesses the patient as having a known or suspected infection (section A) and if they meet at least 2 criteria (section B), then the secondary screens are completed to assess for severe sepsis or septic shock. If the nurse assesses the patient as having a positive sepsis screen, he or she independently initiates a critical care nurse consult to further assess the patient. This practice supports clinical nurse autonomy to provide the best care possible.

Figure 1. Sepsis Screen for nursing.



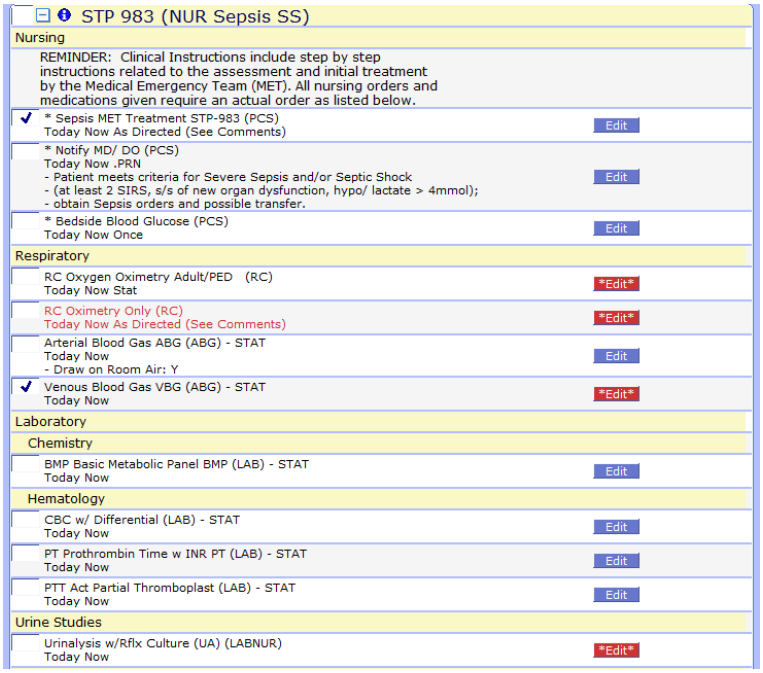
A- Infection	
Infection Criteria Present	○ Documented Infection ○ Immunocompromised ○ Suspected Infection Suspected infection examples (not limited to): pneumonia, UTI, central line, dialysis catheter or PICC line infection, soft tissue infection, peritonitis, or surgical incision.
Any Answers Checked In Section A- Infection	○ Yes ○ No
B- SIRS	
Systemic Inflammatory Response Synd (SIRS) Criteria Present	☐ HR >90 ☐ Temp over 100.9F/ 38.3C ☐ RR >20 ☐ Temp below 96.8F/36C ☐ WBC <4, >12, Or 10% Bands ☐ Neuro- Alt. in LOC
Two Or More Answers Checked In Section B- SIRS	○ Yes ○ No
If Yes in A and Yes in B= Positive Sepsis Screen	Notify your appropriate team member for positive sepsis screen.
If Positive Sepsis Screen- Name Of Individual Notified	
C- OrganDysfunction-Severe Sepsis Screen	
Organ Dysfunction Criteria Present (Acute Only, Not Chronic)	☐ ALOC/Confusion ☐ Lactate >2 ☐ Bilirubin > 2 ☐ Platelets < 100,000 ☐ Creatinine > 2.0 ☐ PTT > 60 Seconds ☐ Decrease in SBP>40 Points ☐ SBP <90 or MAP <65 ☐ INR > 1.5 ☐ UOP<0.5ml/kg/hr for 2 Hrs
Any Answers Checked In Section C- Organ Dysfunction	○ Yes ○ No
Severe Sepsis Screen	
Severe Sepsis Screen	If Positive Sepsis Screen, suggests Severe Sepsis. Notify your appropriate team member for positive severe sepsis screen.
If Positive Severe Sepsis - Name of Individual Notified	

We also instituted weekly review of medical records for sepsis patients by the manager of our stepdown unit, a clinical coordinator from critical care, a clinical coordinator from the emergency department, the emergency department medical director, and our sepsis physician champion (an Intensivist) to ensure compliance with the sepsis bundle. If issues are identified, small tests of change can be performed to determine what the most appropriate interventions.

The sepsis collaborative recommended that the Medical Emergency Team (MET) nurse proactively round on identified stable sepsis patients admitted to stepdown or medical-surgical units. This experienced critical care nurse recognizes early signs of severe sepsis or septic shock, advocating and implementing early treatment, and preventing clinical decline. The MET RN is given a list of high alert patients that have met sepsis criteria (ex. Pt. J.L. has WBC 14.2, HR 96, temp 38.3C, lactate 3.4). The patient is kept on the proactive rounding list, removed from the list as their condition improves, or transferred to a higher level of care if their condition declines.

"Code Sepsis" is a rapid response request for a MET nurse to evaluate a patient identified with severe sepsis and/or septic shock. The purpose of activating Code Sepsis is to support the bedside nurse in identifying critically ill patients and coordinating early goal directed therapies by utilizing standardized procedures and order sets. (See Figure 2.) In the first 3 months, the sepsis related MET calls rose from 12% to 42%. This rise in sepsis related calls was a result of the additional responses to the emergency department and proactive rounding on inpatients.

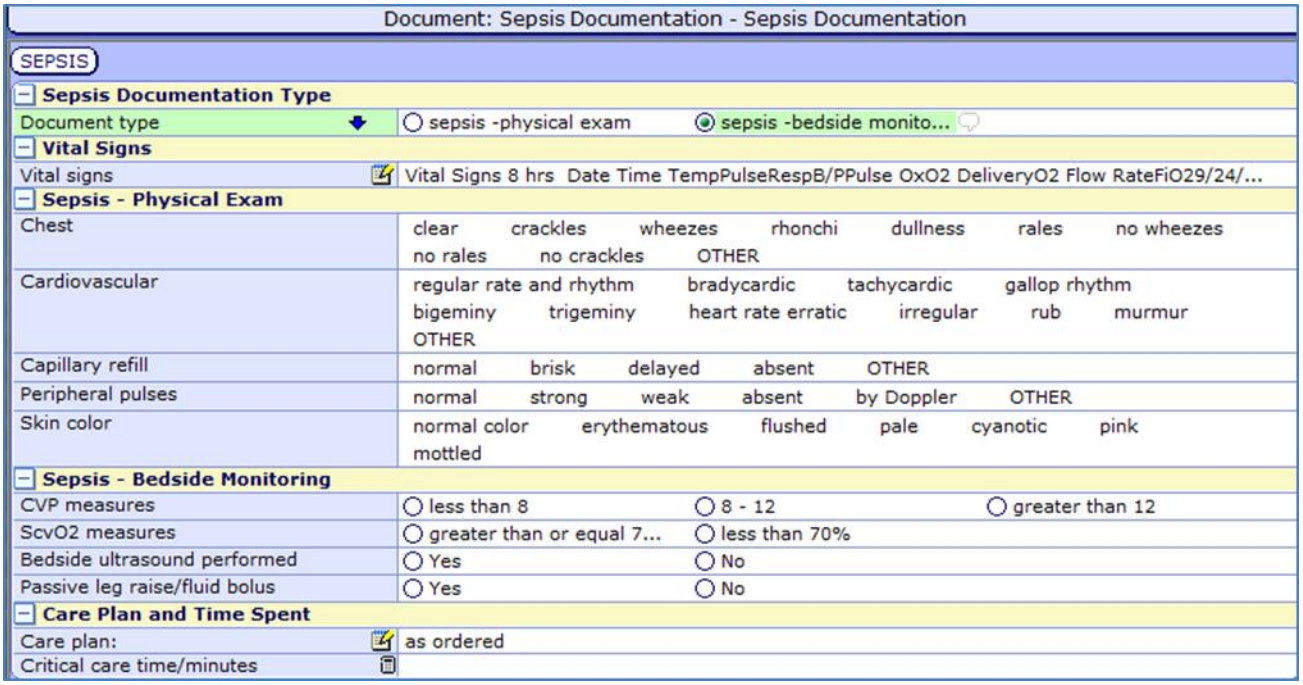
Figure 2. Standardized Procedure Sepsis Orders for the MET RN.



The percentage of sepsis related MET calls were 57% which increased the MET nurse workload by 44%. The intervention recommended by the regional collaborative was allocation of a dedicated twelve-hour nurse who assists in MET calls and proactive rounding throughout the hospital. This process was piloted, deemed successful, and implemented as a permanent solution. Interestingly, it was identified during the weekly sepsis medical record review that bundle compliance unfavorably decreased and mortality unfavorably increased when there was no sepsis RN. Therefore, the sepsis RN began 24/7 coverage on July 4, 2016.

While the changes were taking place on the nursing side, physician education was also taking place. Quality ran a list of all physicians having cared for patients with any type of sepsis during the previous twelve months. Physician documentation was revised within the EHR. (See Figure 3.) The Intensivist physician champion provided one on one sepsis education to each of those physicians regarding compliance to the evidence-based sepsis bundles, using the standardized order sets to streamline care, and following the advice of the expert sepsis RN.

Figure 3. Physician documentation of reassessment.



Document: Sepsis Documentation - Sepsis Documentation

SEPSIS

Sepsis Documentation Type	
Document type	○ sepsis -physical exam ◉ sepsis -bedside monito...
Vital Signs	
Vital signs	Vital Signs 8 hrs Date Time TempPulseRespB/PPulse OxO2 DeliveryO2 Flow RateFiO29/24/...
Sepsis - Physical Exam	
Chest	clear crackles wheezes rhonchi dullness rales no wheezes no rales no crackles OTHER
Cardiovascular	regular rate and rhythm bradycardic tachycardic gallop rhythm bigeminy trigeminy heart rate erratic irregular rub murmur OTHER
Capillary refill	normal brisk delayed absent OTHER
Peripheral pulses	normal strong weak absent by Doppler OTHER
Skin color	normal color erythematous flushed pale cyanotic pink mottled
Sepsis - Bedside Monitoring	
CVP measures	○ less than 8 ○ 8 - 12 ○ greater than 12
ScvO2 measures	○ greater than or equal 7... ○ less than 70%
Bedside ultrasound performed	○ Yes ○ No
Passive leg raise/fluid bolus	○ Yes ○ No
Care Plan and Time Spent	
Care plan:	as ordered
Critical care time/minutes	

Results

St. Joseph Hospital Orange simplified processes to treat sepsis quickly and efficiently, ultimately saving 30 lives from July 2015 through June 2016 and 231 lives saved regionally with more than $5 million dollars in savings. Our patients with sepsis now experience a 20% lower than expected mortality rate and we anticipate further favorable reductions moving forward.

Significance

St. Joseph Hospital Orange is creating a healthier community for the patients we serve by decreasing mortality rates for the top driver of mortality in the nation. By identifying and treating patients with sepsis quickly and efficiently we were also able to save millions of dollars.

Sustainability

A continued focus on sepsis is in place. Annual sepsis education is provided for employees and physicians with bundle compliance and mortality tracked monthly and annually. The 24/7 sepsis RN has built bridges between the emergency department and critical care, contributing to the collaborative teamwork it takes to care for sepsis patients. Sepsis screens and physician documentation have been embedded into our EHR for easy documentation of pertinent information. Standardized, evidence-based order sets have been developed and implemented. In the event a physician does not use the order set, he or she is contacted to encourage usage and explain the importance of such use.

Key lessons and advice

Gather your evidence-based research and any baseline data prior to the first meeting. You can't improve what you don't measure, so metrics are everything. Carefully select your team members (stakeholders) and let them know why it's important they attend. This may involve the executive management team. Include frontline staff on your committee. Incentivize physician committee members with small stipends to help offset their personal cost of attendance.

Test all electronic interventions from all points of view. For example, when we implemented our fluid resuscitation order it was tested from the point of view of the ordering physician, bedside nurse, and pharmacist to ensure the order had the least number of "clicks" that was safe for our patients.

Use information from review of medical records as feedback, not reprimands. Lastly, catch them doing a good job. When those perfect cases are reviewed, make a big deal about it. When those incredibly sick patients survive, perform a case conference and let the care team know the difference they made in that patient's life.