

Nurses can help improve outcomes in severe sepsis

From early screening to timely interventions, nurses can save lives.

By Christa Schorr, RN, MSN, FCCM

THE BODY'S systemic response to an infection, sepsis can progress to severe sepsis and, in some cases, to septic shock. More than 1 million Americans suffer from severe sepsis annually. This number may grow in the future because sepsis risk increases with age.

Sepsis is deadly and expensive. In 2011, it was the most expensive condition in U.S. hospitals, accounting for more than \$20 billion in medical costs. In a 2013 report of inpatient hospital deaths, mortality decreased for many diagnoses, including respiratory failure, stroke, and heart disease—but for septicemia (frequently associated with severe infection) it rose 17% during the same period. (See *Defining sepsis-related terms*.)

This article discusses the nurse's role in early sepsis recognition and explains how to apply sepsis care guidelines to clinical practice.

SEP-1 measures

Government agencies are paying increased attention to sepsis. In April 2015, the Centers for Medicare & Medicaid Services (CMS) released a new inpatient reporting program—Early Management Bundle, Severe Sepsis/Septic Shock (SEP-1) measures. Centering on care processes in the early stages of severe sepsis, SEP-1 measures

focus on improving outcomes. Starting with October 1, 2015 discharges, all U.S. hospitals were required to begin reporting on SEP-1 measures. To help identify severe sepsis patients and start treatment earlier, many hospitals now emphasize a systems approach based on established guidelines.

Guidelines from the Surviving Sepsis Campaign

Guidelines from the Surviving Sepsis Campaign (SSC) provide evidence-based recommendations for managing severe sepsis and septic shock. Known as the severe sepsis 3-hour and 6-hour bundles, they were updated in April 2015 to reflect new evidence. (See *Severe sepsis*

sis bundles.) Unfortunately, compliance with these bundles remains low.

Applying knowledge to clinical practice

What's the value of evidence-based guidelines if clinicians don't apply them in practice? To promote optimal care, nurses need to be aware of the guidelines and understand the rationale for implementing the recommendations. Accepting ownership and realizing you can make a difference in patient outcomes provides motivation for change.

SCC recommends healthcare organizations have a performance improvement program. Interdisciplinary involvement through education, engagement of frontline staff, and a better workflow can lead to improved care. In any patient-care setting, clinicians must make severe sepsis screening and bundle application a part of routine practice. Screening must include assessing for signs and symptoms of sepsis and determining the patient's infection risk. Patients with suspected sepsis must be evaluated and monitored for organ dysfunction to promote early identification, prompt treatment, and improved outcomes. The screening process begins with emergency room (ED) triage and extends through the post-acute care setting.

Preventing disease progression is challenging to measure. Other outcomes, such as length of stay, need for intensive care unit (ICU) admission, mechanical ventilator days, and mortality are retrievable data measures. Although mortality is a valid outcome measure, a successful screening program can be evaluated by compliance with sepsis bundle indicators, assessment of progression to multisystem failure, the need for higher-level care, and lengths of stay.



LEARNING OBJECTIVES

1. Compare sepsis-related terms.
2. Discuss the nurse's role in identifying severe sepsis.
3. Describe guidelines from the Surviving Sepsis Campaign.

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Defining sepsis-related terms*

Being familiar with the terms below can help you identify sepsis earlier.

| Term | Definition | Clinical considerations |
|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Systemic inflammatory response syndrome (SIRS) | Clinical systemic response to inflammation | Common signs and symptoms: <ul style="list-style-type: none"> • hyperthermia (temperature > 101.0° F [38.3° C]) • hypothermia (temperature < 96.8° F [36° C]) • tachycardia (heart rate > 90 bpm) • tachypnea (respiratory rate > 20 breaths/minute) • leukocytosis (WBC count > 12,000 mm³/L) • leukopenia (WBC count < 4,000 mm³/L) • altered mental status |
| Sepsis | Body's response to infection | At least two systemic manifestations of infection (listed above) plus a confirmed or suspected infection |
| Severe sepsis | Sepsis-induced tissue hypoperfusion or organ dysfunction presumably caused by infection | Organ dysfunction: <ul style="list-style-type: none"> • sepsis-induced hypotension • lactate level above upper limit of normal • urine output < 0.5 mL/kg/hour for more than 2 hours despite adequate fluid resuscitation • acute lung injury with PaO₂/FiO₂ < 250 mm Hg <i>without</i> pneumonia as infection source • acute lung injury with PaO₂/FiO₂ < 200 mm Hg <i>with</i> pneumonia as infection source • creatinine level > 2 mg/dL • bilirubin > 2 mg/dL • platelet count < 100,000/mL • coagulopathy (International Normalized Ratio) > 1.5 |
| Septic shock | Severe sepsis with refractory hypotension | Hypotension unresponsive to fluid resuscitation, requiring vasopressors to maintain mean arterial pressure ≥ 65 mm Hg |
| Septic shock as defined by the Centers for Medicare and Medicaid Services | Severe sepsis and tissue hypoperfusion persisting after crystalloid fluid administration | Hypotension as shown by systolic pressure < 90 mm Hg, mean arterial pressure < 65 mm Hg, decrease in systolic pressure by > 40 points, or lactate level ≥ 4 mmol/L |

BPM: beats/minute. WBC: white blood cell. PaO₂/FiO₂: ratio of arterial oxygen partial pressure to fractional inspired oxygen.

*Consensus recommendations for new sepsis definitions were published in February 2016 (<http://goo.gl/Am1Rcr>) as this article went to press. The new definitions recommend replacing the term "severe sepsis" with "sepsis." Patients previously classified as having sepsis are now classified as having an infection, with no distinction between infection with and without SIRS. These recommendations don't alter the basic grouping of infected patients for diagnosis and treatment purposes or the continued usefulness of SIRS and previous sepsis definitions for teaching purposes.

Source: Dellinger RP, Levy MM, Rhodes A, et al; Surviving Sepsis Campaign Guidelines Committee, including the Pediatric Subgroup. Surviving Sepsis Campaign: international guidelines for management of severe sepsis and septic shock: 2012. *Crit Care Med.* 2013;41(2):580-637.

Nurses are well positioned to influence and improve care in this vulnerable patient population. The nurse's specific role varies as described below.

Triage and ED nurses

More than half of patients with severe sepsis present to the ED. Triage nurses prioritize treatment based on the seriousness of the pa-

tient's condition. As with acute stroke and acute myocardial infarction, early identification of severe sepsis contributes to better patient outcomes.

The first step is to determine if the patient has a suspected or obvious infection source with associated systemic manifestations. The triage nurse obtains vital signs and history, quickly determining the severity

of the patient's condition and the level of urgency required. This nurse collaborates with the ED nurse to ensure that the patient's transition is seamless from one nurse to the next. This transition is important to the continuum of time-sensitive sepsis care. As appropriate, the ED nurse implements sepsis bundles.

During all phases of the ED

process, the nurse coordinates severe sepsis care through effective communication with physicians, support staff, the patient, and family members. Once stabilized, the patient may be transferred to a bed in the critical care unit (CCU) or a unit with a nurse-to-patient ratio of 1:≤4.

Although not unique to the ED, treatment delays contribute to disease progression and worse outcomes. Various factors may delay antibiotic administration, including delays in diagnosis, ordering, delivery to the bedside, and administration (such as lack of I.V. access), as well as miscommunication during the shift or transfer of care.

Establishing standardized systems can decrease delays. Standardized systems can encompass routine severe sepsis screening, use of a sepsis order set, collaborating with the pharmacy to deliver initial antibiotics to the bedside, and improved transitions in care. For instance, if a severe sepsis patient is transferred before receiving broad-spectrum antibiotics, this information needs to be conveyed to the receiving nurse during transfer.

CCU nurses

A CCU nurse who receives a severe sepsis patient from the ED or other unit should determine if all elements of the 3- and 6-hour sepsis bundles have been completed. If a bundle wasn't initiated or any of its elements wasn't completed, this must be done in the CCU. Communicating with the transfer team helps ensure a smooth care transition, with clear goals established in the early hours of severe sepsis management.

Say, for example, a severe sepsis patient with normal blood pressure is transferred from the ED to the CCU 5 hours after presentation. In the ED, the patient's initial lactate level was 3.5 mmol/L; blood cultures were completed and antibiotics were given by hour three. The CCU nurse knows that a repeat serum lactate level must be obtained within 6 hours of presentation to accomplish the 6-hour bundle requirements. Ensuring that an order for the repeat lactate level has been given and completed helps prevent fallout in cross-departmental care transitions.

Critically ill patients admitted to the CCU with a diagnosis other

than severe sepsis may develop severe sepsis during a CCU stay. When this occurs, early interventions include the same 3- and 6-hour severe sepsis bundles.

Nurses on other units

Nurses on units other than the ED or CCU have a challenging workflow, given the number of patients they care for. The nurse may need several hours to evaluate all of the patients in his or her assignment. Also, patient turnover is high.

The SSC Phase III performance improvement program reported 44.3% mortality for patients presenting with severe sepsis on units. Potential reasons for such high mortality include delays in severe sepsis recognition, delayed treatment initiation, and anchoring to the admitting diagnosis (latching onto the first symptom or initial data instead of considering all information available). In general, other units lack the resources of EDs and CCUs. Unit location also may affect care processes, as these units commonly are located relatively far from the pharmacy and laboratory.

Physician workflow and availability also may pose a challenge. Hospitalists, surgeons, and cardiologists commonly cover patients throughout the hospital and in outpatient clinics. Understanding the uniqueness of units' operational and resource patterns can help staff overcome obstacles and provide solutions to improve sepsis outcomes.

SSC Phase IV program

Recognizing these challenges on units, SSC developed a quality-improvement program known as SSC Phase IV, with sites throughout the United States. Designed to improve early severe sepsis identification and promote early treatment, SSC Phase IV involved in-person learning sessions, webinars, coaching calls, and data-collection software. Each site identified one unit to pilot the program; every patient on every

Severe sepsis bundles

Intervention bundles help simplify care of patients with severe sepsis. A bundle is a set of elements that, when implemented together, have a greater effect on outcomes than individual elements implemented alone.

The Surviving Sepsis Campaign developed two sets of bundles. Elements in the 3-hour bundle should be completed within 3 hours of patient presentation; the three additional elements in the 6-hour bundle should be completed within 6 hours of presentation.

3-hour bundle

1. Measure the patient's lactate level.
2. Obtain blood cultures before antibiotic administration.
3. Administer broad-spectrum antibiotics.
4. Administer 30 mL/kg crystalloid for hypotension or a serum lactate level of 4 mmol/L or higher.

6-hour bundle

5. Give vasopressors (if hypotension doesn't respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) of 65 mm Hg or higher.
6. If hypotension persists after initial fluid administration (MAP below 65 mm Hg) or if the initial lactate level was 4 mmol/L or higher, reassess the patient's volume status and tissue perfusion, and document findings.
7. Remeasure the patient's lactate level if the initial level was elevated.

Using SBAR for effective communication of severe sepsis

shift was screened every day with a standardized tool for severe sepsis. The units' quality-improvement program focused primarily on the severe sepsis 3-hour bundle.

Screening-process tools were developed at the site level based on the SSC severe sepsis screening tool. Some sites applied variables from the screening tool to develop electronic surveillance alerts in the electronic health record (EHR). Others developed an early-warning system based on vital signs and laboratory results, while still others used a paper tool customized to their site. Alerts (severe sepsis notifications) varied with EHR capability and accessible information technology resources. Alert model development included a pop-up notification within the EHR, an automated call to the rapid response or sepsis response team and, in some cases, inbox notification to sepsis team leaders.

SSC Phase IV is in the final stages; data collection is complete and analysis is underway. Early accounts indicate that nurse-driven, every-shift screening for severe sepsis is possible.

Screening preparation

Simplifying the screening process promotes sepsis identification. Physicians, nurses, and nursing assistants should collaborate to determine all steps needed to identify severe sepsis patients. Mapping out the process for obtaining, documenting, and reporting vital signs helps the team visualize how a potential defect in the process can occur. This step is crucial because detecting abnormal vital signs typically is the first step in early sepsis recognition.

Communicating results

A common challenge identified in the screening process is staff nurses' reluctance to call the physician when they identify a patient they suspect might have severe sepsis.

For effective communication with the patient's physician or nurse practitioner, make sure the information you convey is clear and concise. In the script below, the nurse communicates findings for a patient with signs and symptoms of severe sepsis using the Situation, Background, Assessment and Recommendation (SBAR) technique.

"Hello, Dr. Brown. This is Mary Jones. I am the primary nurse caring for James Smith."

Situation: "Mr. Smith was admitted early this morning with cellulitis of his left lower extremity. He states that the pain in his leg has increased and the redness has extended since admission."

Background: "Mr. Smith is an 82-year-old man with a history of heart failure and diabetes. He reported a wound on his left lower leg, present for about 2 weeks. He arrived in the emergency department yesterday afternoon complaining of increased pain, warmth, redness, and blistering."

Assessment: "Mr. Smith's vital signs this morning were temperature, 101.4° F; heart rate, 95; and respiratory rate, 24. His current blood pressure is 92/40. His most recent laboratory values are from 4 pm yesterday. At that time, his WBC count was 16.2. Blood cultures were obtained in the ED and results are pending. He hasn't had any laboratory orders since his ED admission."

Recommendation: "I would like to request an order for a chemistry panel, CBC with differential, and lactic acid level."

The physician should repeat and confirm the information provided by Nurse Jones. He or she may agree with the recommendations and place the requested orders, or may determine the patient should be monitored at a higher level of care.

Failure to communicate findings may lead to delayed diagnosis and treatment. To help ease nurse-to-physician communication, clinicians can use a tool based on the Situation, Background, Assessment, Recommendation (SBAR) method. Including SBAR within the electronic sepsis alert allows the nurse to report to the physician directly from the automated sepsis alert. (See *Using SBAR for effective communication of severe sepsis*.)

Developing roles for nurses

Nurses in the roles below can play a significant part in sepsis identification, management, and quality improvement. Including each member on the sepsis quality team can build a strong foundation in a hospital's improvement effort.

Clinical educator

Clinical educators promote performance improvement. Serving as teachers and mentors, they teach both new and seasoned nurses about current procedures, protocols, and performance improvement ini-

tiatives. They provide feedback to staff, act as liaisons for process improvement, and help provide methods to report severe sepsis screening results to physicians.

Besides helping to uncover barriers to improvement, clinical educators also can develop solutions. At one hospital, educators found that on a medical-surgical unit participating in a pilot program to screen every patient on every shift every day (as part of SSC Phase IV), many nurses were unable to determine if a patient had an infection, delaying further screening for organ dysfunction. Discussion with nursing staff revealed they were unsure of the terminology associated with sepsis as well as signs and symptoms of a new or suspected infection. The clinical educator provided education sessions on signs and symptoms, which included postings on bulletin boards, one-on-one education, and pre-shift huddle discussions.

Nurse informatics specialist

The nurse informaticist role is

growing with today's emphasis on electronic alerts, nursing protocols, and order sets. Nurse informaticists may help develop programs for continuous vital-sign surveillance and alerts, sepsis-specific documentation, hospital education programs for the local learning network, user education, and ongoing quality assessment.

Automated prompts for severe sepsis can be programmed to include surveillance of vital signs and laboratory data, which prompt the nurse and provider to evaluate the patient for severe sepsis. The alert may be linked to nurse-driven protocols and documentation tools that help caregivers and quality team members track severe sepsis quality measures.

Quality outcomes manager

Many nurses work in quality performance departments, retrieving and reporting data required by CMS. SEP-1 is the early-management bundle for severe sepsis and septic shock (part of the National Hospital Inpatient Quality Measures). It emphasizes the need for nurses to become proficient in sepsis recognition and intervention.

SEP-1 measures resemble the SSC sepsis bundles, with some differences related to time of presentation and determining if and when appropriate treatments were administered. Quality outcomes managers are excellent resources for the data that provide such feedback.

Clinical documentation specialist

Clinical documentation specialists are knowledgeable about various diagnoses and proficient in interpreting the EHR. This skillset gives them the ability to monitor appropriate documentation to support a severe sepsis diagnoses and help clinicians to identify severe sepsis cases, ensuring appropriate coding, analysis, and performance benchmarking.



Including each member on the *sepsis quality team* can build a strong foundation in a hospital's improvement effort.

Sepsis response team

The sepsis response team, which commonly includes a critical care nurse, focuses on delivering early sepsis interventions, including antibiotics, fluid administration, and respiratory support. Team members are proficient in identifying and managing severe sepsis. They also can serve as liaisons between the nurse and physician to communicate findings, place orders and, when necessary, promote patient transfer to a higher level of care.

Sepsis coordinator

In this evolving role, the sepsis coordinator leads the multidisciplinary team to deliver care for sepsis patients. This person may be responsible for developing educational programs, establishing methods to ensure adherence to the organization's sepsis program, and collecting data for CMS sepsis quality measures. In some organizations, the sepsis coordinator also is responsible for ensuring that clinicians are following best practices for severe sepsis.

Besides providing education and support for clinicians, the sepsis coordinator may provide education and care planning for the patient and family, collect data, provide feedback, and collaborate with the clinical documentation specialist and medical coders working in medical

billing and coding departments. In sepsis, the role of coding is crucial not just for billing but also for public reporting, as the coded data is used for publicly reported outcomes. Miscoding may cause misrepresentation of the patient population in regard to sepsis outcomes.

Researcher

The nurse researcher explores novel questions with original data and develops methods for implementing sepsis programs on a local level. Original research promotes innovation and testing, such as development of a nurse-driven screening tool or protocol to be used in a specified setting and patient population.

Implementation of research findings may focus on details of early sepsis identification and management. The process begins with data collection using specified data definitions and consistent data points. The researcher views the details surrounding specific groups and care processes. Implementation research requires a deep investigation into the data, which is invaluable for clinician feedback. Clinician behavior will change and outcomes will improve only when we answer novel questions and receive feedback on performance and outcomes.

Nurses at the center of care

Sepsis, severe sepsis, and septic shock continue to cause many deaths and carry a huge economic burden. Frequent severe sepsis screening, clear communication, and early treatment can lead the way to decreased sepsis deaths. Nurses are central to delivering this optimal level of sepsis care. ★

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For selected references and a severe sepsis screening tool, visit www.AmericanNurseToday.com/?p=22423.

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Please mark the correct answer online.**1. Which statement about sepsis incidence and mortality is correct?**

- The incidence of sepsis is lower in patients older than age 70.
- The risk of mortality from sepsis decreases with age.
- In 2011, sepsis was the most expensive condition treated in U.S. hospitals.
- Like many other conditions, the incidence of sepsis fell in 2013.

2. Which of the following laboratory findings might indicate that your patient is in severe sepsis?

- Creatinine level of 2.5 mg/dL
- Bilirubin level of 1.2 mg/dL
- Platelet count of 125,000/mL
- International Normalized Ratio of 1

3. Which of the following findings may indicate that your patient is experiencing systemic inflammatory response syndrome?

- Temperature of 96.2° F (35.6° C)
- Heart rate of 70 beats/minute
- Temperature of 99.5° F (37.5° C)
- Respiratory rate of 16 breaths/minute

4. Which statement about septic shock is correct?

- The Centers for Medicare and Medicaid Services (CMS) defines it as severe sepsis and tissue hypoperfusion that persist after colloid fluid administration.
- CMS defines it as severe sepsis and tissue hypoperfusion that persist after crystalloid fluid administration.
- Hypotension, as indicated by systolic blood pressure below 100 mm Hg, occurs.
- Hypotension, as indicated by a mean arterial pressure below 75 mm Hg, occurs.

5. Which of the following meets the requirements of organ dysfunction for severe sepsis?

- An acute lung injury with P_{aO_2}/F_{iO_2} below 250 mm Hg *with* pneumonia as the infection source
- An acute lung injury with P_{aO_2}/F_{iO_2} below 250 mm Hg *without* pneumonia as the infection source
- A normal serum lactate level
- A reduced serum lactate level

6. Which of the following is part of the 6-hour bundle from the Surviving Sepsis Campaign?

- Measure the patient's serum lactate level.
- Administer 15 mL/kg colloid solution for hypotension.
- Administer 30 mL/kg crystalloid solution for hypotension
- Give vasopressors if hypotension doesn't respond to initial fluid resuscitation.

7. Which statement about antibiotics and the sepsis bundles from the Surviving Sepsis Campaign is accurate?

- Blood cultures should be obtained after the first dose of antibiotics.
- Blood cultures should be obtained before the first dose of antibiotics.
- Antibiotics should not be given until 3 hours after patient presentation.
- Narrow-spectrum antibiotics are preferred over broad-spectrum antibiotics.

8. Which of the following is an important fact to know about lactate levels in patients with sepsis?

- The second lactate level should be obtained 2 hours after initial presentation.
- The first lactate level should be obtained 5 hours after initial presentation.
- If the initial lactate level is 4 mmol/L or higher, the patient should be reassessed within 6 hours of presentation.

- The lactate level should be remeasured within 2 hours if the initial level was elevated.

9. The Evaluation for Severe Sepsis Screening Tool:

- is required by CMS.
- has five components.
- was developed by The Joint Commission.
- has three components.

10. All of the following statements about early sepsis recognition are correct EXCEPT:

- Interdisciplinary involvement improves care.
- Severe sepsis screening should be part of a clinician's routine practice.
- Screening for sepsis begins with emergency department (ED) triage.
- Screening for sepsis begins when the patient is transferred to the hospital unit.

11. One way to decrease delays in effective treatment of patients with sepsis is to:

- avoid standard sepsis order sets.
- wait to deliver antibiotics until the ED patient is admitted.
- implement a sepsis order set.
- avoid transferring patients to the intensive care unit.

12. Which statement about nurses' roles in early identification and treatment of patients with sepsis is NOT correct?

- The nurse informaticist can help develop such tools as automated prompts.
- The nurse should avoid the Situation, Background, Assessment, Recommendation (SBAR) method of communication.
- The sepsis coordinator leads the multidisciplinary team to deliver care for sepsis patients.
- The Early Management Bundle, Severe Sepsis/Septic Shock (SEP-1) measures emphasize the need for nurses to become proficient in sepsis recognition and intervention.