

LETTER



International critical care nursing considerations and quality indicators for the 2017 surviving sepsis campaign guidelines

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Dear Editor,

Internationally, sepsis remains a complex condition with high mortality rates for critically ill patients. With the associated high resource use in developed and developing countries, early recognition and treatment have become a global priority area of focus for critical care [1].

Since 2002, the European Society of Intensive and Critical Care Medicine (ESICM) and the Society of Critical Care Medicine (SCCM) have collaborated to develop [2, 3] and update international guidelines for the management of sepsis and septic shock. The most recent guidelines were published in 2017 and outline 93 recommendations and best practice statements for the medical treatment of sepsis in 21 categories including diagnosis, initial resuscitation, antimicrobial therapy, fluid therapy, mechanical ventilation, source control, and screening for sepsis and performance improvement, among others [2, 3].

Nurses play a pivotal role in the early identification and management of sepsis. In recognition of this, four leading international critical care organizations (the European Federation of Critical Care Nursing Associations, EfCCNa, the European Society of Intensive Care Medicine Nursing and Allied Healthcare Professionals Section; the SCCM, and the World Federation of Critical Care Nurses, WFCCN) collaborated to outline considerations for nursing care based on the revised SSC guidelines. The President or Chair of the organizations (authors) formed the core group and engaged with, and drew upon,

nursing members with expertise on sepsis care. Consensus on quality indicators was gained through face to face communication with committees at organizational meetings and via email among the leadership. Nurse-sensitive actions and quality indicators were identified based on key areas of nursing care as outlined in the guidelines.

The role of the nurse in sepsis care

A number of nurse-led initiatives targeting sepsis care highlight the important role that nurses play in sepsis care. For example, the use of nurse-led protocols for early identification of sepsis, initiation of sepsis protocols to facilitate obtaining blood cultures and starting early resuscitation measures, and nurse-led sepsis response teams have demonstrated the impact of nurse-led multi-professional team-based care in decreasing mortality, ICU length of stay, and ICU readmission rates [4, 5].

International critical care nursing interventions for patients with sepsis

Nursing interventions for sepsis care start with promoting early identification and treatment of sepsis, as research continues to demonstrate increasing mortality rates with the progression of organ system failure and septic shock [5]. Interventions include the following:

1. Prompt identification of sepsis.
 - Monitor vital signs for elevated heart rate, reduced blood pressure, increased respiratory rate, or elevated temperature. Detecting abnormal vital signs is the first step in early sepsis recognition.

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- Consider implementing sepsis screening as part of routine nursing care for patient assessments and patient care rounds.
- Activate sepsis team/sepsis care protocols including transfer to higher level of care as indicated.

2. Provide sepsis treatment measures.

- Obtain blood cultures prior to administering antibiotics whenever possible.

The SSC guidelines recommend obtaining two sets of blood cultures: aerobic and anaerobic, if doing so results in no substantial delay in the start of antibiotic therapy.

- Administer antibiotics as ordered. Nurses have a direct role in administering antibiotics as part of sepsis treatment; therefore, awareness of the importance of prompt initiation of antibiotics is a cornerstone of care.
- Provide fluid resuscitation as outlined in the guidelines and directed by institutional protocols.

The guidelines recommend aggressive fluid resuscitation of up to 30 mL/kg of intravenous crystalloids within the first 3 hours, targeting a mean arterial pressure (MAP) of 65 mmHg in patients with septic shock requiring vasopressors. Resuscitation is recommended to be guided by monitoring lactate levels as a marker of tissue hypoperfusion.

3. Manage altered perfusion and shock.

- Monitor and report alterations in perfusion including decreasing urine output, altered skin perfusion, mental status changes, and changes in other perfusion metrics.
- Monitor lactate levels as directed by institutional protocols and as ordered.
- Assess and report response to sepsis care treatments.

Sepsis bundles have been advocated with each update of the SSC guidelines and focus on early identification of sepsis by obtaining lactate levels, blood cultures before antibiotics, fluid administration for resuscitation, and use of vasopressors for continued hypotension despite fluid administration (Supplemental content).

4. Promote awareness/implementation of the international sepsis guidelines.

- Disseminate information on the international sepsis guidelines to members of the critical care team, including the emergency department and ward staff, where sepsis care measures are implemented before patients arrive in the intensive care unit.
- Include a discussion of the guidelines during unit clinical care meetings and clinical rounds.
- Ensure clinician awareness of the surviving sepsis campaign guidelines website: <http://www.survivingsepsis.org> which contains open access resources, toolkits, educational videos, bundles, and the guidelines.

5. Target sepsis with quality improvement initiatives.

- Support and champion quality improvement initiatives aimed at improving sepsis care.
- Use the SSC as a performance improvement initiative to identify gaps in care and specific areas for improvement (Table 1).
- Time to perform blood culture sampling.
- Time to start antimicrobial therapy.
- Time to reach fluid bolus goals.
- Time to perform blood lactate monitoring.
- Maintain compliance with all elements of the sepsis bundles.

Using these components as quality indicators, nurses can assess, evaluate, and report on the implementation of SSC recommendations and help to improve care for patients with sepsis (Supplemental content).

6. Advocate for patient- and family-centered care to improve sepsis care outcomes.

- Promote patient and family awareness of sepsis, including addressing the needs of families of critically ill patients, setting goals of care, and holding family care conferences to discuss goals of care.

7. Ensure infection prevention measures are implemented for all critically ill patients.

Table 1 Sepsis nursing quality of care indicators

Sepsis care metric	Indicator
Time to perform blood culture sampling	<p>Nursing quality indicator</p> <p>1 (a) Blood culture (BC) sampling Proportion of sepsis cases in which BCs were sampled Measured: (n cases with BCs sampled/total number of sepsis cases) \times 100</p> $\frac{n \text{ cases with blood cultures sampled}}{\text{total } n \text{ of sepsis cases}} \times 100$ <p>1 (b) Timing of blood culture sampling Proportion of sepsis cases in which BCs were sampled before starting antimicrobial Measured: (n cases with BCs sampled before start of antimicrobial therapy/total n of sepsis cases in which blood cultures could be sampled without substantially delaying the start of antimicrobial therapy) \times 100</p> $\frac{n \text{ cases with blood cultures sampled before start antimicrobial therapy}}{\text{total } n \text{ of sepsis cases in which blood cultures could be sampled without substantially delaying the start of antimicrobial therapy}} \times 100$
Time to start antimicrobial therapy	<p>2. Antimicrobial therapy (time to administration of antimicrobials once they have been prescribed by the physician or advanced practice provider) Proportion of cases in which antibiotic (AB) therapy was started within 30 min after prescription Measured: (n cases in which AB therapy was delivered with 30 min post prescription/total n of sepsis cases with a prescription of a new antimicrobial therapy or a switch in current therapy) \times 100</p> $\frac{n \text{ cases in which antimicrobial therapy was started } < 30 \text{ min of prescription}}{\text{total } n \text{ of sepsis cases with a prescription of a new antimicrobial therapy or a switch in current therapy}} \times 100$
Time to reach fluid bolus goals	<p>3 (a) Time to fluid bolus goals (time to administration of fluids once they have been prescribed by the physician or advanced practice provider) Proportion of cases in which fluid therapy was started within 30 min after prescription Measured: (n cases in which fluid therapy was started within 30 min post prescription/total n of sepsis cases in which fluid therapy was prescribed) \times 100</p> $\frac{n \text{ cases in which resuscitation fluids were started } < 30 \text{ min of prescription}}{\text{total } n \text{ of sepsis cases in which resuscitation fluids were prescribed}} \times 100$ <p>3 (b) 30 mL/kg of crystalloid fluid be given within the first 3 h (unless contraindicated) Proportion of cases in which 30 mL/kg of crystalloid fluid was given within the first 3 h unless this was contraindicated Measured: (n cases in which 30 mL/kg of crystalloid fluid was administered $<$ 3 h of prescription)/total n of sepsis cases in which resuscitation fluid was prescribed) \times 100</p> $\frac{n \text{ cases in which 30 mL/kg was administered } < 3 \text{ h of prescription}}{\text{total } n \text{ of sepsis cases in which resuscitation fluid were prescribed}} \times 100$
Time to perform blood lactate monitoring	<p>4. Time to blood lactate monitoring (time to obtaining initial lactate level) Proportion of cases in which lactate level was drawn within 30 min after prescription Measured: (n cases in which lactate level was drawn $<$ 1 h of sepsis onset/total n of sepsis cases in which blood lactate level can be monitored*) \times 100</p> $\frac{n \text{ cases in which blood lactate was monitored } < 1 \text{ h of sepsis onset}}{\text{total } n \text{ of sepsis cases in which blood lactate level can be monitored}} \times 100$
Maintaining glucose control	<p>5. Glucose blood value levels $<$ 180 mg/dL Proportion of cases in which glycemia was $<$ 180 mg/dL within 6 h of onset of hyperglycemia Measured: (n cases in which glucose blood value levels were ($<$ 180 mg/dL) $<$ 6 h/total n of sepsis cases presenting with hyperglycemia) \times 100</p> $\frac{n \text{ cases in which glucose was normalized } (< 180 \text{ mg/dL}) < 6 \text{ h of onset hyperglycemia}}{\text{total } n \text{ of sepsis cases presenting with hyperglycemia}} \times 100$

Table 1 (continued)

Sepsis care metric	Indicator
Family care conference to address goals of care	6. Patients receiving family care conference to address goals of care within 72 h of ICU admission Proportion of cases in which patients received family care conference to address goals of care within 72 h of ICU admission Measured: $(n \text{ cases in which a family care conference was held to address goals of care within 72 h of ICU admission} / \text{total } n \text{ of sepsis cases with an ICU admission of } > 72 \text{ h}) \times 100$ $\frac{n \text{ cases in which a family care conference was provided}}{\text{total } n \text{ of sepsis cases with an ICU stay } > 72\text{h}} \times 100$
Total sepsis bundle performance	7. Compliance to all aforementioned quality indicators Proportion of cases in which all elements of the sepsis bundle were implemented Measured: $(n \text{ cases in which all elements of the sepsis bundle were implemented} / \text{total } n \text{ of sepsis cases}) \times 100$

*In settings where blood lactate monitoring is not readily available (low resource countries), this indicator can be omitted from the quality control

- Adhere to recommendations regarding healthcare-associated infection prevention.

The ultimate aim of updating clinical practice guidelines is to improve patient care. As critical care nurses implement many of the sepsis care interventions as part of nursing care, ensuring nurses' awareness of the SSC guidelines is essential to maximize benefit for critically ill patients. By instituting measures that are based on the SSC guidelines, critical care nurses can improve care for patients with sepsis and help to ensure that critically ill patients with sepsis receive expert nursing care to promote optimal outcomes worldwide.

Electronic supplementary material

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Compliance with ethical standards

Conflicts of interest

The authors declare that they have no conflicts of interests.

Ethical approval

The manuscript does not involve research with human participants and/or animals or informed consent.

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References

1. Perner A, Rhodes A, Venkatesh B et al (2017) Sepsis: frontiers in supportive care, organization and research. *Intensive Care Med* 43:496–508
2. Rhodes A, Evans L, Alhazzani W et al (2017) Surviving sepsis campaign: international guidelines for management of sepsis and septic shock: 2016. *Crit Care Med* 45:1–67
3. Rhodes A, Evans L (2017) Surviving sepsis campaign: international guidelines for management of sepsis and septic shock: 2016. *Intensive Care Med* 43:304–377
4. Maclay T, Rephann A (2017) The impact of early identification and a critical care-based sepsis response team on sepsis outcomes. *Crit Care Nurse* 37:88–91
5. Kleinpell R, Schorr C, Aitken L (2013) Implications of the new international sepsis guidelines for nursing care. *Am J Crit Care* 22:212–222