

# The Surviving Sepsis Campaign Guidelines 2012: Update for Emergency Physicians

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The Surviving Sepsis Campaign recently developed and published an updated version in 2012 of the international guidelines for the assessment and management of severe sepsis and septic shock. These guidelines reflect literature published in the last 5 years, and many of the recommendations have direct implications for emergency physicians. In this review, we present a concise summary of these recommendations, with a particular focus on those that have changed and those that have direct relevance to the clinical practice of emergency medicine. [Ann Emerg Med. 2014;63:35-47.]

A **podcast** for this article is available at [www.annemergmed.com](http://www.annemergmed.com).

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## INTRODUCTION

The Surviving Sepsis Campaign has attempted to increase awareness and establish practice guidelines to improve the recognition and treatment of patients with severe sepsis and septic shock. Since the publication of the last iteration of the guidelines in 2008,<sup>1</sup> several studies with major implications to the initial assessment and management of the emergency department (ED) patient with severe sepsis and septic shock have been published. The results of these studies were incorporated into the newly published 2012 Surviving Sepsis Campaign Guidelines,<sup>2</sup> which has been endorsed by numerous stakeholders from the fields of critical care, infectious diseases, and nursing and by the American College of Emergency Physicians and the Society for Academic Emergency Medicine. The goal of this review is to provide the emergency practitioner a synopsis of the recent changes in guidelines, with a particular emphasis on those that may have direct implications for ED assessment and management of early sepsis. This article will also provide a brief discussion of the various studies that led to these changes in recommendations so that the reader may have a better understanding of the current state of the art and relevant gaps in the literature.

## DEFINITIONS AND WEIGHTING OF THE EVIDENCE

Definitions of sepsis and its variants are based on consensus definitions.<sup>3</sup> Sepsis is defined as probable (documented or suspected) infection and signs of systemic inflammation. Severe sepsis is defined as sepsis and organ dysfunction or tissue hypoperfusion (Figure 1). Septic shock is defined as sepsis-induced hypotension despite adequate fluid resuscitation.

Evidence incorporated in the guidelines was evaluated with the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system as follows: grade 1 (strong) and grade 2 (weak) recommendations are based on the committee's overall

assessment of the risks and benefits of the intervention, which is of greater importance to clinicians than the quality of evidence. Grade 1 guidelines use the language "we recommend," whereas the weaker grade 2 guidelines carry the language "we suggest." Considerations in grading evidence included quality, certainty about the balance of risks and harms, certainly in value, and resource implications. Quality of evidence was classified as high (A), moderate (B), low (C), or very low (D). High-quality randomized controlled trials represent class A, whereas downgraded randomized controlled trials because of methodological issues or upgraded observational studies are representative of class B. Well-done observational studies typically represent class C, whereas downgraded studies or expert opinion represent class D.

## SPECIFIC GUIDELINE RECOMMENDATIONS OF RELEVANCE TO EMERGENCY PHYSICIANS

The primary goal of this review is to provide a summary of both the changes to the Surviving Sepsis Campaign Guidelines and those of foremost relevance to emergency medicine. These changes are summarized in the Table and are discussed in further detail throughout the review.

In this version of the guidelines, the Surviving Sepsis Campaign has issued a general statement that the recommendations are considered best practices but do not represent standard of care to which physicians should be held. As stated in the guidelines, "Thus, these recommendations are intended to be best practice (the committee considers this a goal for clinical practice) and not created to represent standard of care." This is important inasmuch as, in previous versions of the guidelines, there were instances in which certain specific recommendations were stated to not represent standard of care (eg, time to antibiotics); however, in this version this statement applies to all the recommendation contained in the guidelines. Also, there continue to be some internal inconsistencies in the document most significantly related to

## SEPSIS: INFECTION, DOCUMENTED OR SUSPECTED, AND SOME OF THE FOLLOWING

### General Variables

Fever (temperature  $>38.3^{\circ}\text{C}$ )  
 Hypothermia (core temperature  $<36^{\circ}\text{C}$ )  
 Pulse rate  $>90/\text{min}$  or more than 2 SDs above the normal value for age  
 Tachypnea  
 Altered mental status  
 Significant edema or positive fluid balance ( $>20\text{ mL/kg}$  during 24 h)  
 Hyperglycemia (plasma glucose  $>140\text{ mg/dL}$  or  $7.7\text{ mmol/L}$ ) in the absence of diabetes

### Inflammatory Variables

Leukocytosis (WBC  $>12,000\ \mu\text{L}$ )  
 Leukopenia (WBC  $<4,000\ \mu\text{L}$ )  
 Normal WBC with  $>10\%$  immature forms  
 Plasma C-reactive protein more than 2 SDs above the normal value  
 Plasma procalcitonin more than 2 SDs above the normal value

### Hemodynamic Variables

Arterial hypotension (SBP  $<90\text{ mm Hg}$ , MAP  $<70\text{ mm Hg}$ , or an SBP decrease  $>40\text{ mm Hg}$  in adults or less than 2 SDs below normal for age)

### Organ Dysfunction Variables

Arterial hypoxemia ( $\text{PaO}_2/\text{FiO}_2 <300$ )  
 Acute oliguria (urine output  $<0.5\text{ mL/kg}$  per hour for at least 2 h despite adequate fluid resuscitation)

Creatinine-level increase  $>0.5\text{ mg/dL}$   
 Coagulation abnormalities (INR  $>1.5$  or aPTT  $>60\text{ s}$ )  
 Ileus (absent bowel sounds)  
 Thrombocytopenia (platelet count  $<100,000\ \mu\text{L}$ )  
 Hyperbilirubinemia (plasma total bilirubin  $>4\text{ mg/dL}$ )

### Tissue Perfusion Variables

Hyperlactatemia ( $>1\text{ mmol/L}$ )  
 Decreased capillary refill or mottling

## SEVERE SEPSIS: SEPSIS-INDUCED TISSUE HYPOPERFUSION OR ORGAN DYSFUNCTION (ANY OF THE FOLLOWING THOUGHT TO BE DUE TO INFECTION)

Sepsis-induced hypotension  
 Lactate level above upper limits of laboratory normal levels  
 Urine output  $<0.5\text{ mL/kg}$  per hour for more than 2 h despite adequate fluid resuscitation  
 Acute lung injury with  $\text{PaO}_2/\text{FiO}_2 <250$  in the absence of pneumonia as infection source  
 Acute lung injury with  $\text{PaO}_2/\text{FiO}_2 <200$  in the presence of pneumonia as infection source  
 Creatinine level  $>2.0\text{ mg/dL}$   
 Bilirubin level  $>2\text{ mg/dL}$   
 Platelet count  $<100,000\ \mu\text{L}$   
 Coagulopathy (INR  $>1.5$ )  
*SBP*, Systolic blood pressure; *MAP*, mean arterial pressure; *INR*, international normalized ratio; *aPTT*, activated partial thromboplastin time.

**Figure 1.** Diagnostic criteria for sepsis and severe sepsis. Adapted from: 2012 Surviving Sepsis Campaign Guidelines.<sup>2</sup>

recommendations of resuscitation that will be addressed in detail in the following commentary.

## SCREENING AND PRACTICE IMPROVEMENT

*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 (grade 1C).*

*Performance improvement efforts in severe sepsis should be used to improve patient outcomes (ungraded).*

Data suggest that early recognition of sepsis and initiation of appropriate interventions improves patient-centered outcomes.<sup>4</sup> Numerous trials<sup>5-12</sup> have demonstrated significant reductions in mortality after initiation of early care for the treatment of severe sepsis. Furthermore, the reduction in mortality found after the implementation of sepsis screening tools in the ICU suggests that

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