# Sepsis Syndrome, Bloodstream Infections, and Device-Related Infections

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**KEYWORDS**

• Sepsis • Septic shock • Bloodstream infection • Central line infection
• Device infection • Cardiac implantable electronic device • Cerebrospinal fluid shunt
• Prosthetic joint

**KEY POINTS**

- Early diagnosis and timely management of sepsis are imperative.
- Catheters should be removed in most cases of catheter-related bloodstream infections, especially when the infection is caused by *Staphylococcus aureus, Pseudomonas aeruginosa*, or *Candida* species.
- Transesophageal echocardiography should be performed in bacteremic patients with cardiac implantable electronic devices.
- Infected cerebrospinal shunts should be replaced temporarily with external ventricular drains and treated with antibiotics before reinsertion of new cerebrospinal shunts.
- Two-stage surgical replacement and intravenous antibiotics are the preferred management of prosthetic joint infections.

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## SEPSIS SYNDROME

### *Definitions*

The term systemic inflammatory response syndrome (SIRS) has been used to describe physiologic changes in response to infectious or noninfectious events such as pancreatitis, burns, or trauma (**Fig. 1**).[1] The 1991 American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference established definition criteria for SIRS, sepsis, and septic shock (**Table 1**).[1]

The 2001 International Sepsis Definitions Conference broadened the classification of SIRS/sepsis to include hyperglycemia, increased C-reactive protein (CRP) or procalcitonin, hyperlactatemia, decreased capillary refill, and hemodynamic instability or organ dysfunction.[2] The study investigators stressed that the clinician should go to the bedside, identify a myriad of symptoms, and then declare if the patient does look septic and have some criteria regardless of whether a source of infection is obvious. The criteria published in both 1991 and 2001 were criticized for having suboptimal performance,[3,4] because they both have high sensitivity but suffer from low specificity. The 2001 criteria had a slightly higher sensitivity but decreased specificity compared with the 1991 definitions. One study suggested that the 1991 criteria should not be used for clinical definition of sepsis because they fail to characterize this complex disease.[4]

### *Epidemiology*

The population-adjusted incidence of sepsis has increased over the past few decades, mostly because of an increase in age and immunosuppression.[5,6] In a 1994 study, the estimated hospital-wide incidence was 2 cases per 100 admissions or 2.8 per 1000 patient-days.[6] However, the current incidence of sepsis syndrome in the United States is 240 per 100,000 people, whereas the incidence of severe sepsis is between 51 and 95 patients per 100,000 people. Sepsis is more common in men and among nonwhite persons.[7] The incidence and mortality of sepsis and severe sepsis are higher in the winter because of respiratory infections.[8]

Gram-negative bacteria were the most common cause of sepsis until the mid-1980s, when they were surpassed by gram-positive organisms. The occurrence of fungal sepsis has been on the increase as well.[5] Although less prominent, viruses

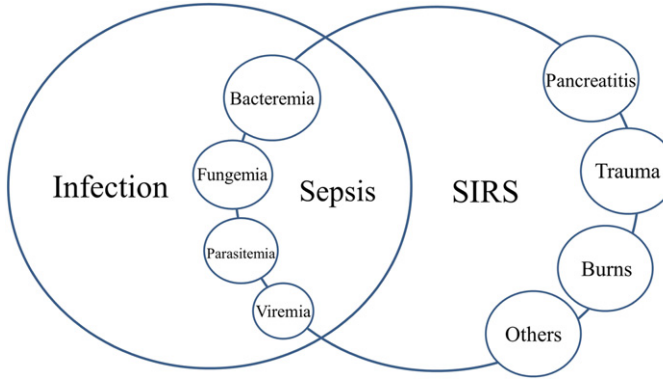


**Fig. 1.** The term systemic inflammatory response syndrome (SIRS) has been used to describe physiologic changes in response to infectious or noninfectious events such as pancreatitis, burns or trauma. (*Adapted from* ACCP/SCCM consensus conference: definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. Crit Care Med 1992;20:865; with permission.)