

bacterial meningitis must be given before or at the time of the first dose of antibiotic. Glucocorticoids can also be harmful, sometimes resulting in worse outcomes—e.g., when given in the setting of cerebral malaria or viral hepatitis.

SPECIFIC PRESENTATIONS

The infections considered below according to common clinical presentation can have rapidly catastrophic outcomes, and their immediate recognition and treatment can be life-saving. Recommended empirical therapeutic regimens are presented in [Table 147-1](#).

SEPSIS WITHOUT AN OBVIOUS FOCUS OF PRIMARY INFECTION

Patients initially have a brief prodrome of nonspecific symptoms and signs that progresses quickly to hemodynamic instability with hypotension, tachycardia, tachypnea, respiratory distress, and altered mental status. Disseminated intravascular coagulation (DIC) with clinical evidence of a hemorrhagic diathesis is a poor prognostic sign.

Septic Shock (See also [Chap. 325](#)) Patients with bacteremia leading to septic shock may have a primary site of infection (e.g., pneumonia, pyelonephritis, or cholangitis) that is not evident initially. Elderly patients with comorbid conditions, hosts compromised by malignancy and neutropenia, and patients who have recently undergone a surgical procedure or hospitalization are at increased risk for an adverse outcome. Gram-negative bacteremia with organisms such as *Pseudomonas aeruginosa* or *Escherichia coli* and gram-positive infection with organisms such as *Staphylococcus aureus* (including methicillin-resistant *S. aureus* [MRSA]) or group A streptococci can present as intractable hypotension and multiorgan failure. Treatment can usually be initiated empirically on the basis of the presentation, host factors ([Chap. 325](#)), and local patterns of bacterial resistance. Outcomes are worse when antimicrobial treatment is delayed or when the responsible pathogen ultimately proves not to be susceptible to the initial regimen. Broad-spectrum antimicrobial agents are therefore recommended and should be instituted rapidly, preferably within the first hour after presentation. Risk factors for fungal infection should be assessed, as the incidence of fungal septic shock is increasing. Biomarkers such as C-reactive protein and procalcitonin have not proved reliable diagnostically but, when measured over time, can facilitate appropriate de-escalation of therapy. Glucocorticoids should be considered only for patients with severe sepsis who do not respond to fluid resuscitation and vasopressor therapy.

Overwhelming Infection in Asplenic Patients (See also [Chap. 325](#))

Patients without splenic function are at risk for overwhelming bacterial sepsis. Asplenic adult patients succumb to sepsis at 58 times the rate of the general population. Most infections are thought to occur within the first 2 years after splenectomy, with a mortality rate of ~50%, but the increased risk persists throughout life. In asplenia, encapsulated bacteria cause the majority of infections. Adults, who are more likely to have antibody to these organisms, are at lower risk than children. *Streptococcus pneumoniae* is the most common isolate, causing 50–70% of cases, but the risk of infection with *Haemophilus influenzae* or *Neisseria meningitidis* is also high. Severe clinical manifestations of infections due to *E. coli*, *S. aureus*, group B streptococci, *P. aeruginosa*, *Bordetella holmesii*, and *Capnocytophaga*, *Babesia*, and *Plasmodium* species have been described.

Babesiosis (See also [Chap. 249](#)) A history of recent travel to endemic areas raises the possibility of infection with *Babesia*. Between 1 and 4 weeks after a tick bite, the patient experiences chills, fatigue, anorexia, myalgia, arthralgia, shortness of breath, nausea, and headache; ecchymosis and/or petechiae are occasionally seen. The tick that most commonly transmits *Babesia*, *Ixodes scapularis*, also transmits *Borrelia burgdorferi* (the agent of Lyme disease) and *Anaplasma*; coinfection can occur, resulting in more severe disease. Infection with the European species *Babesia divergens* is more frequently fulminant than that due to the U.S. species *Babesia microti*. *B. divergens* causes a febrile syndrome with hemolysis, jaundice, hemoglobinemia, and renal failure and is associated with a mortality rate of >40%. Severe babesiosis

is especially common in asplenic hosts but does occur in hosts with normal splenic function, particularly those >60 years of age and those with underlying immunosuppressive conditions such as HIV infection or malignancy. Complications include renal failure, acute respiratory failure, and DIC.

Other Sepsis Syndromes Tularemia ([Chap. 195](#)) is seen throughout the United States but occurs primarily in Arkansas, Missouri, South Dakota, and Oklahoma. This disease is associated with wild rabbit, tick, and tabanid fly contact. It can be transmitted by arthropod bite, handling of infected animal carcasses, consumption of contaminated food and water, or inhalation. The typhoidal form can be associated with gram-negative septic shock and a mortality rate of >30%, especially in patients with underlying comorbid or immunosuppressive conditions. Plague occurs infrequently in the United States ([Chap. 196](#)), primarily after contact with ground squirrels, prairie dogs, or chipmunks, but is endemic in other parts of the world, with >90% of all cases occurring in Africa. The septic form is particularly rare and is associated with shock, multiorgan failure, and a 30% mortality rate. These infections should be considered in the appropriate epidemiologic setting. The Centers for Disease Control and Prevention lists *Francisella tularensis* and *Yersinia pestis* (the agents of tularemia and plague, respectively) along with *Bacillus anthracis* (the agent of anthrax) as important organisms that might be used for bioterrorism ([Chap. 261e](#)).

SEPSIS WITH SKIN MANIFESTATIONS

(See also [Chap. 24](#)) Maculopapular rashes may reflect early meningococcal or rickettsial disease but are usually associated with nonemergent infections. Exanthems are usually viral. Primary HIV infection commonly presents with a rash that is typically maculopapular and involves the upper part of the body but can spread to the palms and soles. The patient is usually febrile and can have lymphadenopathy, severe headache, dysphagia, diarrhea, myalgias, and arthralgias. Recognition of this syndrome provides an opportunity to prevent transmission and to institute treatment and monitoring early on.

Petechial rashes caused by viruses are seldom associated with hypotension or a toxic appearance, although there can be exceptions (e.g., severe measles or arboviral infection). Petechial rashes limited to the distribution of the superior vena cava are rarely associated with severe disease. In other settings, petechial rashes require more urgent attention.

Meningococcemia (See also [Chap. 180](#))

Almost three-quarters of patients with *N. meningitidis* bacteremia have a rash. Meningococcemia most often affects young children (i.e., those 6 months to 5 years old). In sub-Saharan Africa, the high prevalence of serogroup A meningococcal disease has been a threat to public health for more than a century. Thousands of deaths occur annually in this area, which is known as the “meningitis belt,” and large epidemic waves occur approximately every 8–12 years. Serogroups W135 and X are also important emerging pathogens in Africa. In the United States, sporadic cases and outbreaks occur in day-care centers, schools (grade school through college, particularly among college freshmen living in residential halls), and army barracks. Household contacts of index cases are at 400–800 times greater risk of disease than the general population. Patients may exhibit fever, headache, nausea, vomiting, myalgias, changes in mental status, and meningismus. However, the rapidly progressive form of disease is not usually associated with meningitis. The rash is initially pink, blanching, and maculopapular, appearing on the trunk and extremities, but then becomes hemorrhagic, forming petechiae. Petechiae are first seen at the ankles, wrists, axillae, mucosal surfaces, and palpebral and bulbar conjunctiva, with subsequent spread on the lower extremities and to the trunk. A cluster of petechiae may be seen at pressure points—e.g., where a blood pressure cuff has been inflated. In rapidly progressive meningococcemia (10–20% of cases), the petechial rash quickly becomes purpuric (see [Fig. 70-5](#)), and patients develop DIC, multiorgan failure, and shock; 50–60% of these patients die, and survivors often require extensive debridement or amputation of gangrenous extremities.