The increased frequency of nosocomial endocarditis (15–30% of cases, depending on the series) reflects in part the increased use of intravascular devices. This form of endocarditis is most commonly caused by *S. aureus*. Because patients often are critically ill, are receiving antibiotics for various other indications, and have comorbid conditions, the diagnosis is often missed.

Urinary Tract Infections Urinary tract infections (UTIs) are infrequently caused by *S. aureus*. The presence of *S. aureus* in the urine generally suggests hematogenous dissemination. Ascending *S. aureus* infections occasionally result from instrumentation of the genitourinary tract.

Prosthetic Device–Related Infections *S. aureus* accounts for a large proportion of prosthetic device–related infections. These infections often involve intravascular catheters, prosthetic valves, orthopedic devices, peritoneal catheters, pacemakers, left-ventricular-assist devices, and vascular grafts. In contrast with the more indolent presentation of CoNS infections, *S. aureus* device-related infections are often more acute, with both localized and systemic manifestations. The latter infections also tend to progress more rapidly. It is relatively common for a pyogenic collection to be present at the device site. Aspiration of these collections and performance of blood cultures are important components in establishing a diagnosis. *S. aureus* infections tend to occur more commonly soon after implantation unless the device is used for access (e.g., intravascular or hemodialysis catheters). In the latter instance, infections can occur at any time. As in most prosthetic-device infections, successful therapy usually involves removal of the device. Left in place, the device is a potential nidus for either persistent or recurrent infections.

Infections Associated with Community-Acquired MRSA Although the skin and soft tissues are the most common sites of infection associated with CA-MRSA, 5–10% of these infections are invasive and can even be life-threatening. The latter unique infections, including necrotizing fasciitis, necrotizing pneumonia, and sepsis with Waterhouse-Friderichsen syndrome or purpura fulminans, were rarely associated with *S. aureus* prior to the emergence of CA-MRSA. These life-threatening infections reflect the increased virulence of CA-MRSA strains.

Toxin-Mediated Diseases • ***FOOD POISONING*** *S. aureus* is among the most common causes of foodborne outbreaks of infection in the United States. Staphylococcal food poisoning results from the inoculation of toxin-producing *S. aureus* into food by colonized food handlers. Toxin is then elaborated in such growth-promoting food as custards, potato salad, or processed meats. Even if the bacteria are killed by warming, the heat-stable toxin is not destroyed. The onset of illness is rapid, occurring within 1–6 h of ingestion. The illness is characterized by nausea and vomiting, although diarrhea, hypotension, and dehydration may also occur. The differential diagnosis includes diarrhea of other etiologies, especially that caused by similar toxins (e.g., the toxins elaborated by *Bacillus cereus*). The rapidity of onset, the absence of fever, and the epidemic nature of the presentation (without second-degree spread) arouse suspicion of staphylococcal food poisoning. Symptoms generally resolve within 8–10 h. The diagnosis can be established by the demonstration of bacteria or the documentation of enterotoxin in the implicated food. Treatment is entirely supportive.

TOXIC SHOCK SYNDROME TSS gained attention in the early 1980s, when a nationwide outbreak occurred in the United States among young, otherwise healthy, menstruating women. Epidemiologic investigation demonstrated that these cases were associated with the use of a highly absorbent tampon that had recently been introduced to the market. Subsequent studies established the role of TSST-1 in these illnesses. Withdrawal of the tampon from the market resulted in a rapid decline in the incidence of this disease. However, menstrual and nonmenstrual cases continue to be reported. Nonmenstrual cases are frequently seen in patients with surgical or postpartum wound infections.

The clinical presentation is similar in menstrual and nonmenstrual TSS. Evidence of clinical *S. aureus* infection is not a prerequisite.

TABLE 172-2 CASE DEFINITION OF *S. AUREUS* TOXIC SHOCK SYNDROME

1. Fever: temperature of ≥38.9°C (≥102°F)
2. Hypotension: systolic blood pressure of ≤90 mmHg or orthostatic hypotension (orthostatic drop in diastolic blood pressure by ≥15 mmHg, orthostatic syncope, or orthostatic dizziness)
3. Diffuse macular rash, with desquamation 1–2 weeks after onset (including the palms and soles)
4. Multisystem involvement
   a. Hepatic: bilirubin or aminotransferase levels ≥2 times normal
   b. Hematologic: platelet count ≤100,000/μL
   c. Renal: blood urea nitrogen or serum creatinine level ≥2 times the normal upper limit
   d. Mucous membranes: vaginal, oropharyngeal, or conjunctival hyperemia
   e. Gastrointestinal: vomiting or diarrhea at onset of illness
   f. Muscular: severe myalgias or serum creatine phosphokinase level ≥2 times the normal upper limit
   g. Central nervous system: disorientation or alteration in consciousness without focal neurologic signs and in the absence of fever and hypotension
5. Negative serologic or other tests for measles, leptospirosis, and Rocky Mountain spotted fever as well as negative blood or cerebrospinal fluid cultures for organisms other than *S. aureus*

Source: M Wharton et al: Case definitions for public health surveillance. MMWR 39:1, 1990; with permission.

TSS results from the elaboration of an enterotoxin or the structurally related enterotoxin-like TSST-1. More than 90% of menstrual cases are caused by TSST-1, whereas a high percentage of nonmenstrual cases are caused by enterotoxins. TSS begins with relatively nonspecific flu-like symptoms. In menstrual cases, the onset usually comes 2 or 3 days after the start of menstruation. Patients present with fever, hypotension, and erythroderma of variable intensity. Mucosal involvement is common (e.g., conjunctival hyperemia). The illness can rapidly progress to symptoms that include vomiting, diarrhea, confusion, myalgias, and abdominal pain. These symptoms reflect the multisystemic nature of the disease, with involvement of the liver, kidneys, gastrointestinal tract, and/or CNS. Desquamation of the skin occurs during convalescence, usually 1–2 weeks after the onset of illness. Laboratory findings may include azotemia, leukocytosis, hypoalbuminemia, thrombocytopenia, and liver function abnormalities.

Diagnosis of TSS still depends on a constellation of findings rather than one specific finding and on a lack of evidence of other possible infections (Table 172-2). Other diagnoses to be considered are drug toxicities, viral exanthems, Rocky Mountain spotted fever, sepsis, and Kawasaki disease. Illness occurs only in persons who lack antibody to TSST-1. Recurrences are possible if antibody fails to develop after the illness.

STAPHYLOCOCCAL SCALDED-SKIN SYNDROME SSSS primarily affects newborns and children. The illness may vary from a localized blister to exfoliation of much of the skin surface. The skin is usually fragile and often tender, with thin-walled, fluid-filled bullae. Gentle pressure results in rupture of the lesions, leaving denuded underlying skin (*Nikolsky's sign*; Fig. 172-4). The mucous membranes are usually spared. In more generalized infection, there are often constitutional symptoms, including fever, lethargy, and irritability with poor feeding. Significant amounts of fluid can be lost in more extensive cases. Illness usually follows localized infection at one of a number of possible sites. SSSS is much less common among adults but can follow infections caused by exfoliative toxin–producing strains.

PREVENTION

Primary prevention of *S. aureus* infections in the hospital setting involves hand washing and careful attention to appropriate isolation procedures. Through careful screening for MRSA carriage and strict isolation practices, several Scandinavian countries have been remarkably