

Diagnostic Approach to Bloodstream Infections

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Description

Blood stream infections include infective endocarditis, central venous catheter associated bloodstream infections, primary bacteremia and those with secondary bacteremia due to focal infections including abscesses, osteomyelitis, urinary tract infections or pneumonia. Bloodstream infection is a major cause of morbidity and mortality despite the availability of broad spectrum and effective antimicrobials and major advances in supportive care. Bacterial endocarditis accounts for approximately 3%-8% of cases of bloodstream infections.

Infectious pathogens reach the bloodstream by direct invasion into blood vessels *via* lymphatic vessels draining a focus of infection or through vascular devices such as needles or catheters. It may also occur without a clearly identifiable mechanism, for example, in some cases of complicated community-acquired *S. aureus* bacteremia. The spleen is major immunize organ for responding to invasive pathogens reaching the bloodstream. Sterilization and clearance of viable bacteria from the bloodstream and from the original source of infection is crucial in improving those physiological parameters of systemic inflammatory response syndrome. Beside source removal and the institution of specific antimicrobial therapy, the goal of treating a patient with sepsis is to maintain cellular oxygenation *via* support of organ perfusion.

Blood cultures are usually obtained along with clinical investigations to search for a focus of infection and therefore provide specific antimicrobial therapy. Blood cultures should not be routinely ordered for adult patients with isolated fever or leucocytosis without considering factors such as the presence of systemic inflammatory response syndrome or the presence of chills, both of which raise the pretest probability of blood cultures yielding bacteremia in the right clinical setting.

The term "endovascular infection" is often used to refer to a condition where there is continuous bacteremia despite the institution of adequate antimicrobial therapy. Although *S. aureus* may use vascular endothelial cells to thrive and produce a true endovascular infection, this term should be reserved for infection of the wall of large

vessels belonging to the systemic, pulmonary or venous system and often producing aneurysms, pseudoaneurysms or even arteriovenous fistulae. Common bacterial pathogens that cause endovascular infections include. *Salmonella*, *Abiotrophia* and *Granulicatella* species. *Mycobacterium bovis* is the form of BCG infusion for bladder carcinomas has been also associated with endovascular infections. In this context, infection of the endocardium/cardiac valves as part of endocarditis should be considered within the spectrum of endovascular infections. In summary, although continuous or persistent bacteremia despite institution of therapy is a feature of endovascular infections, this group of infections implies infection of the wall of a large vessel or the endocardium.

Many bloodstream infections are linked to intravascular access devices. Among them, central-line-associated bloodstream infection is associated with increased length of hospital stay and increased inpatient mortality. The term catheter-related blood-stream infection encompasses not only central-line-associated blood-stream infection but also long-term indwelling catheters used for parenteral nutrition, chemotherapy, outpatient antibiotic infusions or other drugs for chronic medical conditions. Central-line-associated blood-stream infection terminology is used mostly for surveillance purposes, whereas catheter-related blood-stream infections is used clinically when diagnosing or treating patients. The definition of catheter-related blood-stream infection includes the presence of bacteremia or fungemia in a patient who has an intravascular catheter, with clinical signs of infection and the absence of other source of infection. Other criteria that assist clinicians in diagnosing Catheter-related blood-stream infection and this, the likely need of catheter removal is a positive quantitative or semi-quantitative catheter tip culture, quantitative blood culture or a differential time to positivity. Long term catheters should be removed in cases of bloodstream infections with *S. aureus*, *Pseudomonas aeruginosa*, *Fusarium*, *Candida* or nontuberculous mycobacteria regardless of disease severity. Short-term catheters including central lines should also be removed in most cases of suspected infection, particularly if the patient is developing sepsis/septic shock.