



Complete Summary

GUIDELINE TITLE

Guideline for the management of intravascular catheter-related infections.

BIBLIOGRAPHIC SOURCE(S)

Mermel LA, Farr BM, Sherertz RJ, Raad II, O'Grady N, Harris JS, Craven DE.
Guidelines for the management of intravascular catheter-related infections. Clin Infect Dis 2001 May 1; 32(9):1249-72. [210 references]

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COMPLETE SUMMARY CONTENT

SCOPE

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INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT

CATEGORIES

IDENTIFYING INFORMATION AND AVAILABILITY

SCOPE

DISEASE/CONDITION(S)

Intravascular catheter-related infections

GUIDELINE CATEGORY

Diagnosis
Management
Treatment

CLINICAL SPECIALTY

Critical Care
Family Practice
Infectious Diseases
Internal Medicine
Nursing
Pediatrics

INTENDED USERS

Advanced Practice Nurses
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

To present recommendations for the management of adults and children with, and diagnosis of infections related to, peripheral and nontunneled central venous catheters, pulmonary artery catheters, tunneled central catheters, and implantable devices

TARGET POPULATION

Patients with intravascular catheters or implantable devices

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis

1. Clinical findings, such as fever, chills, inflammation or purulence, and positive blood culture results
2. Rapid diagnostic techniques, such as Gram staining or acridine orange leukocyte cyto-spin
3. Cultures of samples of intravenous catheters using semiquantitative (roll plate) or quantitative (vortex or sanitation methods) culture techniques
4. Paired cultures of blood drawn through the intravenous catheter and percutaneously
5. Quantitative cultures of peripheral and central venous catheter blood samples
6. Differential time to positivity for central venous catheter versus peripheral blood cultures
7. Quantitative broth cultures of catheters (considered but not recommended)

Management

1. Antimicrobial therapy, such as amphotericin B, ampicillin, aztreonam, carbapenem, cefazolin, cefepime, cefuroxime, ceftriaxone, ceftazidime, clavulanate, ciprofloxacin, fluconazole, gentamicin, imipenem, ketoconazole, levofloxacin, linezolid, meropenem, methicillin, mezlocillin, nafcillin, penicillin, penicillin G, piperacillin, quinupristin/dalfopristin, rifampin, sulbactam, ticarcillin, tobramycin, trimethoprim-sulfamethoxazole, and vancomycin
2. Antibiotic lock therapy

3. Removal of central venous catheter or implantable device
4. Transesophageal and transthoracic echocardiography to evaluate for infective endocarditis
5. Evaluation for complications, such as septic thrombosis, infective endocarditis, and other metastatic infections
6. Thrombolytic therapy, such as streptokinase (considered but not recommended)

MAJOR OUTCOMES CONSIDERED

- Sensitivity and specificity of diagnostic techniques
- Relapse-free period after therapy
- Patient morbidity and mortality
- Incidence of complications, such as septic thrombosis and persistent bloodstream infection and infective endocarditis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Grades reflecting the quality of evidence on which recommendations are based

- I. Evidence from at least one properly randomized, controlled trial
- II. Evidence from at least one well-designed clinical trial without randomization, from cohort or case-controlled analytic studies (preferably from more than one center), from multiple time-series studies, or from dramatic results of uncontrolled experiments
- III. Evidence from opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Strength of recommendation:

- A. Good evidence to support a recommendation for use
- B. Moderate evidence to support a recommendation for use
- C. Poor evidence to support a recommendation
- D. Moderate evidence to support a recommendation against use
- E. Good evidence to support a recommendation against use

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Each recommendation includes a ranking for the strength and the quality of evidence supporting it, as well as performance indicators. Definitions of the levels of evidence (I-III) and grades of recommendation (A-E) are repeated at the end of the Major Recommendations field.

General Recommendations for the Diagnosis and Management of Catheter-related Infections

Culture of catheters

1. Culture of catheters should be done only when catheter-related bloodstream infection is suspected (B-II) (Maki & Mermel, 1998; Siegman-Igra et al., 1997).
2. Quantitative or semiquantitative cultures of catheters are recommended (A-II) (Sherertz, Heard, & Raad, 1997; Siegman-Igra et al., 1997).
3. Qualitative broth cultures of catheters are not recommended (E-II) (Siegman-Igra et al., 1997; Brun-Buisson et al., 1987; Maki, Weise, & Sarafin, 1977).
4. When culturing a central venous catheter segment, either the catheter tip or a subcutaneous segment should be submitted for culture (B-III) (Sherertz, Heard, & Raad, 1997).
5. For suspected pulmonary artery catheter infection, culture of the introducer tip should be done because it provides a higher yield, in comparison with the pulmonary artery catheter tip (A-II) (Mermel & Maki, 1997).
6. If available, acridine orange leukocyte cytospin should be considered for rapid diagnosis of central venous catheter infection (B-II) (Kite et al., 1999).

Culture of blood samples

1. Two sets of blood samples for culture, with at least 1 drawn percutaneously, should be obtained from all patients with a new episode of suspected central venous catheter-related bloodstream infection (A-II) (Siegman-Igra et al., 1997; Mermel & Maki, 1997; DesJardin, 1999; Dunne Jr, Nolte, & Wilson, 1997; Fan, Teoh-Chan, & Lau, 1989; Blot et al., 1998; Blot et al., 1999).
2. Paired quantitative blood cultures or paired qualitative blood cultures with a continuously monitored differential time to positivity are recommended for the diagnosis of catheter-related infection, especially when the long-term catheter cannot be removed (A-II) (Siegman-Igra et al., 1997; DesJardin, 1999; Fan, Teoh-Chan, & Lau, 1989; Blot et al., 1998; Blot et al., 1999).

Specific Recommendations for the Diagnosis and Management of Catheter-related Infections

Peripheral venous catheters

1. If there is suspicion of short-term peripheral catheter infection, the catheter should be removed, the tip should be cultured by use of a semiquantitative method, and 2 separate blood samples should be obtained for culture before starting antibiotic therapy (A-II) (Maki, Weise, & Sarafin, 1977).
2. If there are signs of local infection, any exudate at the exit site should be submitted for Gram stain and culture (A-II) (Maki & Mermel, 1998).

Nontunneled central venous catheters

1. Central venous catheters in patients with fever and mild to moderate disease should not routinely be removed (D-III) (Rello, Coll, & Prats, 1992).
2. Central venous catheters should be removed and cultured if the patient has erythema or purulence overlying the catheter exit site, or clinical signs of sepsis (B, III) (Mermel & Maki, 1997; Kristinsson, 1997); if blood culture results are positive or if the central venous catheter is exchanged over the guidewire and has significant colonization according to results of quantitative

- or semiquantitative cultures, the catheter should be removed and placed into a new site (B-III) (Pettigrew et al., 1985; Armstrong et al., 1986).
3. In some patients without evidence of persistent bloodstream infection, or if the infecting organism is a coagulase-negative staphylococcus, and if there is no suspicion of local or metastatic complications, the central venous catheter may be retained (C-III) (Raad et al., 1992).
 4. If not contraindicated, transesophageal echocardiography should be done to rule out vegetations in patients with catheter-related *Staphylococcus aureus* bloodstream infection because of recently reported high rates of complicating endocarditis (B-II) (Li et al., 2000; Hartstein, Mulligan, & Morthland, 1992; Rosen et al., 1999; Fowler et al., 1997); if transesophageal echocardiography is not available and results of transthoracic echocardiography are negative, the duration of therapy should be decided clinically for each patient
 5. After removal of a colonized catheter associated with bloodstream infection, if there is persistent bacteremia or fungemia, or a lack of clinical improvement (especially if it is >3 days after catheter withdrawal and initiation of appropriate antimicrobial therapy), aggressive evaluation for septic thrombosis, infective endocarditis, and other metastatic infections should ensue (B-III).
 6. Febrile patients with valvular heart disease or those patients with neutropenia whose catheter tip culture reveals significant growth of *Staphylococcus aureus* or *Candida* species on semiquantitative or quantitative culture in the absence of bloodstream infection, should be followed closely for development of infection, and samples of blood for culture should be obtained accordingly (B-II) (Sherertz, Heard, & Raad, 1997; Peacock et al., 1998; Arnow, Quimosing, & Beach, 1993).
 7. After catheters have been removed from patients with catheter-related bloodstream infection, nontunneled catheters may be reinserted after appropriate systemic antimicrobial therapy is begun (C-III).

Tunneled central venous catheters and implantable devices

1. Clinical assessment is recommended to determine that the central venous catheter or the implantable device is the source of infection or bloodstream infection (B-III; see figure 3 in the guideline document) (Mayhall, 1992; Raad, 1998; Velez et al., 1992)
2. For complicated infections, the central venous catheter or the implantable device should be removed (B-II) (Dugdale & Ramsey, 1990).
3. For salvage of the central venous catheter or the implantable device in patients with uncomplicated infections, antibiotic lock therapy should be used for 2 weeks with standard systemic therapy for treatment of catheter-related bacteremia due to *Staphylococcus aureus*, coagulase-negative staphylococci, and gram-negative bacilli for suspected intraluminal infection in the absence of tunnel or pocket infection (B-II) (Gaillard et al., 1990; Rao et al., 1992; Messing et al., 1990; Capdevila et al., 1995; Capdevila et al., 1993; Capdevila et al., 1994; Krzywda et al., 1995; Andris et al., 1998; Domingo et al., 1999).
4. Tunneled catheter pocket infections or port abscess require removal of catheter and usually 7–10 days of appropriate antibiotic therapy (C-III).
5. Reinsertion of tunneled intravascular devices should be postponed until after appropriate systemic antimicrobial therapy is begun, based on susceptibilities of the bloodstream isolate, and after repeat cultures of blood samples yield

negative results (B-III); if time permits, insertion of a tunneled intravascular catheter in a stable patient ideally should be done after a systemic antibiotic course of therapy is completed and repeat blood samples drawn 5–10 days later yield negative results (C-III)

Hemodialysis catheters

1. Vancomycin use for methicillin-susceptible *Staphylococcus aureus* bloodstream infections is not recommended because of the risk of selecting out vancomycin-resistant organisms; antistaphylococcal penicillinase-resistant penicillin (nafcillin or oxacillin) is recommended; furthermore, glycopeptides are inferior to antistaphylococcal penicillins (B-III) (Gibson & Mosquera, 1991; Rello et al., 1989; Saltissi & Macfarlane, 1994; Carlisle et al., 1991).
2. Antibiotic lock therapy is recommended for treatment when the catheter is retained (B-III; see table 7 in the guideline document)
3. Catheter-related, coagulase-negative staphylococcal bloodstream infection can be treated without removal of the catheter, but this may require longer duration of therapy (B-II) (Gibson & Mosquera, 1991; Rello et al., 1989; Carlisle et al., 1991; Kairraitis & Gottlieb, 1999).
4. In addition to intravenous antimicrobial therapy and catheter removal for catheter-related bloodstream infection, culture of the nares for *Staphylococcus aureus* and treatment of carriers with mupirocin ointment (2%) are recommended for those patients who will need intravenous access (B-II) (Boelaert et al., 1993; Holton et al., 1991; Watanakunokorn et al., 1992; Reagan et al., 1991).

Recommendations for the Management of Intravenous Catheter–Related Bloodstream Infection Caused by Specific Microorganisms

See also Table 4 in the guideline.

Coagulase-negative staphylococci

1. Treat empirically with vancomycin and change to semisynthetic penicillin if the isolate is susceptible (A-II) (Chambers, Miller, & Newman, 1988; Archer, 2000).
2. Combination therapy with vancomycin plus gentamicin or rifampin is not recommended for routine therapy (D-III) (Massanari & Donta, 1978; Vasquez & Archer, 1980; Karchmer, Archer, & Dismukes, 1983; Kobasa et al., 1983).
3. If the central venous catheter is removed, appropriate systemic antibiotic therapy is recommended for 5–7 days (B-III) (Herrmann & Peters, 1997).
4. If nontunneled central venous catheter is retained and intraluminal infection is suspected, systemic antibiotic therapy for 10–14 days and antibiotic lock therapy are recommended (B-III) (Rao et al., 1992; Messing et al., 1990; Capdevila et al., 1995; Capdevila et al., 1993; Capdevila et al., 1994; Krzywda et al., 1995; Benoit et al., 1995).
5. A tunneled central venous catheter or an implantable device can be retained, if necessary, in patients with uncomplicated, catheter-related, bloodstream infection (C-III) (Raad et al., 1992); if the central venous catheter or the implantable device is retained, patients should be treated with systemic antibiotic therapy for 7 days and with antibiotic lock therapy for 14 days (B-

- II; see figure 4 in the guideline document) (Gaillard et al., 1990; Rao et al., 1992; Messing et al., 1990; Capdevila et al., 1995; Capdevila et al., 1993; Capdevila et al., 1994; Krzywda et al., 1995; Andris et al., 1998; Benoit et al., 1995)
6. Treatment failure that manifests as persistent fever, persistent positive blood culture results, or relapse of infection after antibiotics have been discontinued is a clear indication for removal of the catheter (A-II) (Malanoski et al., 1995; Fowler et al., 1998; Nguyen et al., 1995).

Staphylococcus aureus

1. Beta-lactam antibiotics should be first choice for parenteral treatment of Staphylococcus aureus bacteremia when the isolate is susceptible; for patients with penicillin allergy without anaphylaxis or angioedema, first-generation cephalosporins, such as cefazolin, can be used without allergic response in 90%; for patients with serious allergy to beta-lactams and for those with methicillin-resistant Staphylococcus aureus, vancomycin is the drug of choice (A-II) (Chambers, Miller, & Newman, 1988; Hospital Infection Control Practices and Advisory Committee [HICPAC], 1995; Small & Chambers, 1990; Levine, Fromm, & Reddy, 1991).
2. Vancomycin should not be used when infection with beta-lactam-susceptible Staphylococcus aureus is diagnosed; excessive vancomycin use selects vancomycin-resistant organisms; vancomycin has higher failure rates than do either oxacillin or nafcillin, and it results in slower clearance of bacteremia among patients with Staphylococcus aureus endocarditis (D-III) (Hartstein, Mulligan, & Morthland, 1992; Chambers, Miller, & Newman, 1988; Hospital Infection Control Practices and Advisory Committee [HICPAC], 1995; Small & Chambers, 1990; Levine, Fromm, & Reddy, 1991).
3. Nontunneled central venous catheters suspected to be the source of Staphylococcus aureus bacteremia should be removed, and a new catheter should be reinserted at a different site (B-II) (Fowler et al., 1997; Malanoski et al., 1995; Fowler et al., 1998; Libman & Arbeit, 1984).
4. Tunneled central venous catheters or implantable devices should be removed if there is evidence of tunnel, pocket, or exit-site infection (B-II) (Dugdale & Ramsey, 1990; Benezra et al., 1988).
5. Transesophageal echocardiography should be done for patients without contraindications, to identify those who have complicating endocarditis that requires therapy for 4–6 weeks (B-II) (Rosen et al., 1999; Fowler et al., 1997).
6. Sensitivity of transthoracic echocardiography is low and thus is not recommended for excluding a diagnosis of catheter-related endocarditis if transesophageal echocardiography can be done (B-II) (Rosen et al., 1999; Fowler et al., 1997).
7. Patients who have negative transesophageal echocardiography results and from whom the catheter is removed should be treated for 14 days with systemic antibiotic therapy (B-II) (Rosen et al., 1999; Fowler et al., 1997).
8. Tunneled central venous catheters or implantable devices with uncomplicated intraluminal infection and Staphylococcus aureus bacteremia should be removed or, in selected cases, retained and treated with appropriate systemic and antibiotic lock therapy for 14 days (B-II) (Capdevila et al., 1995; Williams et al., 1994; Rubin et al., 1999).

Gram-negative bacilli and miscellaneous pathogens

1. Patients with catheter-related, gram-negative bacteremia with nontunneled central venous catheters and no evidence of septic thrombosis or endocarditis should have the catheter removed and should receive appropriate antimicrobial therapy for 10–14 days (B-III) (Elting & Bodey, 1990; Seifert, Strate, & Pulverer, 1995).
2. Patients with tunneled central venous catheters or implantable devices that cannot be removed, who have suspected catheter-related, gram-negative bacteremia without associated organ dysfunction, hypoperfusion, or hypotension, can be treated for 14 days with systemic and antibiotic lock therapy (B-III) (Capdevila et al., 1993); quinolones, such as ciprofloxacin with or without rifampin, may be preferred because they can be given orally and because they have been shown to eradicate gram-negative bacilli from foreign bodies in animal models (C-III) (Widmer et al., 1991; Ishida et al., 1998; Ashby et al., 1994).
3. For episodes of bacteremia due to *Pseudomonas* species other than *Pseudomonas aeruginosa*, *Burkholderia cepacia*, *Stenotrophomonas* species, *Agrobacterium* species, and *Acinetobacter baumannii*, serious consideration should be given to catheter removal, especially if bacteremia continues despite appropriate antimicrobial therapy or if the patient becomes unstable (A-III) (Elting & Bodey, 1990; Seifert, Strate, & Pulverer, 1995; Voss, 1997).
4. Empirical antimicrobial therapy for suspected gram-negative, catheter-related bloodstream infection should include drugs that are active against *Pseudomonas aeruginosa*, especially in patients with neutropenia (C-III) (Seifert, 1997).
5. For patients with prolonged bacteremia after appropriate antimicrobial therapy and catheter removal, especially in the presence of underlying valvular heart disease, 4–6 weeks of antibiotic therapy should be undertaken (C-III) (Seifert, 1997).
6. Because the vast majority of catheter-related bloodstream infections caused by *Bacillus* and *Corynebacterium* species require catheter removal, catheters should be removed in these instances (A-II) (Voss, 1997; Gill, Klein, & Cunnha, 1996).
7. Intravenous catheter-related infections due to mycobacteria, such as *Mycobacterium fortuitum* and *Mycobacterium chelonae*, require catheter removal (A-II).

Candida albicans and other fungi

1. All patients with candidemia should be treated; amphotericin B is recommended for suspected catheter-related candidemia in patients who are hemodynamically unstable or who have received prolonged fluconazole therapy (A-I); patients who are hemodynamically stable and who have not had recent therapy with fluconazole, or those who have a fluconazole-susceptible organism, can be treated with fluconazole instead of amphotericin B (A-II) (Rex et al., 1994; Rex et al., 2000).
2. Duration of antifungal treatment for candidemia should be for 14 days after the last positive blood culture result and when signs and symptoms of infection have resolved (A-III) (Rex et al., 1994; Rex et al., 1995).

3. Catheter-related *Candida krusei* infections should be treated with amphotericin B (A-II) (Voss, 1997; Gill, Klein, & Cunha, 1996; Pittet, Hulliger, & Auckenthaler, 1995).
4. Tunneled central venous catheters or implantable devices should be removed in the presence of documented catheter-related fungemia (A-II) (Kiehn & Armstrong, 1990; Rex et al., 1995; Edwards et al., 1997).
5. Salvage therapy for infected tunneled central venous catheters or implantable devices is not recommended for routine use, because salvage rates with systemic fungal therapy and antibiotic lock therapy for *Candida* species have been in the 30% range (D-II) (Krzywda et al., 1995; Benoit et al., 1995; Johnson, Johnson, & Goldman, 1994; Arnow & Kushner, 1991).
6. Treatment of catheter-related bloodstream infection due to *Malassezia furfur* includes discontinuation of intralipids and removal of intravascular catheter, especially with nontunneled catheter infections (B-III) (Marcon & Powell, 1992; Barber et al., 1993).
7. Patients with catheter-related *Malassezia furfur* fungemia should be treated with amphotericin B (B-III) (Marcon & Powell, 1992).

Recommendations for the Management of Intravenous Device–related Complications

Septic thrombosis

1. In all cases, the involved catheter should be removed (A-II) (Maki & Mermel, 1998; Verghese, Widrich, & Arbeit, 1985; Strinden, Helgerson, & Maki, 1985; Topiel et al., 1986; Kaufman et al., 1986).
2. Incision and drainage and excision of the infected peripheral vein and any involved tributaries should be done, especially when there is suppuration, persistent bacteremia or fungemia, or metastatic infection, in conjunction with appropriate antibiotic therapy (B-III) (Fry, Fry, & Borzotta, 1994; Andes et al., 1998).
3. Surgical exploration is needed when infection extends beyond the vein into surrounding tissue (B-II) (Verghese, Widrich, & Arbeit, 1985).
4. Surgical excision and repair is needed in cases of peripheral arterial involvement with pseudoaneurysm formation (A-III) (Maki et al., 1979; Falk et al., 1992).
5. Heparin should be used in the treatment of septic thrombosis of the great central veins and arteries (A-II) (Verghese, Widrich, & Arbeit, 1985; Strinden, Helgerson, & Maki, 1985; Topiel et al., 1986) but it is not indicated for the routine management of septic thrombosis of the peripheral veins (D-III) (Torres-Rojas et al., 1982; Walsh et al., 1986; Garrison, Richardson, & Fry, 1982).
6. Duration of antimicrobial therapy for septic thrombosis of great central veins should be same as that for endocarditis (4–6 weeks); in most cases, vein excision is not required (D-III) (Strinden, Helgerson, & Maki, 1985; Kaufman et al., 1986).
7. For septic thrombosis of the great central vein due to *Candida* species, a prolonged course of amphotericin B therapy has been shown to be effective and is recommended; fluconazole can be used if the strain is susceptible (A-II) (Strinden, Helgerson, & Maki, 1985).

8. Use of thrombolytic agents in addition to antimicrobial agents in patients with catheter-related bloodstream infection and thrombus formation is not recommended (E-I) (Atkinson, Chamberlin, & Boody, 1998).

Persistent bloodstream infection and infective endocarditis

1. For nontunneled catheters and in most instances involving long-term catheters, persistent bacteremia or fungemia warrants removal of the device (A-II) (Malanoski et al., 1985; Fowler et al., 1998; Nguyen et al., 1995).
2. Patients with repeatedly positive blood culture results and/or unchanged clinical status for 3 days after catheter removal should be treated presumptively for endovascular infection for ≥ 4 weeks of antimicrobial therapy in most cases and with surgical intervention when indicated (B-II) (Raad, 1992; Wilson et al., 1995).
3. Empirical therapy in this situation must include coverage for staphylococci (A-II) (Fang et al., 1993; Lamas & Evkyn, 1998; Fernandez-Guerrero et al., 1995; Terpenning, Buggy, & Kaufman, 1988).
4. For uncomplicated right-side (tricuspid valve) endocarditis due to staphylococci in injection drug users, a 2-week duration of antimicrobial therapy with use of penicillinase-resistant penicillin for susceptible isolates, with or without gentamicin, appears to be effective (B-I) (Reagan et al., 1991; Wilson et al., 1995; Torres-Tortosa et al., 1994; Ribera et al., 1996).
5. With rare exception, *Candida* endocarditis will require surgical intervention in addition to antimicrobial therapy (A-III) (Hogevik & Alestig, 1996).

Definitions of Strength of Recommendation and Quality of Evidence Ratings

Quality of evidence

- I. Evidence from at least one properly randomized, controlled trial
- II. Evidence from at least one well-designed clinical trial without randomization, from cohort or case-control analytic studies (preferably from more than one center), from multiple time-series studies, or from dramatic results of uncontrolled experiments
- III. Evidence from opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees

Strength of recommendation

- A. Good evidence to support a recommendation for use
- B. Moderate evidence to support a recommendation for use
- C. Poor evidence to support a recommendation
- D. Moderate evidence to support a recommendation against use
- E. Good evidence to support a recommendation against use

CLINICAL ALGORITHM(S)

The original guideline contains clinical algorithms for:

1. Diagnosis of acute fever in a patient suspected of having nontunneled central venous catheter infection
2. Management of patients with nontunneled central venous catheter-related bloodstream infection
3. Management points for a patient with bloodstream infection and a tunneled central venous catheter or an implantable device
4. Management of a patient with a tunneled central venous catheter or a surgically implanted device-related bloodstream infection

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

[References open in a new window](#)

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

More than 200,000 nosocomial bloodstream infections occur each year in the United States, most of these infections are related to different types of intravascular devices. Infection related to intravenous devices results in significant increases in hospital costs, duration or hospitalization, and patient morbidity. Accurate diagnosis and management of catheter-related bacteremia and associated complications can lead to a reduction in patient morbidity and mortality.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

Because the pathogenesis of catheter-related infections is complicated, the virulence of the pathogens is variable, and the host factors have not been well defined, there is a notable absence of compelling clinical data to make firm recommendations for an individual patient. Therefore, the recommendations in these guidelines are intended to support, and not replace, good clinical judgment.

Pediatric Considerations

Management of intravascular catheter-related infections in infants and children is challenging. Most of the recommendations given in the guideline document for adults are also applicable to children, but removal of a catheter may not be feasible for infants and young children, especially neonates. Indications for catheter removal in children remain controversial and warrant further evaluation. Those children who are treated without catheter removal should be closely monitored, and the device should be removed in clinical deterioration occurs.

Conventional treatment for intravascular catheter-related infection has not been established to be different than that which has previously been described for adults (see Table 4 and Figures 1-4 in the original guideline document) but certain procedures may not apply to infants and young children. For example, transesophageal echocardiography, as noted in Figures 2 and 4 in the guideline, is not commonly used in small infants and children who have central venous catheter-related bloodstream infection without other indicators of endocarditis. Finally, optimal duration of therapy has not been established for the treatment of catheter-related infections in children with or without catheter removal.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

The guideline developers list the following performance indicators for guideline implementation:

1. Assess whether the medical staff (physicians and nurses) are aware of the guidelines
2. Distribute copies of the guidelines to all medical staff and have them acknowledge that they have read them
3. Monitor compliance with the guidelines at individual institutions

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

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ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2001 May

GUIDELINE DEVELOPER(S)

American College of Critical Care Medicine - Professional Association
Infectious Diseases Society of America - Medical Specialty Society
Society for Healthcare Epidemiology of America - Professional Association
Society of Critical Care Medicine - Professional Association

GUIDELINE DEVELOPER COMMENT

This guideline was prepared jointly by the Intravenous Guideline Subcommittee of the Infectious Diseases Society of America, the American College of Critical Care Medicine (for the Society of Critical Care Medicine), and the Society for Healthcare Epidemiology of America.

SOURCE(S) OF FUNDING

Not stated

GUIDELINE COMMITTEE

Intravenous Guideline Subcommittee of the Infectious Diseases Society of America, the American College of Critical Care Medicine (for the Society of Critical Care Medicine), and the Society for Healthcare Epidemiology of America.

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Committee Members: Leonard A. Mermel; Barry M. Farr; Robert J. Sherertz; Issam I. Raad; Naomi O'Grady; JoAnn S. Harris; Donald E. Craven.

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

An update is not in progress at this time.

GUIDELINE AVAILABILITY

Electronic copies: Available (in HTML and PDF format) from the [Infectious Diseases Society of America \(IDSA\) Web site](#).

Print copies: Available from Infectious Diseases Society of America, 66 Canal Center Plaza, Suite 600, Alexandria, VA 22314.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Kish MA. Guide to development of practice guidelines. Clin Infect Dis 2001; 32: 851-4.
- Gross PA. Practice guidelines for infectious diseases: Rationale for a work in progress. Clin Infect Dis. 1998 May; 26(5): 1037-41.
- Gross PA, Barrett TL, Dellinger EP, Krause PJ, Martone WJ, McGowan JE Jr, Sweet RL, Wenzel RP. Purpose of quality standards for infectious diseases. Infectious Diseases Society of America. Clin Infect Dis 1994 Mar; 18(3): 421.

Electronic copies: Available from the [Infectious Diseases Society of American \(IDSA\) Web site](#).

Print copies: Available from Infectious Diseases Society of America, 66 Canal Center Plaza, Suite 600, Alexandria, VA 22314.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on September 17, 2001. The information was verified by the guideline developer as of November 21, 2001.

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FIRST GOV

