Complete Summary

GUIDELINE TITLE

Prevention of infective endocarditis: guidelines from the American Heart Association.

BIBLIOGRAPHIC SOURCE(S)

Wilson W, Taubert KA, Gewitz M, Lockhart PB, Baddour LM, Levison M, Bolger A, Cabell CH, Takahashi M, Baltimore RS, Newburger JW, Strom BL, Tani LY, Gerber M, Bonow RO, Pallasch T, Shulman ST, Rowley AH, Burns JC, Ferrieri P, Gardner T, Goff D, Durack DT, American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease, American Heart Association Council on Cardiovascular Disease in the Young, American Heart Association Council on Clinical Cardiology, American Heart Association Council on Cardiovascular Surgery and Anesthesia, Quality of Care and Outcomes Research Interdisciplinary Working Group. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever [trunc]. Circulation 2007 Oct 9;116(15):1736-54. [153 references] PubMed

GUIDELINE STATUS

This is the current release of the guideline.

It updates a previously published version: Dajani AS, Taubert KA, Wilson W, Bolger AF, Bayer A, Ferrieri P, Gewitz MH, Shulman ST, Nouri S, Newburger JW, Hutto C, Pallasch TJ, Gage TW, Levison ME, Peter G, Zuccaro G Jr. Prevention of bacterial endocarditis. Recommendations by the American Heart Association. Circulation. 1997 Jul 1;96(1):358-66.

** REGULATORY ALERT **

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory information has been released.

- September 11, 2007, Rocephin (ceftriaxone sodium): Roche informed healthcare professionals about revisions made to the prescribing information for Rocephin to clarify the potential risk associated with concomitant use of Rocephin with calcium or calcium-containing solutions or products.

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

Infective endocarditis

GUIDELINE CATEGORY

Prevention

CLINICAL SPECIALTY

Cardiology
Colon and Rectal Surgery
Dentistry
Dermatology
Gastroenterology
Infectious Diseases
Obstetrics and Gynecology
Orthopedic Surgery
Pediatrics
Plastic Surgery
Surgery
Urology

INTENDED USERS

Dentists
Health Care Providers
Patients
Physicians

GUIDELINE OBJECTIVE(S)

To update the recommendations by the American Heart Association (AHA) for the prevention of infective endocarditis that were last published in 1997

TARGET POPULATION

Adults and children with underlying cardiac conditions placing them at highest risk for adverse outcomes of infective endocarditis (IE) including those with:

- Prosthetic cardiac valve or prosthetic cardiac valve repair
- Previous IE
- Congenital heart disease (CHD) associated with unrepaired cyanotic CHD, including palliative shunts and conduits; completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure; repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialization)
- Cardiac transplantation who develop cardiac valvulopathy

INTERVENTIONS AND PRACTICES CONSIDERED

Antibiotic prophylaxis with dental procedures:

1. Amoxicillin
2. Ampicillin
3. Cefazolin
4. Ceftriaxone
5. Cephalexin
6. Clindamycin
7. Azithromycin
8. Clarithromycin

MAJOR OUTCOMES CONSIDERED

- Incidence, nature, magnitude, and duration of bacteremia
- Correlation of dental disease, oral hygiene, and type of dental procedure on bacteremia
- Effectiveness of antibiotic therapy on bacteremia
- Incidence of antibiotic resistance
- Overall morbidity and mortality from infective endocarditis attributable to dental procedures

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

MEDLINE database searches from 1950 to 2006 were done for English-language papers using the following search terms: endocarditis, infective endocarditis, prophylaxis, prevention, antibiotic, antimicrobial, pathogens, organisms, dental, gastrointestinal, genitourinary, streptococcus, enterococcus, staphylococcus, respiratory, dental surgery, pathogenesis, vaccine, immunization, and bacteremia. The reference lists of the identified papers were also searched. The American Heart Association (AHA) online library was also searched.

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

Level of Evidence A: Data derived from multiple randomized clinical trials or meta-analyses.

Level of Evidence B: Data derived from a single randomized trial or nonrandomized studies.

Level of Evidence C: Only consensus opinion of experts, case studies, or standard of care.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

A writing group was appointed by the American Heart Association (AHA) for their expertise in prevention and treatment of infective endocarditis, with liaison members representing the American Dental Association, the Infectious Diseases Society of America, and the American Academy of Pediatrics. The writing group reviewed input from national and international experts on infective endocarditis.

Members of the Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee of the AHA Council on Cardiovascular Disease in the Young ("the Committee") and a national and international group of experts on infective endocarditis (IE) extensively reviewed data published on the prevention of IE.

The writing group was charged with the task of performing an assessment of the evidence and giving a classification of recommendations and a level of evidence (LOE) to each recommendation. The American College of Cardiology (ACC)/AHA classification system was used.

The recommendations in this document reflect analyses of relevant literature regarding procedure-related bacteremia and infective endocarditis, in vitro susceptibility data of the most common microorganisms that cause infective endocarditis, results of prophylactic studies in animal models of experimental endocarditis, and retrospective and prospective studies of prevention of infective endocarditis.

The following factors were considered: (1) frequency, nature, magnitude, and duration of bacteremia associated with dental procedures; (2) impact of dental disease, oral hygiene, and type of dental procedure on bacteremia; (3) impact of antibiotic prophylaxis on bacteremia from a dental procedure; and (4) the exposure over time of frequently occurring bacteremia from routine daily activities compared with bacteremia from various dental procedures.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is beneficial, useful, and effective.

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

> **Class IIa**: Weight of evidence/opinion is in favor of usefulness/efficacy.
>
> **Class IIb**: Usefulness/efficacy is less well established by evidence/opinion.

Class III: Conditions for which there is evidence and/or general agreement that a procedure/treatment is not useful/effective and in some cases may be harmful.

COST ANALYSIS

Published cost analyses were reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

- The paper was reviewed by outside experts not affiliated with the writing group and by the American Heart Association Science Advisory and Coordinating Committee.
- This guideline was approved by the American Heart Association (AHA) Science Advisory and Coordinating Committee on March 7, 2007.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Levels of evidence (LOE) (A-C) and classification of recommendations (I-III) are defined at the end of the "Major Recommendations" field.

Should Infective Endocarditis (IE) Prophylaxis Be Recommended for Patients With the Highest Risk of Acquisition of IE or for Patients With the Highest Risk of Adverse Outcome From IE?

In a major departure from previous American Heart Association (AHA) guidelines, the Committee no longer recommends IE prophylaxis based solely on an increased lifetime risk of acquisition of IE. It is noteworthy that patients with the conditions listed in the table below with a prosthetic cardiac valve, those with a previous episode of IE, and some patients with congenital heart disease (CHD) are also among those patients with the highest lifetime risk of acquisition of endocarditis. No published data demonstrate convincingly that the administration of prophylactic antibiotics prevents IE associated with bacteremia from an invasive procedure. The guideline authors cannot exclude the possibility that there may be an exceedingly small number of cases of IE that could be prevented by prophylactic antibiotics in patients who undergo an invasive procedure. However, if prophylaxis is effective, such therapy should be restricted to those patients with the highest risk of adverse outcome from IE who would derive the greatest benefit from prevention of IE. In patients with underlying cardiac conditions associated with the highest risk of adverse outcome from IE (see table below), IE prophylaxis for dental procedures is reasonable, even though the authors acknowledge that its effectiveness is unknown (***Class IIa, LOE B***).

Compared with previous AHA guidelines, under these revised guidelines, many fewer patients would be candidates to receive IE prophylaxis. The authors believe that these revised guidelines are in the best interest of patients and healthcare providers and are based on the best available published data and expert opinion. Additionally, the change in emphasis to restrict prophylaxis for only those patients with the highest risk of adverse outcome should reduce the uncertainties among patients and providers about who should receive prophylaxis. Mitral valve prolapse (MVP) is the most common underlying condition that predisposes to acquisition of IE in the Western world; however, the absolute incidence of endocarditis is extremely low for the entire population with MVP, and it is not usually associated with the grave outcome associated with the conditions identified below. Thus, IE prophylaxis is no longer recommended for this group of individuals.

Finally, the administration of prophylactic antibiotics is not risk free. Additionally, the widespread use of antibiotic therapy promotes the emergence of resistant microorganisms most likely to cause endocarditis, such as viridans group streptococci and enterococci. The frequency of multidrug-resistant viridans group streptococci and enterococci has increased dramatically during the past 2 decades. This increased resistance has reduced the efficacy and number of antibiotics available for the treatment of IE.

Table: Cardiac Conditions Associated With the Highest Risk of Adverse Outcome From Endocarditis for Which Prophylaxis With Dental Procedures Is Reasonable
• Prosthetic cardiac valve or prosthetic material used for cardiac valve repair • Previous IE

Table: Cardiac Conditions Associated With the Highest Risk of Adverse Outcome From Endocarditis for Which Prophylaxis With Dental Procedures Is Reasonable

• Congenital heart disease (CHD)*
  • Unrepaired cyanotic CHD, including palliative shunts and conduits
  • Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure**
  • Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialization)
• Cardiac transplantation recipients who develop cardiac valvulopathy
 	
*Except for the conditions listed above, antibiotic prophylaxis is no longer recommended for any other form of CHD.
 	
**Prophylaxis is reasonable because endothelialization of prosthetic material occurs within 6 months after the procedure.

Antibiotic Regimens

General Principles

An antibiotic for prophylaxis should be administered in a single dose before the procedure. If the dosage of antibiotic is *inadvertently* not administered before the procedure, the dosage may be administered up to 2 hours after the procedure. However, administration of the dosage after the procedure should be considered only when the patient did not receive the pre-procedure dose. Some patients who are scheduled for an invasive procedure may have a coincidental endocarditis. The presence of fever or other manifestations of systemic infection should alert the provider to the possibility of IE. In these circumstances, it is important to obtain blood cultures and other relevant tests before administration of antibiotics intended to prevent IE. Failure to do so may result in delay in diagnosis or treatment of a concomitant case of IE.

Regimens for Dental Procedures

Antibiotic prophylaxis is reasonable for patients with the conditions listed in the table above who undergo any dental procedure that involves the gingival tissues or periapical region of a tooth and for those procedures that perforate the oral mucosa. Although IE prophylaxis is reasonable for these patients, its effectiveness is unknown (***Class IIa, LOE C***). This includes procedures such as biopsies, suture removal, and placement of orthodontic bands, but it does not include routine anesthetic injections through noninfected tissue, the taking of dental radiographs, placement of removable prosthodontic or orthodontic appliances, placement of orthodontic brackets, or adjustment of orthodontic appliances. Finally, there are other events that are not dental procedures and for which prophylaxis is not recommended, such as shedding of deciduous teeth and trauma to the lips and oral mucosa.

In this limited patient population, prophylactic antimicrobial therapy should be directed against viridans group streptococci.

The impact of viridans group streptococcal resistance on antibiotic prevention of IE is unknown. If resistance in vitro is predictive of lack of clinical efficacy, the high resistance rates of viridans group streptococci provide additional support for the assertion that prophylactic therapy for a dental procedure is of little, if any, value. It is impractical to recommend prophylaxis with only those antibiotics, such as vancomycin or a fluoroquinolone that are highly active in vitro against viridans group streptococci. There is no evidence that such therapy is effective for prophylaxis of IE, and their use might result in the development of resistance of viridans group streptococci and other microorganisms to these and other antibiotics.

Amoxicillin is the preferred choice for oral therapy because it is well absorbed in the gastrointestinal (GI) tract and provides high and sustained serum concentrations. For individuals who are allergic to penicillins or amoxicillin, the use of cephalexin or another first-generation oral cephalosporin, clindamycin, azithromycin, or clarithromycin is recommended.

Because of possible cross-reactions, a cephalosporin should not be administered to patients with a history of anaphylaxis, angioedema, or urticaria after treatment with any form of penicillin, including ampicillin or amoxicillin. Patients who are unable to tolerate an oral antibiotic may be treated with ampicillin, ceftriaxone, or cefazolin administered intramuscularly or intravenously. For ampicillin-allergic patients who are unable to tolerate an oral agent, therapy is recommended with parenteral cefazolin, ceftriaxone, or clindamycin.

Regimens for Respiratory Tract Procedures

No published data conclusively demonstrate a link between these procedures and IE. Antibiotic prophylaxis with a regimen listed in Table 5 of the original guideline document is reasonable (***Class IIa, LOE C***) for patients with the conditions listed in the table above who undergo an invasive procedure of the respiratory tract that involves incision or biopsy of the respiratory mucosa, such as tonsillectomy and adenoidectomy. The guideline authors do not recommend antibiotic prophylaxis for bronchoscopy unless the procedure involves incision of the respiratory tract mucosa. For patients listed in the table above who undergo an invasive respiratory tract procedure to treat an established infection, such as drainage of an abscess or empyema, the authors recommend that the antibiotic regimen administered to these patients contain an agent active against viridans group streptococci. If the infection is known or suspected to be caused by *Staphylococcus aureus*, the regimen should contain an agent active against *S aureus*, such as an antistaphylococcal penicillin or cephalosporin, or vancomycin in patients unable to tolerate a beta-lactam. Vancomycin should be administered if the infection is known or suspected to be caused by a methicillin-resistant strain of *S aureus*.

Recommendations for GI or Genitourinary (GU) Tract Procedures

The administration of prophylactic antibiotics solely to prevent endocarditis is not recommended for patients who undergo GU or GI tract procedures, including diagnostic esophagogastroduodenoscopy or colonoscopy (***Class III, LOE B***).

The significance of the increased frequency of multiresistant strains of enterococci on prevention of IE in patients who undergo GI or GU tract procedures is unknown. The high prevalence of resistant strains of enterococci adds further doubt about the efficacy of prophylactic therapy for GI or GU tract procedures.

Patients with infections of the GI or GU tract may have intermittent or sustained enterococcal bacteremia. For patients with the conditions listed in the table above who have an established GI or GU tract infection or for those who receive antibiotic therapy to prevent wound infection or sepsis associated with a GI or GU tract procedure, it may be reasonable that the antibiotic regimen include an agent active against enterococci, such as penicillin, ampicillin, piperacillin, or vancomycin (***Class IIb, LOE B***); however, no published studies demonstrate that such therapy would prevent enterococcal IE.

For patients with the conditions listed in the table above scheduled for an elective cystoscopy or other urinary tract manipulation who have an enterococcal urinary tract infection or colonization, antibiotic therapy to eradicate enterococci from the urine before the procedure may be reasonable (***Class IIb, LOE B***). If the urinary tract procedure is not elective, it may be reasonable that the empiric or specific antimicrobial regimen administered to the patient contain an agent active against enterococci (***Class IIb, LOE B***).

Amoxicillin or ampicillin is the preferred agent for enterococcal coverage for these patients. Vancomycin may be administered to patients unable to tolerate ampicillin. If infection is caused by a known or suspected strain of resistant enterococcus, consultation with an infectious diseases expert is recommended.

Regimens for Procedures on Infected Skin, Skin Structure, or Musculoskeletal Tissue

These infections are often polymicrobial, but only staphylococci and beta-hemolytic streptococci are likely to cause IE. For patients with the conditions listed in the table above who undergo a surgical procedure that involves infected skin, skin structure, or musculoskeletal tissue, it may be reasonable that the therapeutic regimen administered for treatment of the infection contain an agent active against staphylococci and beta-hemolytic streptococci, such as an antistaphylococcal penicillin or a cephalosporin (***Class IIb, LOE C***; See Table 5 in the original guideline document for dosage). Vancomycin or clindamycin may be administered to patients unable to tolerate a beta-lactam or who are known or suspected to have an infection caused by a methicillin-resistant strain of staphylococcus.

<u>Specific Situations and Circumstances</u>

Patients Already Receiving Antibiotics

If a patient is already receiving long-term antibiotic therapy with an antibiotic that is also recommended for IE prophylaxis for a dental procedure, it is prudent to select an antibiotic from a different class rather than to increase the dosage of the current antibiotic. For example, antibiotic regimens used to prevent the recurrence of acute rheumatic fever are administered in dosages lower than those recommended for the prevention of IE. Individuals who take an oral penicillin for

secondary prevention of rheumatic fever or for other purposes are likely to have viridans group streptococci in their oral cavity that are relatively resistant to penicillin or amoxicillin. In such cases, the provider should select either clindamycin, azithromycin, or clarithromycin for IE prophylaxis for a dental procedure, but only for patients shown in the table above. Because of possible cross-resistance of viridans group streptococci with cephalosporins, this class of antibiotics should be avoided. If possible, it would be preferable to delay a dental procedure until at least 10 days after completion of the antibiotic therapy. This may allow time for the usual oral flora to be reestablished.

Patients receiving parenteral antibiotic therapy for IE may require dental procedures during antimicrobial therapy, particularly if subsequent cardiac valve replacement surgery is anticipated. In these cases, the parenteral antibiotic therapy for IE should be continued and the timing of the dosage adjusted to be administered 30 to 60 minutes before the dental procedure. This parenteral antimicrobial therapy is administered in such high doses that the high concentration would overcome any possible low-level resistance developed among mouth flora (unlike the concentration that would occur after oral administration).

Patients Who Receive Anticoagulants

Intramuscular injections for IE prophylaxis should be avoided in patients who are receiving anticoagulant therapy (***Class I, LOE A***). In these circumstances, orally administered regimens should be given whenever possible. Intravenously administered antibiotics should be used for patients who are unable to tolerate or absorb oral medications.

Patients Who Undergo Cardiac Surgery

A careful preoperative dental evaluation is recommended so that required dental treatment may be completed whenever possible before cardiac valve surgery or replacement or repair of CHD. Such measures may decrease the incidence of late prosthetic valve endocarditis caused by viridans group streptococci.

Patients who undergo surgery for placement of prosthetic heart valves or prosthetic intravascular or intracardiac materials are at risk for the development of infection. Because the morbidity and mortality of infection in these patients are high, perioperative prophylactic antibiotics are recommended (***Class I, LOE B***). Early-onset prosthetic valve endocarditis is most often caused by *S aureus*, coagulase-negative staphylococci, or diphtheroids. No single antibiotic regimen is effective against all these microorganisms. Prophylaxis at the time of cardiac surgery should be directed primarily against staphylococci and should be of short duration. A first-generation cephalosporin is most often used, but the choice of an antibiotic should be influenced by the antibiotic susceptibility patterns at each hospital. For example, a high prevalence of infection by methicillin-resistant *S aureus* should prompt the consideration of the use of vancomycin for perioperative prophylaxis. The majority of nosocomial coagulase-negative staphylococci are methicillin-resistant. Nonetheless, surgical prophylaxis with a first-generation cephalosporin may be recommended for these patients (***Class I, LOE A***) (Baddour & Wilson, 2005) In hospitals with a high prevalence of methicillin-resistant strains of *S epidermidis*, surgical prophylaxis with vancomycin may be reasonable but has not been shown to be superior to prophylaxis with a

cephalosporin (***Class IIb, LOE C***). Prophylaxis should be initiated immediately before the operative procedure, repeated during prolonged procedures to maintain serum concentrations intraoperatively, and continued for no more than 48 hours postoperatively to minimize emergence of resistant microorganisms (***Class IIa, LOE B***). The effects of cardiopulmonary bypass and compromised renal function on antibiotic concentrations in serum should be considered and dosages adjusted as necessary before and during the procedure.

Other Considerations

There is no evidence that coronary artery bypass graft surgery is associated with a long-term risk for infection. Therefore, antibiotic prophylaxis for dental procedures is not needed for individuals who have undergone this surgery. Antibiotic prophylaxis for dental procedures is not recommended for patients with coronary artery stents (***Class III, LOE C***). The treatment and prevention of infection for these and other endovascular grafts and prosthetic devices are addressed in a separate AHA publication. There are insufficient data to support specific recommendations for patients who have undergone heart transplantation. Such patients are at risk of acquired valvular dysfunction, especially during episodes of rejection. Endocarditis that occurs in a heart transplant patient is associated with a high risk of adverse outcome (see table above). Accordingly, the use of IE prophylaxis for dental procedures in cardiac transplant recipients who develop cardiac valvulopathy is reasonable, but the usefulness is not well established (***Class IIa, LOE C***). The use of prophylactic antibiotics to prevent infection of joint prostheses during potentially bacteremia-inducing procedures is not within the scope of this document.

Summary of Major Changes in Updated Document

- Bacteremia resulting from daily activities is much more likely to cause IE than bacteremia associated with a dental procedure.
- Only an extremely small number of cases of IE might be prevented by antibiotic prophylaxis even if prophylaxis is 100% effective.
- Antibiotic prophylaxis is not recommended based solely on an increased lifetime risk of acquisition of IE.
- Recommendations for IE prophylaxis are limited to those conditions listed in the table above and in the "Target Population" field.
- Antibiotic prophylaxis is no longer recommended for any other form of congenital heart disease (CHD), except for the conditions listed in the table above (and in the "Target Population" field of this summary).
- Antibiotic prophylaxis is reasonable for all dental procedures that involve manipulation of gingival tissues or periapical region of teeth or perforation of oral mucosa only for patients with underlying cardiac conditions associated with the highest risk of adverse outcome from IE (see the table above and the "Target Population" field).
- Antibiotic prophylaxis is reasonable for procedures on respiratory tract or infected skin, skin structures, or musculoskeletal tissue only for patients with underlying cardiac conditions associated with the highest risk of adverse outcome from IE (see the table above and the "Target Population" field).
- Antibiotic prophylaxis solely to prevent IE is not recommended for GU or GI tract procedures.

- Although these guidelines recommend changes in indications for IE prophylaxis with regard to selected dental procedures (see the original guideline document), the writing group reaffirms that those medical procedures listed as not requiring IE prophylaxis in the 1997 statement remain unchanged and extends this view to vaginal delivery, hysterectomy, and tattooing. Additionally, the committee advises against body piercing for patients with conditions listed in the table above and the "Target Population" field because of the possibility of bacteremia, while recognizing that there are minimal published data regarding the risk of bacteremia or endocarditis associated with body piercing.

Definitions:

Levels of Evidence

A. Data derived from multiple randomized clinical trials or meta-analyses.
B. Data derived from a single randomized trial or nonrandomized studies.
C. Only consensus opinion of experts, case studies, or standard of care.

Classification of Recommendations

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is beneficial, useful, and effective.

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

Class IIa: Weight of evidence/opinion is in favor of usefulness/efficacy.

Class IIb: Usefulness/efficacy is less well established by evidence/opinion.

Class III: Conditions for which there is evidence and/or general agreement that a procedure/treatment is not useful/effective and in some cases may be harmful.

CLINICAL ALGORITHM(S)

None provided

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 specifically stated for selected recommendations (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Reduction in morbidity and mortality attributed to infective endocarditis
- Reduction in the unnecessary use of antibiotics

POTENTIAL HARMS

The administration of prophylactic antibiotics is not risk free. Additionally, the widespread use of antibiotic therapy promotes the emergence of resistant microorganisms most likely to cause endocarditis, such as viridans group streptococci and enterococci. The frequency of multidrug-resistant viridans group streptococci and enterococci has increased dramatically during the past 2 decades. This increased resistance has reduced the efficacy and number of antibiotics available for the treatment of infective endocarditis.

CONTRAINDICATIONS

CONTRAINDICATIONS

Cephalosporins should not be used in an individual with a history of anaphylaxis, angioedema, or urticaria with penicillins or ampicillin.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

If these guidelines are applied outside of the United States of America, adaptation of the recommended antibiotic agents may be considered with respect to the regional situation.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Foreign Language Translations
Patient Resources

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Wilson W, Taubert KA, Gewitz M, Lockhart PB, Baddour LM, Levison M, Bolger A, Cabell CH, Takahashi M, Baltimore RS, Newburger JW, Strom BL, Tani LY, Gerber M, Bonow RO, Pallasch T, Shulman ST, Rowley AH, Burns JC, Ferrieri P, Gardner T, Goff D, Durack DT, American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease, American Heart Association Council on Cardiovascular Disease in the Young, American Heart Association Council on Clinical Cardiology, American Heart Association Council on Cardiovascular Surgery and Anesthesia, Quality of Care and Outcomes Research Interdisciplinary Working Group. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever [trunc]. Circulation 2007 Oct 9;116(15):1736-54. [153 references] PubMed

ADAPTATION

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

DATE RELEASED

1997 (revised 2007 Jan)

GUIDELINE DEVELOPER(S)

American Heart Association - Professional Association

SOURCE(S) OF FUNDING

American Heart Association

GUIDELINE COMMITTEE

American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee

Council on Cardiovascular Disease in the Young

Council on Clinical Cardiology

Council on Cardiovascular Surgery and Anesthesia

Quality of Care and Outcomes Research Interdisciplinary Working Group

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Writing Committee Members: Walter Wilson, MD, Chair; Kathryn A. Taubert, PhD, FAHA; Michael Gewitz, MD, FAHA; Peter B. Lockhart, DDS; Larry M. Baddour, MD; Matthew Levison, MD; Ann Bolger, MD, FAHA; Christopher H. Cabell, MD, MHS; Masato Takahashi, MD, FAHA; Robert S. Baltimore, MD; Jane W. Newburger, MD, MPH, FAHA; Brian L. Strom, MD; Lloyd Y. Tani, MD; Michael Gerber, MD; Robert O. Bonow, MD, FAHA; Thomas Pallasch, DDS, MS; Stanford T. Shulman, MD, FAHA; Anne H. Rowley, MD; Jane C. Burns, MD; Patricia Ferrieri, MD; Timothy Gardner, MD, FAHA; David Goff, MD, PhD, FAHA; David T. Durack, MD, PhD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

Writing Group Disclosures

Writing Group Member	Employment	Research Grant	Other Research Support	Speakers' Bureau/ Honoraria	Ownership Interest	Consultant/ Advisory Board	Other
Walter Wilson	Mayo Clinic	None	None	None	None	None	None
Larry M. Baddour	Mayo Clinic	None	None	None	None	None	None
Robert S. Baltimore	Yale University School of Medicine	None	None	None	None	None	None
Ann Bolger	University of California, San Francisco	None	None	None	None	None	None
Robert O. Bonow	Northwestern University Feinberg School of Medicine	None	None	None	None	None	None
Jane C.	University of	None	None	None	None	None	None

Writing Group Member	Employment	Research Grant	Other Research Support	Speakers' Bureau/ Honoraria	Ownership Interest	Consultant/ Advisory Board	Other
Burns	California, San Diego						
Christopher H. Cabell	Duke University	National Institutes of Health**	None	None	None	Gloucester*; Shire*; Cubist*; Carbomedics*; GlaxoSmithKline*; Acusphere*; Endo*; Eli Lilly*; Watson*; Johnson & Johnson*	None
David T. Durack	Becton Dickinson & Co (manufactures medical devices and diagnostics)	None	None	None	None	Joint Commission Resources Board**	None
Patricia Ferrieri	University of Minnesota Medical School	None	None	None	None	None	None
Timothy Gardner	Christiana Care Health System	None	None	None	None	None	None
Michael Gerber	Cincinnati Children's Hospital Medical Center	None	None	None	None	None	None
Michael Gewitz	Maria Fareri Children's Hospital of Westchester, New York Medical College	None	None	None	None	None	None
David Goff	Wake Forest University School of Medicine	None	None	None	None	Spriggs & Hollingsworth Law Firm; Scientific Evidence Consulting Firm; GlaxoSmithKline*	None
Matthew Levison	Drexel University College of Medicine	None	None	None	None	Merck*	None
Peter B. Lockhart	Carolinas Medical	None	None	None	None	None	None

Writing Group Member	Employment	Research Grant	Other Research Support	Speakers' Bureau/ Honoraria	Ownership Interest	Consultant/ Advisory Board	Other
	Center						
Jane W. Newburger	Boston Children's Heart Foundation	None	None	None	None	None	None
Thomas Pallasch	University of Southern California	None	None	None	None	Consultation and expert witness testimony on records of patients with endocarditis	None
Anne H. Rowley	Children's Memorial Hospital, Chicago	None	None	None	None	None	None
Stanford T. Shulman	Children's Memorial Hospital, Chicago	None	None	None	None	None	None
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Lloyd Y. Tani	University of Utah School of Medicine	None	None	None	None	None	None
Kathryn A. Taubert	American Heart Association	None	None	None	None	None	None

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*Modest

**Significant

Reviewer Disclosures

Reviewer	Employment	Research Grant	Other Research Support	Speakers' Bureau/ Honoraria	Expert Witness	Ownership Interest	Consultant/ Advisory Board	Other
Thomas Bashore	Duke University Medical Center	None	None	None	None	None	None	None
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Loren Hiratzka	Bethesda North Hospital	None	None	None	None	None	None	None
Patrick O'Gara	Brigham & Women's Hospital	None	None	None	None	None	None	None
Lauren L. Patton	University of North Carolina	None	None	None	None	None	None	None
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*Modest

**Significant

ENDORSER(S)

American Academy of Pediatrics - Medical Specialty Society
American Dental Association - Professional Association
Infectious Diseases Society of America - Medical Specialty Society
International Society of Chemotherapy for Infection and Cancer - Disease Specific Society
Pediatric Infectious Diseases Society - Professional Association

GUIDELINE STATUS

This is the current release of the guideline.

It updates a previously published version: Dajani AS, Taubert KA, Wilson W, Bolger AF, Bayer A, Ferrieri P, Gewitz MH, Shulman ST, Nouri S, Newburger JW, Hutto C, Pallasch TJ, Gage TW, Levison ME, Peter G, Zuccaro G Jr. Prevention of bacterial endocarditis. Recommendations by the American Heart Association. Circulation. 1997 Jul 1;96(1):358-66.

GUIDELINE AVAILABILITY

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AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

The following is available:

- Bacterial endocarditis wallet card. Dallas (TX): American Heart Association. 2007.

Available in English and Spanish from the American Heart Association Web site.

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