Guideline on Antibiotic Prophylaxis for Dental Patients at Risk for Infection

Originating Committee
Clinical Affairs Committee

Review Council
Council on Clinical Affairs

Adopted
1990

Revised
1991, 1997, 1999, 2002, 2005, 2007, 2008

Purpose
The American Academy of Pediatric Dentistry (**AAPD**) recognizes that numerous medical conditions predispose patients to bacteremia-induced infections. Because it is not possible to predict when a susceptible patient will develop an infection, prophylactic antibiotics are recommended when these patients undergo procedures most likely to produce bacteremia. This guideline is intended to help practitioners make appropriate decisions regarding antibiotic prophylaxis for dental patients at risk.

Methods
This guideline is based on a review of current dental and medical literature pertaining to postprocedural bacteremia-induced infections. A MEDLINE search was performed using the keywords "infective endocarditis" (**IE**), "bacteremia", "antibiotic prophylaxis", and "dental infection".

Background
Bacteremia is anticipated following invasive dental procedures.[1,2] Only a limited number of bacterial species commonly are implicated in resultant postoperative infections. An effective antibiotic regimen should be directed against the most likely infecting organism, with antibiotics administered shortly before the procedure. When procedures involve infected tissues, additional doses may be necessary.

Antibiotic usage may result in the development of resistant organisms. Utilization of antibiotic prophylaxis for patients at risk does not provide absolute prevention of infection. Postprocedural symptoms of acute infection (eg, fever, malaise, weakness, lethargy) may indicate antibiotic failure and need for further medical evaluation.

Appropriateness of antibiotic prophylaxis should be decided on an individual basis. Some medical conditions that may predispose patients to postprocedural infections are discussed below. This is not intended to be an exhaustive list; rather, the categorization should help practitioners identify children who may be at increased risk. If a patient reports a syndrome or medical condition with which the practitioner is not familiar, it is appropriate to contact the child's physician to determine susceptibility to bacteremia-induced infections.

In 2007, the American Heart Association (**AHA**) released its newly revised guidelines for the prevention of IE and reducing the risk for producing resistant strains of bacteria.[3] The 2007 revision was based on relevant literature and studies, in consultation with national and international experts. The AAPD, acknowledging the AHA's expertise and efforts to produce evidenced-based recommendations, continues to endorse the AHA guideline for antibiotic prophylaxis, now entitled "Prevention of Infective Endocarditis".

The primary reasons for the revision include:

- "IE is much more likely to result from frequent exposure to random bacteremias associated with daily activities than from bacteremia caused by a dental, GI tract, or GU tract procedure."[3] (Daily activities would include tooth brushing, flossing, chewing, use of toothpicks, use of water irrigation devices, and other activities.)
- "Prophylaxis may prevent an exceedingly small number of cases of IE, if any, in individuals who undergo a dental, GI tract, or GU tract procedure.
- The risk of antibiotic-associated adverse events exceeds the benefit, if any, from prophylactic antibiotic therapy.
- Maintenance of optimal oral health and hygiene may reduce the incidence of bacteremia from daily activities and is more important than prophylactic antibiotics for a dental procedure to reduce the risk of IE."[3]

The recent AHA revision was intended to clarify when antibiotic prophylaxis is/is not recommended and to provide more uniform global recommendations. Major changes from the 1997 version[4] include:

(1) "The Committee concluded that only an extremely small number of cases of infective endocarditis might be prevented by antibiotic prophylaxis for dental procedures even if such prophylactic therapy were 100% effective.

(2) Infective endocarditis prophylaxis for dental procedures is reasonable only for patients with underlying cardiac conditions associated with the highest risk of adverse outcome from infective endocarditis.
(3) For patients with these underlying cardiac conditions, prophylaxis is reasonable for all dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa.
(4) Prophylaxis is not recommended based solely on an increased lifetime risk of acquisition of infective endocarditis."[3]

Recommendations

The conservative use of antibiotics is indicated to minimize the risk of developing resistance to current antibiotic regimens.[1-13] Given the increasing number of organisms that have developed resistance to current antibiotic regimens, it is best to be prudent in the use of antibiotics for the prevention of IE and other conditions.

Patients with cardiac conditions

Dental practitioners should consider prophylactic measures to minimize the risk of IE in patients with underlying cardiac conditions. These patients and/or parents need to be educated and motivated to maintain personal oral hygiene through daily plaque removal, including flossing. Greater emphasis should be placed on improved access to dental care and oral health in patients with underlying cardiac conditions at high risk for IE and less focus on a dental procedure and antibiotic coverage. Professional prevention strategies should be based upon the individual's assessed risk for caries and periodontal disease.

Specific recommendations from the 2007 AHA guideline on prevention of IE are included in the following tables. The AHA recommends antibiotic prophylaxis only for those whose underlying cardiac conditions are associated with the highest risk of adverse outcome[3] (see Table 1). Such conditions include prosthetic heart valves, previous history of IE, unrepaired cyanotic congenital heart disease (**CHD**), completely repaired congenital heart defect with prosthetic material or device 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 device, and cardiac transplantation recipients who develop valvulopathy.[3] In addition to those diagnoses listed in the AHA guidelines, patients with a history of intravenous drug abuse may be at risk for developing bacterial endocarditis due to associated cardiac anomalies.[5] Consultation with the patient's physician may be necessary to determine susceptibility to bacteremia-induced infections.

Antibiotics are recommended for all dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa[3] (see Table 2). Specific antibiotic regimens can be found in Table 3. Practitioners and patients/parents can review the entire AHA guidelines "http://circ.ahajournals.org/cgi/reprint/CIRCULATIONAHA.106.183095" for additional background information as well as discussion of special circumstances (eg, patients already receiving antibiotic therapy, patients on anticoagulant therapy).

Patients with compromised immunity

Patients with a compromised immune system may not be able to tolerate a transient bacteremia following invasive dental procedures. This category includes, but is not limited to, patients with the following conditions:

1. human immunodeficiency virus (HIV);
2. severe combined immunodeficiency (SCIDS);
3. neutropenia;
4. immunosuppression;
5. sickle cell anemia;
6. status post splenectomy;
7. chronic steroid usage;
8. lupus erythematosus;
9. diabetes;
10. status post organ transplantation.

Consultation with the child's physician is recommended for management of patients with a compromised immune system. Discussion of antibiotic prophylaxis for patients undergoing chemotherapy, irradiation, and hematopoietic cell transplantation appears in a separate AAPD guideline.[14]

Patients with shunts, indwelling vascular catheters, or medical devices

The AHA recommends that antibiotic prophylaxis for nonvalvular devices, including indwelling vascular catheters (central lines), is indicated only at the time of placement of these devices in order to prevent surgical site infection.[15] The AHA found no convincing evidence that microorganisms associated with dental procedures cause infection of nonvalvular devices at any time after implantation.[15] The infections occurring after device implantation most often are caused by staphylococci, Gram-negative bacteria, or other microorganisms associated with surgical implantation or other active infections. The AHA further states that immunosuppression is not an independent risk factor for nonvalvular device infections; immunocompromised hosts who have those devices should receive antibiotic prophylaxis as advocated for immunocompetent hosts.[15] Consultation with the child's physician is recommended for management of patients with nonvalvular devices.

Ventriculoatrial (VA) or ventriculovenus (VV) shunts for hydrocephalus are at risk of bacteremia-induced infections due to their vascular access. In contrast, ventriculoperitoneal (VP) shunts do not involve any vascular structures and, consequently, do not require antibiotic prophylaxis.[15,16] Consultation with the child's physician is recommended for management of patients with vascular shunts.

The AAPD endorses the recommendations of the American Dental Association and the American Academy of Orthopaedic Surgeons for management of patients with prosthetic joints.[17] Antibiotic prophylaxis is not indicated for dental patients with pins, plates, and screws, nor is it indicated routinely for most dental patients with total joint replacements. Antibiotics may be considered when high-risk dental procedures (Table 2) are performed for patients within 2 years following implant surgery or for patients who have had previous joint infections.

Table 1. 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

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.

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Table 2. DENTAL PROCEDURES FOR WHICH ENDOCARDITIS PROPHYLAXIS IS REASONABLE FOR PATIENTS IN TABLE 1

All dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa*

* The following procedures and events do not need prophylaxis: routine anesthetic injections through non-infected tissue, taking dental radiographs, placement of removable prosthodontic or orthodontic appliances, adjustment of orthodontic appliances, placement of orthodontic brackets, shedding of deciduous teeth, and bleeding from trauma to the lips or oral mucosa.

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Table 3. REGIMENS FOR A DENTAL PROCEDURE

Situation	Agent	Regimen: Single Dose 30 to 60 min Before Procedure	
		Adults	Children
Oral	Amoxicillin	2 g	50 mg/kg
Unable to take oral medication	Ampicillin	2 g IM or IV	50 mg/kg IM or IV
	OR		
	Cefazolin or ceftriaxone	1 g IM or IV	50 mg/kg IM or IV
Allergic to penicillins or ampicillin-oral	Cephalexin *†	2 g	50 mg/kg
	OR		
	Clindamycin	600 mg	20 mg/kg
	OR		
	Azithromycin or clarithromycin	500 mg	15 mg/kg
Allergic to penicillin or ampicillin and unable to take oral medication	Cefazolin or ceftriaxone†	1g IM or IV	50 mg/kg IM or IV
	OR		
	Clindamycin	600 mg IM or IV	20 mg/kg IM or IV

IM indicates intramuscular; **IV**, intravenous.

* Or other first-or second-generation oral cephalosporin in equivalent adult or pediatric dosage.

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

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Consultation with the child's physician may be necessary for management of patients with other implanted devices (eg, Harrington rods, external fixation devices).

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