

Therapeutic Guidelines

Prevention of endocarditis

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Prevention of endocarditis

GENERAL CONSIDERATIONS

Infective endocarditis is an uncommon illness with a high morbidity and mortality. For many years antibiotic prophylaxis has been given routinely before dental and other procedures to patients with cardiac conditions that carry a high lifetime risk of infective endocarditis. However, the evidence suggests that endocarditis after dental or other procedures is infrequent and hence prophylaxis prevents very few cases. Infective endocarditis is more likely to result from bacteraemias associated with daily activities and so the maintenance of good oral health and hygiene is more important than peri-procedural antibiotics.

No randomised controlled trial has been performed to decide the role of antibiotic prophylaxis and there are no human studies showing that it can prevent endocarditis. Guidelines produced in different parts of the world rely on expert consensus and consequently can differ in their recommendations. These Australian guidelines follow the lead of the American Heart Association*, continuing a trend to reduce the categories of patients for whom prophylaxis is recommended while still specifying procedures for which prophylaxis is required.

Antibiotic prophylaxis is now recommended only for patients with cardiac conditions associated with the highest risk of *adverse outcomes* from endocarditis (see Box 1, p.2) if undergoing a specified dental (see Table 1, p.4) or other procedure (see Table 2, p.6; Table 3, p.8; Table 4, p.9). This list of cardiac conditions is short and all of these patients have had significant cardiovascular diseases or interventions. Prophylaxis is no longer recommended for patients with other forms of valvular or structural heart disease, including mitral valve prolapse.

* Wilson W, Taubert KA, Gewitz M, Lockhart PB, Baddour LM, Levison M, et al. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *Circulation* 2007;116(15):1736-54.

Box 1. Cardiac conditions associated with the highest risk of adverse outcomes from endocarditis

Antibiotic prophylaxis is recommended in patients with the following cardiac conditions if undergoing a specified dental (see Table 1, p.4) or other procedure (see Table 2, p.6; Table 3, p.8; Table 4, p.9):

- prosthetic cardiac valve or prosthetic material used for cardiac valve repair
- previous infective endocarditis
- congenital heart disease *but* only if it involves:
 - unrepaired cyanotic defects, including palliative shunts and conduits
 - completely repaired defects with prosthetic material or devices, whether placed by surgery or catheter intervention, during the first 6 months after the procedure (after which the prosthetic material is likely to have been endothelialised)
 - repaired defects with residual defects at or adjacent to the site of a prosthetic patch or device (which inhibit endothelialisation)
- cardiac transplantation with the subsequent development of cardiac valvulopathy
- rheumatic heart disease in Indigenous Australians only

It is recognised that the change in recommendations, while justified and in progression from past guidelines, may appear to be controversial. In certain individual circumstances, medical and dental practitioners may consider giving antibiotics to patients not covered by these guidelines. These include patients who have received prophylactic antibiotics over their lifetime and are unwilling to change this practice.

In addition, Indigenous Australian patients with rheumatic heart disease may be a special population at high risk for infective endocarditis or for adverse outcomes from endocarditis. Accordingly, this group has also been included in the list of patients with cardiac conditions requiring prophylaxis (see Box 1, above).

All patients with cardiac abnormalities should be reminded to practise good oral hygiene and have regular dental evaluation. In particular, dental examination is recommended twice yearly for patients with cardiac conditions involving the endocardium, especially those listed in Box 1. Doctors should be alert to investigate an unexplained fever which could be a sign of endocarditis, and take blood cultures before any oral or intravenous antibiotics are administered.

PROCEDURES AND ANTIBIOTIC RECOMMENDATIONS

Dental procedures

Bacteraemia associated with dental procedures predominantly involves viridans group streptococci, organisms known to cause infective endocarditis. Traditionally, the presence of ‘significant bleeding’ associated with a dental procedure has been taken as an indication of bacteraemia and hence need for prophylaxis; however, bleeding has been shown to be a poor indicator of bacteraemia from dental procedures.

The key parameters of a bacteraemia are its incidence, magnitude and duration. The magnitude and duration of the bacteraemia are dependent on the state of periodontal health, the vigour of the detaching or apical manipulation and the duration of the procedure. Some procedures may or may not require prophylaxis depending on these factors.

Prophylaxis is always required for those procedures with a high incidence of bacteraemia (may occur in 70% or more patients). Dental procedures with a moderate incidence of bacteraemia (may occur in 30% or more patients) should be considered for prophylaxis depending on the circumstances of the procedure and the periodontal condition (see Table 1, p.4). Thus, for example, periodontal probing on a single healthy tooth would not justify antibiotic prophylaxis whereas full-mouth periodontal probing on a patient with periodontitis would.

Prophylaxis is not recommended for procedures with a low incidence of bacteraemia.

Patient-performed oral hygiene activities, such as toothbrushing, flossing or use of oral irrigators, can produce similar incidences of bacteraemia as that caused by most dental procedures (excluding extractions and subgingival scaling/root planing). As these activities are performed more frequently, they have the potential to produce regular episodes of bacteraemia, particularly in patients with gingival inflammation. It is considered that the cumulative effect of repeated episodes of bacteraemia caused by oral hygiene activities is very likely to be a more important risk factor for infective endocarditis than isolated episodes of bacteraemia occurring during dental visits, especially in patients with poor oral health and hygiene.

Table 1. Dental procedures and their requirement for endocarditis prophylaxis in patients with cardiac conditions listed in Box 1

Prophylaxis always required	Prophylaxis required in some circumstances	Prophylaxis not required
<ul style="list-style-type: none"> extraction periodontal procedures including surgery, subgingival scaling and root planing replanting avulsed teeth other surgical procedures (eg implant placement, apicoectomy) 	<p><i>Consider prophylaxis for the following procedures if multiple procedures are being conducted, the procedure is prolonged or periodontal disease is present:</i></p> <ul style="list-style-type: none"> full periodontal probing for patients with periodontitis intraalveolar and intraosseous local anaesthetic injection supragingival calculus removal/cleaning rubber dam placement with clamps (where risk of damaging gingiva) restorative matrix band/strip placement endodontics beyond the apical foramen placement of orthodontic bands placement of interdental wedges subgingival placement of retraction cords, antibiotic fibres or antibiotic strips 	<ul style="list-style-type: none"> oral examination infiltration and block local anaesthetic injection restorative dentistry supragingival rubber dam clamping and placement of rubber dam intraoral endodontic procedures removal of sutures impressions and construction of dentures orthodontic bracket placement and adjustment of fixed appliances application of gels intraoral radiographs supragingival plaque removal

If after careful evaluation of both the cardiac condition (see Box 1, p.2) and the dental procedure (see Table 1, above), antibiotic prophylaxis is considered necessary, a single dose of antibiotic should be given before the procedure; there is no proven value to giving a follow-up dose 6 hours later.

If a patient is having more than one procedure requiring antibiotic prophylaxis, dentists should carefully consider their treatment plan and modify it as necessary so that all of the procedures can be completed in a single or at most two sittings, thus avoiding the need for multiple antibiotic doses.

For standard prophylaxis, use:

amoxicillin 2 g (child: 50 mg/kg up to 2 g) orally, 1 hour before the procedure
or amoxy/ampicillin 2 g (child: 50 mg/kg up to 2 g) IV, just before the procedure
or amoxy/ampicillin 2 g (child: 50 mg/kg up to 2 g) IM, 30 minutes before the procedure.

Patients hypersensitive to penicillin, and those on long-term penicillin therapy or who have taken penicillin or a related beta-lactam antibiotic more than once in the previous month, can use:

- clindamycin 600 mg (child: 15 mg/kg up to 600 mg) orally, 1 hour before the procedure*
or clindamycin 600 mg (child: 15 mg/kg up to 600 mg) IV over at least 20 minutes, just before the procedure

OR

- lincomycin 600 mg (child: 15 mg/kg up to 600 mg) IV over at least 1 hour, just before the procedure*

OR

- vancomycin 25 mg/kg up to 1.5 g (child less than 12 years: 30 mg/kg up to 1.5 g) IV by slow infusion (over at least 60 minutes; rate not exceeding 10 mg/min), ending the infusion just before the procedure*

OR

- teicoplanin 400 mg (child: 10 mg/kg up to 400 mg) IV, just before the procedure*
or teicoplanin 400 mg (child: 10 mg/kg up to 400 mg) IM, 30 minutes before the procedure.

There is no oral liquid formulation of clindamycin in Australia. An alternative for patients who are hypersensitive to penicillin (excluding immediate hypersensitivity), is:

cephalexin 2 g (child: 50 mg/kg up to 2 g) orally, 1 hour before the procedure.

Cephalexin is not suitable for those who have been on long-term penicillin or have taken a related beta-lactam antibiotic more than once in the previous month.

Respiratory tract procedures

Bacteraemia associated with respiratory procedures predominantly involves viridans group streptococci, organisms known to cause infective endocarditis. Prophylaxis is only recommended for those procedures which have an increased risk of bacteraemia (see Table 2, below).

Table 2. Respiratory tract procedures and their requirement for endocarditis prophylaxis in patients with cardiac conditions listed in Box 1

Prophylaxis always required (high risk of bacteraemia)	Prophylaxis not required (low risk of bacteraemia)
<p>Any invasive procedure involving incision or biopsy of respiratory mucosa—for example:</p> <ul style="list-style-type: none"> • tonsillectomy/adenoidectomy • rigid or flexible bronchoscopy with incision or biopsy • surgery involving bronchial, sinus, nasal or middle ear mucosa, including tympanostomy tube insertion 	<p><i>These are examples of situations where prophylaxis of infective endocarditis would not be required:</i></p> <ul style="list-style-type: none"> • rigid or flexible bronchoscopy without incision or biopsy • endotracheal intubation

If after careful evaluation of both the cardiac condition (see Box 1, p.2) and the respiratory tract procedure (see Table 2, above), antibiotic prophylaxis is considered necessary, a single dose of antibiotic should be given before the procedure; there is no proven value to giving a follow-up dose 6 hours later. For standard

prophylaxis, antibiotic choice is the same as for dental procedures (see antibiotic recommendations under Dental procedures, p.5).

Genitourinary and gastrointestinal tract procedures

Bacteraemia associated with genitourinary and gastrointestinal procedures predominantly involves enterococci, organisms known to cause infective endocarditis.

In patients with cardiac conditions listed in Box 1, prophylaxis is generally only recommended for genitourinary and gastrointestinal procedures which, because of their increased risk of bacteraemia, also have an indication for antibiotic prophylaxis for surgical reasons (eg to prevent wound infection or sepsis) (see Table 3, p.8). The recommended antibiotic for infective endocarditis prophylaxis should be given *in addition to* the antibiotic required for surgical prophylaxis (see Prophylaxis: surgical in *Therapeutic Guidelines: Antibiotic* version 13).

Infective endocarditis prophylaxis is also recommended for lithotripsy and vaginal delivery with prolonged labour in patients with cardiac conditions listed in Box 1. These procedures similarly have an increased risk of bacteraemia.

Also, for patients with an established genitourinary or intra-abdominal infection undergoing a related procedure and who have a cardiac condition listed in Box 1, *additional* infective endocarditis prophylaxis is required with an antibiotic active against enterococci (see antibiotic recommendations below) unless such an antibiotic is already part of the treatment regimen.

If after careful consideration of both the cardiac condition (see Box 1, p.2) and the genitourinary or gastrointestinal procedure (see Table 3, p.8), antibiotic prophylaxis is considered necessary, use:

amoxy/ampicillin 2 g (child: 50 mg/kg up to 2 g) IV, just before the procedure
or amoxy/ampicillin 2 g (child: 50 mg/kg up to 2 g) IM, 30 minutes before the procedure.

For patients with immediate penicillin hypersensitivity, use:

- 1 vancomycin 25 mg/kg up to 1.5 g (child less than 12 years: 30 mg/kg up to 1.5 g) IV by slow infusion (over at least 60 minutes; rate not exceeding 10 mg/min), ending the infusion just before the procedure
OR
- 2 teicoplanin 400 mg (child: 10 mg/kg up to 400 mg) IV, just before the procedure.

Table 3. Genitourinary and gastrointestinal tract procedures and their requirement for endocarditis prophylaxis in patients with cardiac conditions listed in Box 1

Prophylaxis always required (high risk of bacteraemia)	Prophylaxis not required (low risk of bacteraemia)
<ul style="list-style-type: none"> • any procedure where antibiotic prophylaxis is indicated for surgical reasons (see Prophylaxis: surgical in <i>Therapeutic Guidelines: Antibiotic</i> version 13) • lithotripsy • vaginal delivery with prolonged labour • any genitourinary procedure in the presence of a genitourinary infection unless already treating enterococci (for elective cystoscopy or urinary tract manipulations, obtain a urine culture and treat any significant bacteriuria beforehand) • any gastrointestinal procedure in the presence of an intra-abdominal infection unless already treating enterococci 	<ul style="list-style-type: none"> • procedures not requiring surgical prophylaxis and in the absence of related infection. <i>Examples include:</i> <ul style="list-style-type: none"> – urethral catheterisation, uterine dilatation and curettage, sterilisation procedures, insertion or removal of intrauterine contraceptive device – vaginal delivery – transoesophageal echocardiography – endoscopy +/- biopsy, including colonoscopy – percutaneous endoscopic gastrostomy

Other procedures

For patients who have a cardiac condition associated with a high risk of adverse outcomes from infective endocarditis (see Box 1, p.2) and who are undergoing a procedure listed in Table 4, it is particularly important that antibiotic treatment should be given as recommended for the specific procedure (see cross-references in Table 4 below).

Table 4. Other procedures which require antibiotic treatment in patients with cardiac conditions listed in Box 1*

- incision and drainage of local abscess:
 - brain (see Brain abscess or subdural empyema, p.65)
 - boils and carbuncles (see Boils and carbuncles, p.271)
 - dacryocystitis (see Dacryocystitis, p.71)
 - epidural (see Epidural abscess, p.66)
 - lung (see Lung abscess, p.226)
 - orbital (see Orbital [postseptal] cellulitis, p.71)
 - perirectal (see Perirectal abscess, p.90)
 - pyogenic liver (see Pyogenic liver abscess, p.144)
 - tooth (see Acute odontogenic infections, p.167)
- surgical procedures through infected skin (see Cellulitis, p.274)

* The page numbers for cross-references refer to the relevant topics in *Therapeutic Guidelines: Antibiotic* version 13

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