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# Prevention of endocarditis: dental procedures

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## KEY INFORMATION

The process used to produce this guideline is described on the Therapeutic Guidelines website <[www.tg.org.au](http://www.tg.org.au)>.

### Dosing regimens

The dosing regimens in the text generally apply to nonpregnant adults of average size; higher or lower doses are appropriate for some patients. Children's doses have not been assessed for suitability in neonates; when doses are given for neonates, they apply to full-term neonates only, unless otherwise specified.

Where more than one drug regimen is listed for an indication, the number next to the regimen shows its place in therapy (eg **1** for first-line therapy, **2** for second-line therapy). Drugs that are equally appropriate for a given indication are marked with the same number.

### Disclaimer

These guidelines are an acceptable basis for management of patients, but there may be sound reasons for modifying therapy in certain patients or specific institutions. The complexity of clinical practice requires that users understand the individual clinical situation and exercise independent professional judgment when basing therapy on these guidelines. Particularly in complicated situations, these guidelines are not a substitute for expert advice.

These guidelines do not provide comprehensive drug information. Prescribers should consider the particular harm–benefit profile of a drug in each patient, taking into account adverse effects, contraindications, the potential for drug interactions and other drug characteristics.

# Prevention of endocarditis

## GENERAL CONSIDERATIONS

Infective endocarditis is a relatively uncommon illness with high morbidity and mortality. The incidence in Australia is approximately five cases per 100 000 person–years and the in-hospital mortality is 15% to 20%.

For many years, antibiotic prophylaxis was routinely administered before dental and other procedures to patients with cardiac conditions that carry a high lifetime risk of infective endocarditis. However, endocarditis after dental or other procedures is infrequent, so prophylaxis prevents very few cases. Infective endocarditis is more likely to result from bacteraemia associated with daily activities than from specific dental procedures, so the maintenance of good oral health and hygiene is more important than peri-procedural antibiotics. Endocarditis can occur after hospitalisation, especially in older, sicker patients with diabetes or chronic kidney impairment. However, this does not appear to be a sequel to a particular procedure but rather to problems such as IV-site infections. This emphasises the need for infection prevention and control strategies in hospitals.

No randomised controlled trial has been performed to determine the role of antibiotic prophylaxis, and there are no human studies showing that it can prevent endocarditis. Consequently, guidelines rely on expert consensus. Since 2002, many international guidelines\* have significantly reduced the number of indications for antibiotic prophylaxis for endocarditis. The National Institute for Health and Care Excellence (NICE) in the United Kingdom (UK) went even further in 2008, recommending that antibiotic prophylaxis is not required for any person before dental or other procedures.

Several studies have examined the impact of the changes in guidelines and have not found an increase in the number of cases of endocarditis, including in the UK. However, it appears that the NICE guidelines have not been universally followed in the UK, so the safety of their

\*International guidelines on the prevention of endocarditis are listed in 'Further reading' (p.8).

recommendations is yet to be proven. Therefore, *Therapeutic Guidelines: Antibiotic* continues to recommend antibiotic prophylaxis in a restricted group of patients until further evidence is available.

Antibiotic prophylaxis is recommended only for patients with a cardiac condition associated with the highest risk of *adverse outcomes* from endocarditis (see Box 1, p.4) who are undergoing certain dental procedures (see Table 1, p.5) or other procedures (see *Therapeutic Guidelines: Antibiotic*). This list of cardiac conditions is short; all of these patients have had significant cardiovascular diseases or interventions. Prophylaxis is also recommended for high-risk patients with documented rheumatic heart disease (see below). Prophylaxis is not recommended for patients with other forms of valvular or structural heart disease, including mitral valve prolapse.

It is thought that Indigenous Australians with rheumatic heart disease are at higher risk of developing infective endocarditis and for adverse outcomes from the disease. However, it has been argued that the higher risk and poorer outcomes are associated with socioeconomic disadvantage rather than ethnicity. New Zealand guidelines recommend prophylaxis for all patients with rheumatic heart disease, specifically including Maori and Pacific Islander people. It is the consensus view of the Antibiotic Expert Groups that antibiotic prophylaxis should be administered to all Indigenous Australians with rheumatic heart disease who are undergoing certain dental procedures (see Table 1, p.5) or other procedures (see *Therapeutic Guidelines: Antibiotic*). Non-Indigenous patients with rheumatic heart disease and who are at significant socioeconomic disadvantage should also be considered for antibiotic prophylaxis.

In making the decision about whether to administer antibiotic prophylaxis before a procedure in a particular patient, the following risks must be considered: the risk of giving the antibiotic, the risk of the patient developing endocarditis from the procedure, and the risk of a potential adverse outcome if the patient does develop endocarditis.

All patients with cardiac abnormalities should be reminded to practise good oral hygiene and have regular dental check-ups, with preventive dental and periodontal treatment to ensure optimal oral health. In particular, dental examination is recommended twice yearly for patients with a cardiac condition involving the endocardium, especially those listed in Box 1 (p.4). Doctors should investigate an unexplained fever because it could be a sign of endocarditis, and take samples for blood cultures before administering any oral or IV antibiotics.

### 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 who are undergoing certain dental procedures (see Table 1, p.5) or other procedures (see *Therapeutic Guidelines: Antibiotic*) [NB1]:

- 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)
- rheumatic heart disease in high-risk patients [NB2].

NB1: Patients who have had a heart transplant may also be at high risk of adverse outcomes from endocarditis; consult the patient's cardiologist for specific recommendations.

NB2: See text (p.3) for discussion of patients with rheumatic heart disease.

NPS MedicineWise has developed a patient information resource to help practitioners explain the guidelines on prevention of endocarditis (see <[www.nps.org.au/health-professionals/resources-and-tools/for-your-patients/resources/preventing-infections-of-the-heart-and-antibiotics](http://www.nps.org.au/health-professionals/resources-and-tools/for-your-patients/resources/preventing-infections-of-the-heart-and-antibiotics)>).

## DENTAL PROCEDURES AND ANTIBIOTIC RECOMMENDATIONS

Bacteraemia associated with dental procedures usually involves viridans group streptococci, which are known to cause infective endocarditis. Traditionally, the presence of 'significant bleeding' associated with a dental procedure was assumed to be an indication of bacteraemia and hence a need for prophylaxis; however, studies show that bleeding is a poor indicator of bacteraemia from dental procedures.

The key factors of a bacteraemia of oral origin are the incidence, magnitude and duration of viridans streptococcal bacteraemia. Whether a procedure necessitates prophylaxis depends on these factors.

Prophylaxis is always required for procedures with a high incidence of bacteraemia (ie bacteraemia occurs in 70% or more of patients having the procedure). Dental procedures with a moderate incidence of bacteraemia (ie bacteraemia occurs in 30% or more of patients having the procedure) should be considered for prophylaxis depending on the circumstances of the procedure and the periodontal condition (see Table 1, p.5). 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.

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

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

Self-performed oral hygiene, such as toothbrushing, flossing or use of oral irrigators, can produce a similar incidence of bacteraemia to that caused by most dental procedures (excluding extractions). As these activities are performed more frequently than dental procedures, they have the potential to produce regular episodes of bacteraemia, particularly in patients with gingival inflammation. The cumulative effect of repeated episodes of bacteraemia caused by self-performed oral hygiene 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. However, dental procedures are generally of longer duration than self-performed oral hygiene, and so expose patients to a longer duration of bacteraemia. Antibiotic prophylaxis is therefore warranted for some dental procedures in high-risk patients.

If, after careful evaluation of both the cardiac condition (see Box 1, p.4) and the dental procedure (see Table 1, p.5), antibiotic prophylaxis is considered necessary, a single dose of antibiotic should be given before the procedure. There is no proven value to giving a dose after the procedure.

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

For standard prophylaxis, use:

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

OR

**1** amoxy/ampicillin 2 g (child: 50 mg/kg up to 2 g) IV, within the 60 minutes (ideally 15 to 30 minutes) before the procedure

OR

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

For patients hypersensitive to penicillins (excluding immediate hypersensitivity), use:

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

OR

- 1** *cephazolin 2 g (child: 30 mg/kg up to 2 g) IV, within the 60 minutes (ideally 15 to 30 minutes) before the procedure*

OR

- 1** *cephazolin 2 g (child: 30 mg/kg up to 2 g) IM, 30 minutes before the procedure.*

For patients with immediate hypersensitivity to penicillins, use:

- 1** *clindamycin 600 mg (child: 20 mg/kg up to 600 mg) orally, 1 hour before the procedure\**

OR

- 1** *clindamycin 600 mg (child: 20 mg/kg up to 600 mg) IV over at least 20 minutes, within the 60 minutes (ideally 15 to 30 minutes) before the procedure.†*

There is some evidence that moxifloxacin may be used as an alternative to clindamycin for patients with immediate hypersensitivity to penicillins, but this has not been validated.

In patients taking long-term benzathine penicillin therapy for prevention of recurrent rheumatic fever, evidence suggests that the amoxicillin susceptibility of viridans streptococci in the oral flora is not significantly affected by the benzathine penicillin prophylaxis. The consensus view of the Antibiotic Expert Groups is that amoxicillin is appropriate for endocarditis prophylaxis in this setting.

In contrast, in patients currently taking or who have recently taken a course of beta-lactam therapy, evidence suggests that the amoxicillin susceptibility of viridans streptococci may be affected. Therefore, a non-beta-lactam antibiotic, such as clindamycin, may be considered for prophylaxis in this setting.

\* For patients unable to swallow clindamycin capsules, a 50 mg/mL oral solution can be made before each dose by dissolving the contents of one 150 mg capsule in 2 mL of water. Draw this solution into a syringe and make the volume up to 3 mL (if necessary). The required volume of solution should be mixed with juice or soft food before administration to disguise the taste.

† Lincocmycin is used instead of IV clindamycin in some centres. The recommended dose of lincocmycin is 600 mg (child: 20 mg/kg up to 600 mg) IV over at least 1 hour.

## FURTHER READING

### International guidelines on the prevention of endocarditis:

American Heart Association. Prevention of infective endocarditis guidelines (2007)

<[www.ncbi.nlm.nih.gov/pubmed/17446442](http://www.ncbi.nlm.nih.gov/pubmed/17446442)>

American College of Cardiology / American Heart Association. Guideline for the management of patients with valvular heart disease (2014)

<[www.ncbi.nlm.nih.gov/pubmed/24603191](http://www.ncbi.nlm.nih.gov/pubmed/24603191)>

British Society for Antimicrobial Chemotherapy. Guidelines for the prevention of endocarditis (2006)

<[www.ncbi.nlm.nih.gov/pubmed/16624872](http://www.ncbi.nlm.nih.gov/pubmed/16624872)>

European Society of Cardiology. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis (2009)

<[www.ncbi.nlm.nih.gov/pubmed/19713420](http://www.ncbi.nlm.nih.gov/pubmed/19713420)>

National Heart Foundation of New Zealand. Guideline for prevention of infective endocarditis associated with dental and other medical interventions (2008)

<[www.heartfoundation.org.nz/programmes-resources/health-professionals/guidelines-and-patient-resources/infective-endocarditis1](http://www.heartfoundation.org.nz/programmes-resources/health-professionals/guidelines-and-patient-resources/infective-endocarditis1)>

National Institute for Health and Care Excellence (NICE). Prophylaxis against infective endocarditis (2008)

<[www.nice.org.uk/CG064](http://www.nice.org.uk/CG064)>

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