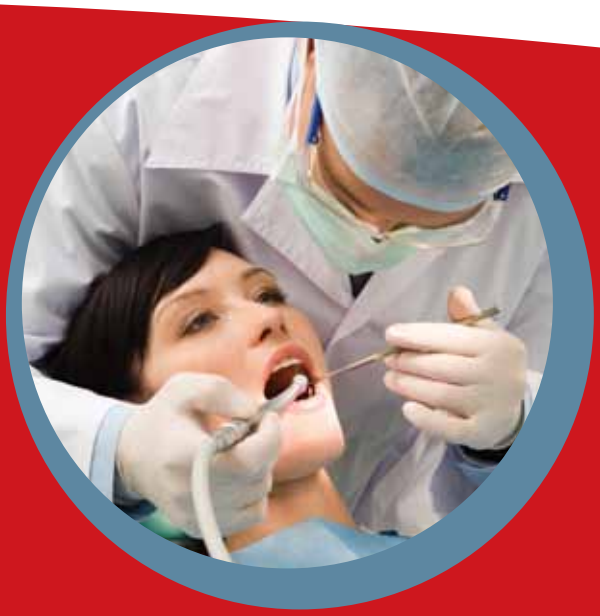
The Cardiac Society of Australia and New Zealand

Heart Foundation



New Zealand Guideline for Prevention of Infective Endocarditis Associated with Dental and Other Medical Interventions

Evidence-based, best practice New Zealand Guideline for **Prevention of Infective Endocarditis Associated with Dental and Other Medical Interventions**

Endorsed By:

NEW ZEALAND DENTAL ASSOCIATION

The Cardiac Society of Australia and New Zealand

Paediatric Society New Zealand

A S I D

Guideline for the Prevention of Infective Endocarditis Associated with Dental and Other Medical Interventions

The National Heart Foundation of New Zealand Advisory Group

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Introduction

Since 1977, the National Heart Foundation of New Zealand (NHF) has published five technical reports on endocarditis prophylaxis for those with cardiac risks, most recently in 1999.[1] Over the last five years groups from Europe,[2] the UK,[3] the USA[4] and the National Institute for Health and Clinical Excellence (NICE) in the UK[5] have published recommendations on endocarditis prophylaxis.

There has never been a prospective clinical placebo-controlled trial of antibacterial prophylaxis in individuals with cardiac risk undergoing a potentially bacteraemia-producing procedure. A recent Cochrane review[6] on penicillin prophylaxis could find only one publication on this topic worthy of analysis, although the various national advisory groups have all considered other less rigorous studies in their discussions. In the absence of definitive human studies, indirect data has been considered and it is therefore not surprising that recommendations differ amongst countries.

The clear trend in recent recommendations represents a pendulum swing away from the widespread prophylaxis recommended in the past. The 2007 American Heart Association (AHA) recommendations[4] advise prophylaxis only for those having dental procedures and particularly advise no prophylaxis for those having gastrointestinal or genitourinary procedures. The 2008 NICE recommendations took the pendulum to its furthest point, advising no prophylaxis for anyone, for any procedure at all. However, most recent recommendations (including the AHA and the NICE) still advise appropriate antibacterial agents when at-risk cardiac patients are having surgery or medical procedures for established local infections at sites where organisms known to cause infective endocarditis might be present.

Factors on which these changed recommendations are based include:

- The continuing absence of direct data to substantiate the benefit of antibacterial prophylaxis in humans.
- An acceptance that the frequency of viridans streptococcal bacteraemia consequent upon routine daily chewing, tooth brushing and flossing, over time, greatly exceeds the frequency of these events consequent upon therapeutic dental procedures.
- An acceptance that the increased lifetime risk of endocarditis for an individual with a particular cardiac defect cannot be translated meaningfully into a definable risk associated with a single bacteraemia-producing procedure for that individual.
- The increasing resistance of viridans streptococci (and enterococci and staphylococci) to antibacterial agents, a phenomenon that can only reduce the effectiveness of prophylaxis with time.
- The knowledge that enterococcal endocarditis is uncommon and rarely related to a prior bacteraemia-producing procedure and that viridans streptococcal endocarditis is rarely related to a prior bacteraemia-producing procedure involving the respiratory tract and upper gastrointestinal tract.
- Two propositions, seemingly strongly driving the NICE position. Firstly, that: '...current antibiotic prophylaxis regimens might result in a net loss of life...' (presumably due to anaphylaxis, although that event has never been reported in the US[4] or the UK[7] consequent upon antibacterial prophylaxis given to prevent endocarditis) and secondly, a cost-benefit analysis that '...suggests the prophylactic antibiotic strategies [are] not cost effective under all scenarios explored...' Both these propositions are as open to debate as any other issues related to this topic.

The NHF Advisory Group considered carefully the option of abandoning all endocarditis prophylaxis, both before and after the NICE recommendations were published. Sensitive to the dictum proposed by Carl Sagan that 'Absence of evidence is not evidence of absence', we have not gone that far.

The recommendations that follow are more closely aligned to the AHA view; an evolutionary rather than a revolutionary approach. Perhaps further information arising from the NICE advice will aid these decisions in the future, if that advice is taken up generally in UK practice and appropriate outcomes evaluated.

Two aspects are particularly relevant to our recommendations:

1. An evaluation of animal models of prophylaxis demonstrates some important lessons about the pathophysiology of this process. The models show that appropriate antibacterial prophylaxis reduces the likelihood of subsequent infective endocarditis after induced viridans streptococcal bacteraemia. It is universally agreed that these models are a more severe test of prophylaxis than is needed, mainly because human bacteraemias are usually milder. Thus it appears implausible that these regimens would not be effective in humans. Continuing to advise antibacterial prophylaxis for those groups who bear the severest consequences if endocarditis ensues, seems a reasonable precautionary measure.

2. Significant numbers of disadvantaged New Zealanders, especially young Maori and Pacific people, have rheumatic valvular heart disease[8] and important dental and periodontal disease. These individuals carry a life-long burden of illness and infective endocarditis can add greatly to this. For health practitioners and dentists in particular, 'Primum non nocere' remains a fundamental tenet of professional practice. To put this in perspective, a single dose of amoxycillin before the dental procedure is really a rather small issue for patient, dentist and global antimicrobial use when considered against the importance of providing the best preventive dental advice and care for these individuals.

If the recommendations that follow are widely accepted, fewer individuals will take prophylaxis for their cardiac defects, fewer procedures will need prophylaxis and the regimens will be slightly simpler. Patients accustomed to past advice will need to be carefully advised of the reasons for these changes, which are the most wide-ranging since the NHF has contributed to this debate.

This guideline will be reviewed in five years time.

Cardiac Conditions

The number of cardiac conditions for which prophylaxis is recommended has been reduced significantly (Table 1). These conditions have been selected because of a high lifetime risk of endocarditis and a high risk of mortality or major morbidity resulting from bacterial endocarditis, should it occur. In line with other recent recommendations we no longer recommend differentiation into high and moderate-risk groups.

The main difference from other recent national recommendations is the retention of rheumatic heart disease in the list of conditions requiring prophylaxis. This reflects the known high lifetime risk of endocarditis in this population and the potential for significant adverse outcomes after endocarditis. Rheumatic heart disease remains a major cause of morbidity and mortality in New Zealand[8] and our recommendations take into account this difference from other developed countries. Although it is possible that the risk of endocarditis may differ with the severity of rheumatic valvular involvement, there is no clear evidence to this effect and prophylaxis is therefore recommended regardless of severity. Prophylaxis is not recommended for those who have had previous rheumatic fever without cardiac involvement. We hope that this pragmatic approach will allow for straight forward interpretation.

Table 1.

Cardiac conditions for which endocarditis prophylaxis is recommended
• Prosthetic heart valves (bio or mechanical)
• Rheumatic valvular heart disease
• Previous endocarditis
• Unrepaired cyanotic congenital heart disease (includes palliative shunts and conduits)
• Surgical or catheter repair of congenital heart disease within 6 months of repair procedure.

Dental Care

This new NHF guideline highlights the imperative that at-risk patients should remain free of dental disease. This requires emphasis on improved access to dental care and improved oral health in patients with underlying cardiac risk factors for infective endocarditis, rather than a sole focus on dental procedures and antibacterial prophylaxis.

Optimal oral health is maintained through regular professional care and the use of appropriate products such as manual and powered toothbrushes, floss and other plaque-control devices such as antibacterial mouthwashes. Patients need to be strongly advised to comply with a continuing oral and dental care regimen.

Treatments to achieve this goal include:

- Removal of impacted teeth and unerupted teeth
- Treatment of all teeth with periapical disease by endodontic debridement and root filling or apical surgery or extraction
- Removal of all carious teeth that cannot be restored
- Treatment of other abnormalities such as cysts or intra-bony lesions associated with the dentition and related structures
- Treatment of oral ulcers including those caused by ill-fitting or irritating dental appliances
- Treatment of inflammatory periodontal disease
- Oral hygiene instructions for the patient to ensure maintenance of ideal oral health.

Dental procedures (and we include here tonsillectomy/adenoidectomy) for which antibacterial prophylaxis is recommended are listed in Table 2.

Table 2.

Dental procedures (plus tonsillectomy/adenoidectomy) for which endocarditis prophylaxis is recommended
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 anaesthetic 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 • Bleeding from trauma to the lips or oral mucosa.

Non-Dental Procedures

Endocarditis prophylaxis is no longer recommended for non-dental procedures (including respiratory, gastrointestinal and genitourinary procedures) (Table 3), unless the procedure is at a site of established infection (Table 5). Antibacterial prophylaxis to prevent non-endocarditis infections after these procedures may be indicated but recommendations for this are not within the scope of this guideline.

Table 3.

Non-dental procedures for which endocarditis prophylaxis is NOT recommended*†

*** The following procedures do NOT need endocarditis prophylaxis:**

- Surgery involving respiratory mucosa (other than tonsillectomy/adenoidectomy)
- Bronchoscopy
- Oesophageal, gastrointestinal or hepatobiliary procedures (including oesophageal stricture dilatation, ERCP)
- Gastrointestinal endoscopy
- Genitourinary or gynaecologic procedures (including TURP, cystoscopy, urethral dilatation, lithotripsy and hysterectomy)
- Vaginal or caesarean delivery
- Cardiac procedures (including percutaneous catheterization).

*** Endocarditis prophylaxis may be recommended if the procedure is at a site of established infection**

† Antibacterial prophylaxis to prevent non-endocarditis infection after these procedures may be indicated

Education and Identification of At-Risk Patients

District Health Boards and other organisations where at-risk patients may be identified are responsible for educating patients and staff about the need for good dental care and appropriate antibacterial prophylaxis. Patient education cards and resources for dentists and healthcare professionals are available from the Heart Foundation (see back cover for contact details).

Electronic alerts should be placed for these patients in appropriate public and private medical information systems. From a dental practitioner's perspective, the Heart Foundation wishes to re-emphasize the need for improved access to dental care and improved oral health in patients with underlying cardiac risk factors for infective endocarditis, rather than a sole focus on dental procedures and antibacterial prophylaxis.

Antibacterial Prophylaxis

Prophylaxis for dental procedures and tonsillectomy is directed against viridans streptococci. While they are not the only organisms that cause bacteraemia following these procedures, they are the organisms most likely to cause endocarditis.

There have been many reports of viridans streptococci with reduced susceptibility to penicillins, both in New Zealand and internationally. These strains are typically also less susceptible to cephalosporins, especially the oral first-generation cephalosporins. This has contributed to our decision to no longer recommend cephalosporins as oral alternatives. Viridans streptococci have shown a similar increase in resistance to macrolides while their resistance to clindamycin has also increased, but to a lesser extent.

The principles of prophylaxis for prevention of endocarditis from viridans streptococci have been well established in animal models. Successful prophylaxis depends more on prolonged antibacterial activity than prevention of bacteraemia. Indeed, failure of a regimen to suppress post-procedure bacteraemia is not a surrogate marker for failure of prophylaxis.[9,10] Because of this, both bactericidal (e.g. amoxycillin) and bacteriostatic or non-killing regimens (e.g. clindamycin or clarithromycin) are very effective so long as the antibacterial agent is present in the blood stream for long enough. This can be achieved with a single dose of these agents, provided the correct dosage is given (Table 4).

Table 4.

Antibacterial regimen for dental procedures (plus tonsillectomy/adenoidectomy)
Amoxycillin 2g (child: 50mg/kg up to 2g), administered • Orally, 1 hour before the procedure, or • IV, just before the procedure, or • IM, 30 minutes before the procedure. *Administer parenterally if unable to take medication orally; administer IV if IV access is readily available.*
For penicillin allergy or if a penicillin or cephalosporin-group antibiotic is taken more than once in the previous month (including those on long-term penicillin prophylaxis for rheumatic fever): **Clindamycin 600mg (child: 15mg/kg up to 600mg), administered** • Orally, 1 hour before the procedure, or • IV, over at least 20 minutes, just before the procedure, or • IM, 30 minutes before the procedure. Or **Clarithromycin 500mg (child: 15mg/kg up to 500mg) orally,** 1 hour before the procedure.
Clindamycin is not available in syrup form in New Zealand. Beware potential interactions between clarithromycin and other medications.
If the antibacterial agent is inadvertently not administered before the procedure, it may be administered up to 2 hours after the procedure.

Prophylaxis is optimal when antibacterial treatment is begun just before the procedure, to ensure adequate levels are present in the blood stream at the time of the procedure. If it is begun hours or days beforehand, it may select strains with decreased susceptibility so that if endocarditis occurs it is more difficult to treat.

Bacteraemia may complicate established focal infection and its surgical management at any site, such as drainage of an abscess (dental, skin and soft tissues, lung etc) or of peritonitis. It may also complicate procedures (including urinary catheterisation) through infected fluids, such as urine, bile or peritoneal fluid. At all of these sites bacteria commonly associated with infective endocarditis may be present. Patients with established infections at these sites will necessarily receive antibacterial treatment and those at cardiac risk are advised to have appropriate antibacterial agents included (Table 5) in their overall antibacterial regimen before their procedure.

Table 5.

Antibacterial regimen for surgery/procedures at sites of established infection
Treat promptly with antibacterial agents expected to cover the majority of causative organisms. For the purposes of endocarditis prevention, this should include:
• Dental or upper respiratory tract infections - amoxycillin (clindamycin or clarithromycin if penicillin allergy) • Gastrointestinal, hepatobiliary, genitourinary or obstetric/gynaecological infections – amoxycillin (vancomycin if penicillin allergy) • Skin, skin structure or musculoskeletal infections - flucloxacillin (a cephalosporin if mild penicillin allergy; clindamycin if severe penicillin allergy or suspect MRSA).

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Cardiovascular disease is the leading cause of death in New Zealand, accounting for 40 percent of all deaths annually (approx. 11,300 people).

Since its inception in 1968, the Heart Foundation has played a major role in reducing the high incidence of death from cardiovascular disease, including:

- Funding vital heart-related medical and scientific research in New Zealand
- Working with at-risk groups through intervention programmes
- Supporting and implementing cardiac rehabilitation programmes
- Working with food industry groups to promote healthier foods
- Providing education programmes that promote healthy eating and physical activity
- Providing heart health resources to health professionals and the general public
- Working with Pacific people through Pacific Heartbeat (PHB).

Without the generosity of New Zealanders' donations and legacies, the Heart Foundation could not achieve many of these goals. Any help you can give is greatly appreciated.

For more information on heart health and/or supporting the Heart Foundation, visit our website www.heartfoundation.org.nz or please contact:

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