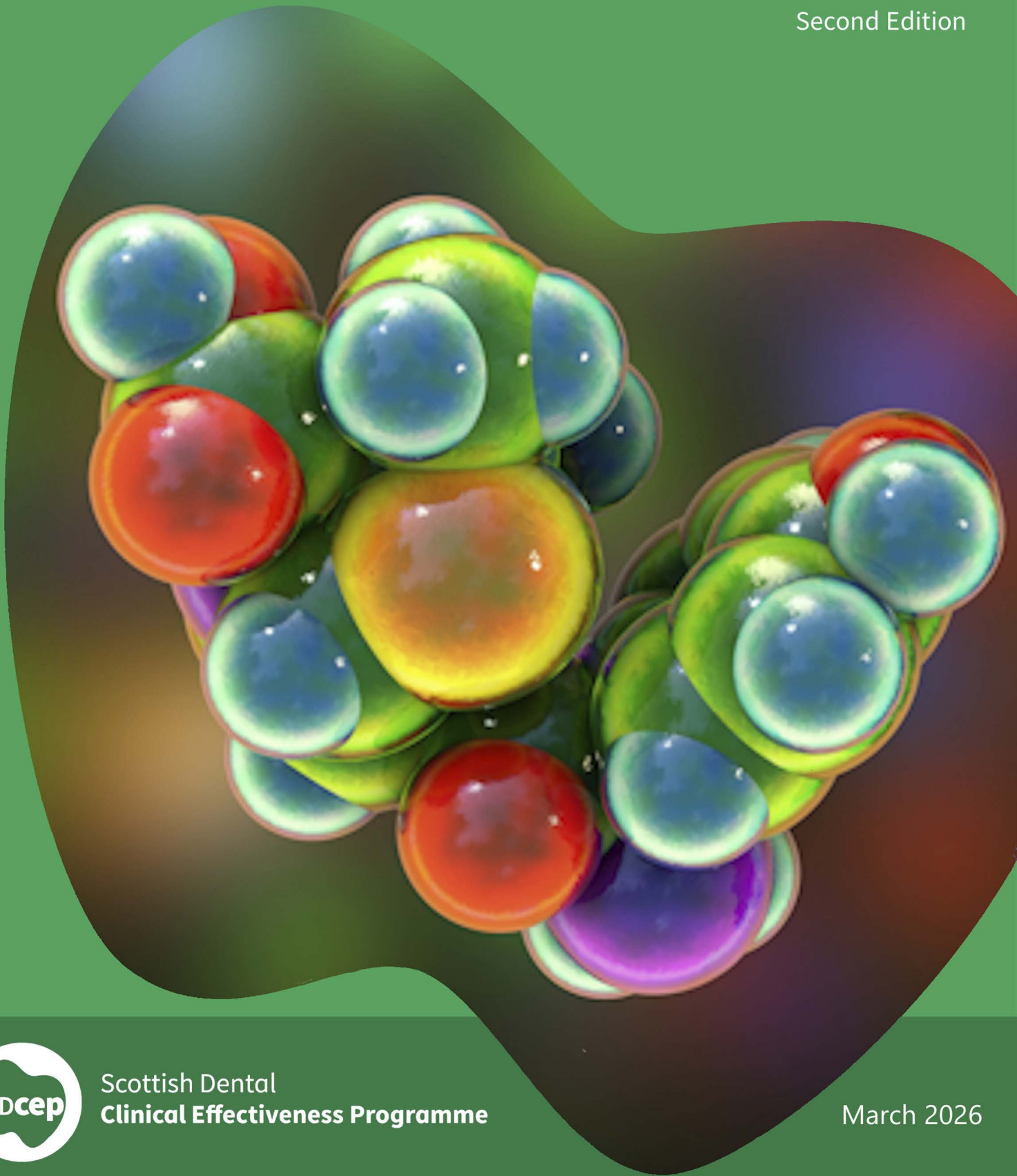
NHS Education for Scotland

Antibiotic Prophylaxis Against Infective Endocarditis

Implementation Advice

Second Edition



SDCEP Scottish Dental **Clinical Effectiveness Programme**

March 2026

Scottish Dental
Clinical Effectiveness Programme

The Scottish Dental Clinical Effectiveness Programme (SDCEP) is an initiative of the National Dental Advisory Committee (NDAC) in partnership with NHS Education for Scotland. The Programme provides user-friendly, evidence-based guidance on topics identified as priorities for oral health care.

SDCEP guidance aims to support improvements in patient care by bringing together, in a structured manner, the best available information that is relevant to the topic and presenting this information in a form that can be interpreted easily and implemented.

Supporting safe, effective, sustainable, person-centred prevention and care

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Scottish Dental Clinical Effectiveness Programme
Dundee Dental Education Centre, Frankland Building, Small's Wynd, Dundee DD1 4HN

Email: scottishdental.cep@nes.scot.nhs.uk
Website: www.sdcep.org.uk

Antibiotic Prophylaxis Against Infective Endocarditis

Executive summary

This implementation advice provides advice on antibiotic prophylaxis for patients at **high risk** and **moderate risk** of infective endocarditis undergoing dental procedures. This summary lists the key points provided within the implementation advice. For a full appreciation of these points, refer to the Sections indicated. A flowchart which illustrates the management of these patients is provided on page iv.

Shared decision-making (see Section 3)

Decisions about treatment options should be made in consultation with the patient and should include discussion of the potential benefits and harms of antibiotic prophylaxis.

Recommendations for patients at high risk of infective endocarditis (see Section 4.1)

Antibiotic prophylaxis against infective endocarditis **is recommended** in:

- patients with a previous episode of infective endocarditis
- patients with surgically implanted prosthetic valves and with any material used for surgical cardiac valve repair
- patients with transcatheter implanted aortic and pulmonary valvular prostheses
- patients with untreated cyanotic congenital heart disease (CHD)
- patients with cyanotic congenital heart disease (CHD) treated with surgery or transcatheter procedures with post-operative palliative shunts, conduits or other prostheses
  (Note: After surgical repair, in the absence of residual defects or valve prostheses, antibiotic prophylaxis is recommended **only for the first 6 months** after the procedure)
- patients with ventricular assist devices

Antibiotic prophylaxis against infective endocarditis **should be considered** in patients with transcatheter mitral and tricuspid valve repair.
(Note: Patients with septal defect closure devices, left atrial appendage closure devices, vascular grafts, vena cava filters, and central venous system ventriculo-atrial shunts are considered within this risk category **only in the first 6 months** after implantation.)

Antibiotic prophylaxis against infective endocarditis **may be considered** in recipients of heart transplant.

Recommendations for patients at moderate risk of infective endocarditis (see Section 4.1)

Antibiotic prophylaxis against infective endocarditis is **not recommended** in:

- patients with rheumatic heart disease
- patients with non-rheumatic degenerative valve disease
- patients with congenital valve abnormalities including bicuspid aortic valve disease
- patients with cardiovascular implanted electronic devices
- patients with hypertrophic cardiomyopathy

Antibiotic prophylaxis is not required for patients at **moderate risk** of infective endocarditis unless this is already specified by the patient's cardiac team (e.g. due to comorbidities).

Executive summary

Prevention of infective endocarditis (see Section 4.2)

All patients at **high risk** and **moderate risk** of infective endocarditis should be given clear and consistent information about prevention of infective endocarditis and reducing poorer outcomes, including:

- the importance of maintaining good oral health
- symptoms that may indicate infective endocarditis and when to seek expert advice
- the risks of undergoing invasive procedures, including non-medical procedures such as body piercing or tattooing

Recommendations for antibiotic prophylaxis and 'at-risk' dental procedures (see Section 4.3)

For patients at **high risk** of infective endocarditis:

- **offer** antibiotic prophylaxis prior to extractions and oral surgery procedures
- **consider** antibiotic prophylaxis for dental procedures that involve manipulation of the gingival or periapical region of the teeth. This must involve reaching a shared decision with the patient and consideration of their oral health status

See Section 4.3 for examples of 'at-risk' dental procedures.

Discuss the potential benefits and harms (e.g. common side effects such as nausea and diarrhoea; more rare adverse events such as hypersensitivity and anaphylaxis) of antibiotic prophylaxis to allow the patient to make an informed decision about whether prophylaxis is appropriate for their individual situation. A list of discussion points and a patient information leaflet can be found in Appendices 3 and 4.

For advice on the management of patients at high risk of infective endocarditis undergoing 'at-risk' dental procedures, see Section 4.4 and the flowchart provided on page iv.

Prescribing advice for antibiotic prophylaxis for 'at-risk' dental procedures (see Section 5)

When prescribing antibiotic prophylaxis for planned 'at-risk' dental procedures, give advice on possible side effects (e.g. nausea, diarrhoea) and other adverse events (e.g. hypersensitivity, anaphylaxis and antibiotic-related colitis).

Oral prophylaxis (to be taken 30-60 minutes before procedure):

Drug	Adult dose	Child dose
Amoxicillin*	2 g (4 x 500 mg capsules) ***or*** 3 g (3 g oral sachet)	50 mg/kg (**maximum dose 2 g**)
In penicillin allergy, a choice of:		
Clarithromycin	500 mg	15 mg/kg (maximum dose 500 mg)
Azithromycin	500 mg	15 mg/kg (maximum dose 500 mg)
*Amoxicillin 2 g is an effective dose for antibiotic prophylaxis in adults, but some patients may prefer to continue taking the 3 g oral sachet. The choice of amoxicillin regimen should be based on patient and clinician preference, availability and cost-effectiveness. Refer to Appendix 1 of the BNF and BNFC for details of drug interactions.		

Executive summary

Intravenous prophylaxis (to be given just before the procedure or at induction of anaesthesia):

Drug	Adult dose	Child dose
Amoxicillin	2 g	50 mg/kg (**maximum dose 2 g**)
In penicillin allergy, a choice of:		
Clarithromycin	500 mg	15 mg/kg (maximum dose 500 mg)
Cefazolin	1 g	50 mg/kg (maximum dose 1 g)
Ceftriaxone	1 g	50 mg/kg (maximum dose 1 g)
These intravenous antibiotic prophylaxis regimens are only relevant in a secondary care or hospital setting. Note that prophylaxis can be given by the oral route to a patient undergoing general anaesthesia if the patient can tolerate this. If this is the case, follow the dosing regimens for oral antibiotic prophylaxis. Refer to Appendix 1 of the BNF and BNFC for details of drug interactions.		

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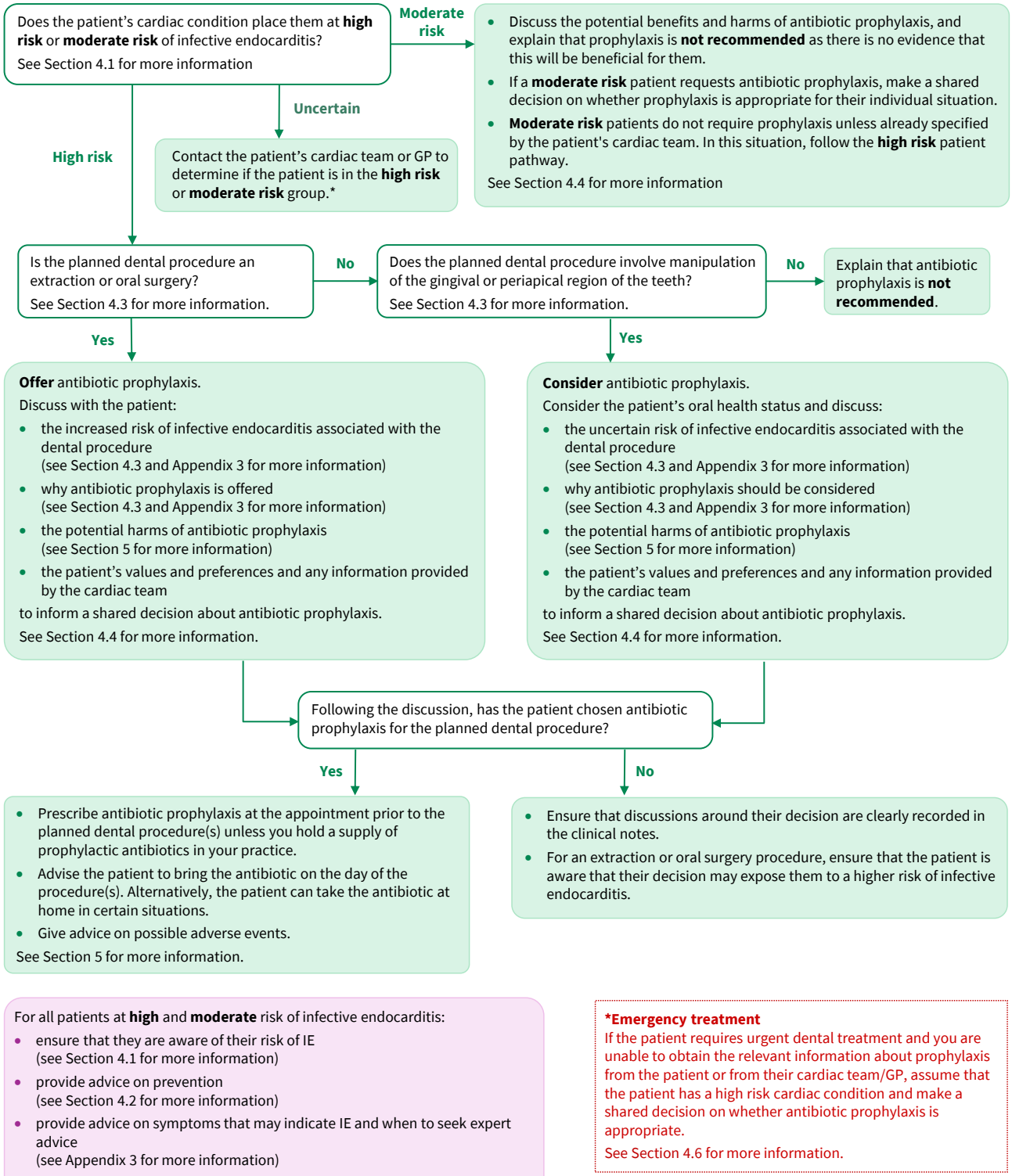
Management of patients at high and moderate risk of infective endocarditis

This flowchart illustrates the management of patients at high risk and moderate risk of infective endocarditis. A separate pdf of this flowchart is available to download from www.antibioticprophylaxis.sdcep.org.uk.



1 Introduction

Infective endocarditis (IE) is a rare (13.8 cases per 100,000 individuals per year in the general population)[1] but life-threatening infection of the endocardium, particularly affecting the heart valves. It can be difficult to diagnose, case fatality rates are approximately 30%[2,3] and there is significant morbidity, with 20-50% of patients undergoing corrective cardiac surgery.[4-11] The incidence of IE is increased in individuals with predisposing cardiac conditions (see Section 4.1). IE incidence is approximately twenty times higher in those with moderate risk cardiac conditions (280 cases per 100, 000 individuals per year) and approximately 36 times higher in those with high risk cardiac conditions (497 cases per 100, 000 individuals per year).[12] These individuals are also at increased risk of the complications of IE. However, around 30-40% of new IE cases have no known predisposing cardiac disease.[12-14]

Most cases in patients with a predisposing cardiac condition are caused by a bacterial infection originating from a transient bacteraemia.[5,6,15] Although streptococci of oral origin have been implicated in up to 45% of IE cases, recent reports suggest that the proportion of IE cases involving streptococci from a presumed oral source has fallen.[4-6,15-18] Studies suggest that less than 10% of patients diagnosed with IE underwent an invasive dental procedure in the 30 days prior to their IE diagnosis.[13,14] However, it should be noted that a lack of robust microbiological data continues to be a particular weakness of the supporting literature and advances in disease diagnosis, cardiac surgical techniques and biomaterials, as well as changes to patient risk factors and the re-classification of streptococcal species makes comparison of historical data challenging.

Previously, sporadic high-grade bacteraemias caused by dental procedures were thought to be the main risk factor for IE of oral origin, with consequent widespread use of antibiotic prophylaxis. However, there is reasonable consensus that cumulative, low grade bacteraemias, triggered by normal daily activities such as tooth brushing, flossing and chewing, may be of greater significance, emphasising the importance of maintaining good oral hygiene.[19,20] Additionally, the evidence-base for the efficacy of antibiotic prophylaxis in preventing IE is weak and views on the balance of benefits and harms have shifted in recent years, with moves to reduce the utilisation of antibiotic prophylaxis. Consequently, antibiotic prophylaxis is not the default option for most patients at risk of IE.

The National Institute for Health and Care Excellence (NICE) Clinical Guideline 64 *Prophylaxis Against Infective Endocarditis* (CG64)[21] states:

'Antibiotic prophylaxis against infective endocarditis is not recommended routinely for people undergoing dental procedures.'

This recommendation reflects the lack of high certainty evidence to support the association between dental procedures and the development of IE and the use of antibiotic prophylaxis before dental procedures in patients at risk of infective endocarditis.[21,22] It also reflects concerns about the risk of adverse reactions to antibiotic prophylaxis and antibiotic stewardship considerations.

However, NICE acknowledges that there is a sub-group of individuals at high risk of IE who may benefit from antibiotic prophylaxis.[21,22] Identification of these individuals may require liaison with the patient's cardiac team(s) and decisions about the appropriateness of antibiotic prophylaxis for different dental procedures will require discussion and shared decision-making with the patient.

1 Introduction

1.1 Statement of intent

This implementation advice has been developed primarily to assist dental teams to implement dentally relevant recommendations from CG64. It aims to help dental teams to:

- identify those patients at high or moderate risk of IE, to identify the patients for whom antibiotic prophylaxis is recommended or should be considered,
- to provide information on prevention of IE to these patients and
- to identify which dental procedures require antibiotic cover.

The implementation advice will also be of relevance to cardiac surgery and cardiology teams, pharmacists and other relevant healthcare professionals.

The evidence used by the NICE guideline committee has not been reassessed for this implementation advice. However, recent evidence which informs the classification of 'at-risk' dental procedures has been independently appraised. Relevant guidelines from the European Society of Cardiology (ESC) and the American Heart Association (AHA) have also informed the implementation advice. Other supplementary references cited in this document have been included to provide context and background information.

This implementation advice was first published in 2018 in response to an amendment to CG64. Changes to the ESC guideline in 2023, and an evidence surveillance review and further clarification to NICE CG64 in 2024, prompted a review of the 2018 implementation advice and this second edition was published in 2026. For more information on the history of this document see Appendix 1.

As with all SDCEP publications, the information presented here does not override the responsibility of the healthcare professional to make decisions appropriate to the individual patient, with their valid consent. It is advised that significant departures from this implementation advice, and the reasons for this, are documented in the patient's clinical record.

1.2 Main changes in this edition

The main changes in this edition are:

- simplified classification of patients at high and moderate risk of infective endocarditis (Section 4.1)
- amendments to the cardiac conditions in the high risk and moderate risk groups (Section 4.1)
- amendments to the recommendations for antibiotic prophylaxis for 'at-risk' dental procedures (Section 4.3)
- amendments to the management of patients at high or moderate risk of infective endocarditis (Section 4.4)
- amendments to the recommended drug regimens for antibiotic prophylaxis (Section 5.3)

1 Introduction

1.3 Supporting tools

Other resources to support this implementation advice are presented in the appendices.

- Appendix 2 – ESC recommendations for high risk patients
- Appendix 3 – Points to cover during discussion with patient about antibiotic prophylaxis
- Appendix 4 – Patient information
- Appendix 5 – Templates
- Appendix 6 – Advice for cardiology and cardiac surgery teams
- Appendix 7 – Glossary of cardiac terms
- Appendix 8 – Glossary of dental terms

2 Overview of other guidelines

Before 2008 in the UK, antibiotic prophylaxis against infective endocarditis (IE) prior to invasive dental procedures was recommended practice for certain groups of patients with predisposing cardiac conditions. In 2008, the National Institute for Health and Care Excellence (NICE) issued Clinical Guideline 64 (CG64) on *Prophylaxis against infective endocarditis* which did not recommend antibiotic prophylaxis prior to dental procedures.[21] The rationale for this was a lack of evidence to support the efficacy of antibiotic prophylaxis to prevent infective endocarditis, the risk of adverse events and antibiotic stewardship concerns.

Most other international guideline committees, such as the European Society of Cardiology (ESC) and the American Heart Association (AHA), took a different view and recommended antibiotic prophylaxis prior to invasive dental procedures for patients at high risk of infective endocarditis, with the rationale that these patients tend to have worse outcomes from an episode of infective endocarditis.[19,23]

In 2016, NICE amended CG64 to state that antibiotic prophylaxis against infective endocarditis is not recommended *routinely* for people undergoing dental procedures, noting that this change was intended to convey the importance of shared decision-making. However, CG64 lacked information on the management of patients at risk of infective endocarditis and in 2018, the Scottish Dental Clinical Effectiveness Programme (SDCEP) published implementation advice to help dental teams apply the NICE recommendation.

In 2024, NICE added a statement to CG64 acknowledging that antibiotic prophylaxis may be appropriate for people at high risk of infective endocarditis undergoing dental procedures and directing users to SDCEP's implementation advice.

The second edition of the SDCEP *Antibiotic Prophylaxis Against Infective Endocarditis* implementation advice is informed by NICE CG64, current guidelines from the ESC and AHA and by more recent evidence, and aims to assist dental teams in the UK to manage patients at risk of infective endocarditis.

2.1 National Institute for Health and Care Excellence (NICE)

In 2008, NICE issued Clinical Guideline 64 (CG64) *Prophylaxis against infective endocarditis.*[21] The guideline recommended that people at risk of infective endocarditis (IE) having dental procedures should not be offered antibiotic prophylaxis against infective endocarditis (Recommendation 1.1.3). The basis for NICE's recommendation was the lack of evidence to link dental procedures with development of IE and to support the effectiveness of antibiotic prophylaxis in preventing IE. Additionally, NICE noted that daily activities may pose a greater cumulative risk and that the number of deaths from anaphylaxis related to antibiotic prophylaxis may be higher than the number of prevented deaths, making it not cost effective.

In 2015, NICE carried out a review of the evidence. It found very low quality evidence that was inconclusive about the efficacy of antibiotic prophylaxis before an interventional procedure to reduce the incidence of IE. Recommendation 1.1.3 remained unchanged. However, in 2016 NICE amended recommendation 1.1.3 to emphasise the importance of shared decision-making:

2 Overview of other guidelines

*'Antibiotic prophylaxis against infective endocarditis is not recommended **routinely** for people undergoing dental procedures'.*

In 2018, the Scottish Dental Clinical Effectiveness Programme (SDCEP) published implementation advice to help dental teams apply the amended recommendation 1.1.3.

In 2024, NICE undertook a surveillance review[22] of the evidence in response to a coroner's request following the death of a patient in England who developed IE after a dental extraction procedure. The patient had not been prescribed antibiotic prophylaxis. The review found new evidence but concluded that this was inadequate to support the use of antibiotic prophylaxis before dental procedures in patients at risk of infective endocarditis. However, NICE did acknowledge that there is a sub-group of individuals at high risk of infective endocarditis (IE) who may benefit from antibiotic prophylaxis:

"While high quality research evidence remains scarce, there is some evidence with uncertainty that a small proportion of IE in patients at high risk may be attributable to invasive dental procedures."

As a result, NICE clarified recommendation 1.1.3 to include a link to the SDCEP implementation advice. The clarified recommendation states:

Antibiotic prophylaxis against infective endocarditis is not recommended routinely for people undergoing dental procedures

- *For advice on antibiotic prophylaxis for people at high risk of infective endocarditis undergoing dental procedures and for relevant patient information, see the implementation advice provided by the Scottish Dental Clinical Effectiveness Programme (this programme is part of NHS Education for Scotland). This advice was developed in conjunction with, and is endorsed by, NICE. It has been endorsed for use across the UK by the Chief Dental Officers of the UK.*

2.2 European Society of Cardiology (ESC) and American Heart Association (AHA)

Current guidelines from two other professional organisations also limit the extent of antibiotic prophylaxis. However, these guidelines provide more information about situations where it may be appropriate to prescribe.

European Society of Cardiology (ESC)

The 2023 ESC *Guidelines for the Management of Infective Endocarditis*[19] states:

'Antibiotic prophylaxis is recommended in patients at high risk of IE undergoing at-risk dental procedures and is not currently recommended in other situations.'

This recommendation is based on data derived from large non-randomised studies.

American Heart Association (AHA)

The most recent (2021) AHA scientific statement *Prevention of Viridans Group Streptococcal (VGS) Infective Endocarditis*,[23] states:

2 Overview of other guidelines

'Antibiotic prophylaxis for a dental procedure that involves manipulation of gingival tissues, periapical region of teeth, or perforation of the oral mucosa is suggested only for patients with the highest risk of adverse outcome from VGS IE.'

This recommendation is based on data derived from non-randomised studies.

Although both of these guidelines acknowledge that the evidence supporting antibiotic prophylaxis is low certainty and that there is a risk of serious adverse events, each states that the rationale for recommending prophylaxis for high risk individuals is that these patients are likely to have worse outcomes from an episode of IE.

For example, the mortality rate of patients who have had a previous episode of IE, and the risk and severity of associated complications, is greater than that of patients who have not previously had IE.[23] Patients with prosthetic valves who develop IE also have an increased risk of mortality, morbidity and complications compared to IE patients who have not had a prosthetic valve replacement.

3 Shared decision-making

The case of *Montgomery v Lanarkshire Health Board*[24] resulted in an increased focus on consent. The law on consent requires a clinician to inform a patient about 'material risks' and to find out what that specific patient would want to know. In the case of a child who is unable to consent for themselves, the clinician should inform the person with appropriate parental responsibility for that child about the specific 'material risks'. For adults lacking the capacity to consent, decisions should be made in accordance with the relevant principles of legislation related to mental capacity.[25-27]

It is a general principle that healthcare professionals must obtain valid consent before starting treatment or physical investigation, providing personal care, or when providing a prescription for a patient. The process for obtaining consent requires a discussion with the patient about the reasonable treatment options available to them,[28] including consideration of the implications of doing nothing, which will in turn facilitate shared decision-making.

This principle is covered in Standards 3.1, 3.2 and 3.3 of the General Dental Council's *Standards for the Dental Team*.[29] NICE's standard advice on healthcare professionals' responsibilities[12] also stresses the importance of offering the most appropriate treatment options in consultation with the patient, while taking into account their values and preferences. NICE guideline 197 (NG197) *Shared decision making*[30] includes advice and recommendations to help embed shared decision making as part of everyday care in all healthcare settings.

- Identify possible treatment options and, using your professional judgement and considering the individual circumstances of the patient, ensure that the patient is aware of any material risks and benefits involved in all reasonable treatment options (including consideration of the implications of doing nothing).
  - A list of points to cover in your discussion with the patient and a patient information leaflet can be found in Appendices 3 and 4.
- Ensure that a contemporaneous note of your discussion with the patient is recorded in the clinical records, including the specific advice given to the patient, details of the options (and benefits and harms) discussed, the patient's responses and a note of the patient's autonomous decision.

4 Advice on the provision of antibiotic prophylaxis against infective endocarditis

4.1 Patients at risk of infective endocarditis

NICE Clinical Guideline 64 (CG64)[21] states that antibiotic prophylaxis against infective endocarditis (IE) is not recommended routinely for people undergoing dental procedures. However, NICE acknowledges that there is a group of individuals for whom antibiotic prophylaxis may be of benefit.

The 2023 ESC guideline[19] identifies several categories of **high risk** patients (see Table 4.1), for whom antibiotic prophylaxis is recommended or should be considered. It also lists a group of **moderate risk** patients (see Table 4.2) for whom antibiotic prophylaxis is not recommended.

High risk patients

The recommendations for antibiotic prophylaxis in **high risk** patients undergoing 'at-risk' dental procedures (see Section 4.3), adopted from the ESC guideline, are shown in Table 4.1. As well as being at high risk of IE, these patients are also considered to be at particularly high risk of developing serious and potentially life-threatening complications.[19,23]

Table 4.1 ESC recommendations regarding antibiotic prophylaxis in high risk patients[19]

Antibiotic prophylaxis against infective endocarditis **is recommended** in:

- patients with a previous episode of infective endocarditis*
- patients with surgically implanted prosthetic valves and with any material used for surgical cardiac valve repair
- patients with transcatheter implanted aortic and pulmonary valvular prostheses
- patients with untreated cyanotic congenital heart disease (CHD),
- patients with cyanotic congenital heart disease (CHD) treated with surgery or transcatheter procedures with post-operative palliative shunts, conduits or other prostheses (Note: After surgical repair, in the absence of residual defects or valve prostheses, antibiotic prophylaxis is recommended **only for the first 6 months** after the procedure)
- patients with ventricular assist devices

(Class I recommendations; level of evidence *B or C)

Antibiotic prophylaxis against infective endocarditis **should be considered** in patients with transcatheter mitral and tricuspid valve repair (Note: Patients with septal defect closure devices, left atrial appendage closure devices, vascular grafts, vena cava filters, and central venous system ventriculo-atrial shunts are considered within this risk category **only in the first 6 months** after implantation)

(Class IIa recommendation; level of evidence C)

Antibiotic prophylaxis against infective endocarditis **may be considered** in recipients of heart transplant.

(Class IIb recommendation; level of evidence C)

Note that the wording of each recommendation reflects the level of evidence/consensus and the class of recommendation. See Appendix 2 for more details of the ESC recommendations.

4 Advice on the provision of antibiotic prophylaxis against infective endocarditis

The Class I recommendations from the ESC guideline are supported by evidence predominantly from observational studies. There is less evidence to support the Class IIa and IIb recommendations. However, due to the increased morbidity and mortality associated with an episode of IE in these groups, these patients are also considered to be at high risk. See Appendix 2 for more details of the ESC recommendations.

A glossary which further explains the cardiac terms used in this implementation advice is available in Appendix 7.

Moderate risk patients

The recommendations regarding antibiotic prophylaxis in **moderate risk** patients undergoing 'at-risk' dental procedures (see Section 4.3), adopted from the ESC guideline*, are shown in Table 4.2.

Table 4.2 ESC recommendations regarding antibiotic prophylaxis in moderate risk patients[19]

Antibiotic prophylaxis against infective endocarditis is **not recommended** in:

- patients with rheumatic heart disease (RHD)
- patients with non-rheumatic degenerative valve disease
- patients with congenital valve abnormalities including bicuspid aortic valve disease
- patients with cardiovascular implanted electronic devices (CIEDs)
- patients with hypertrophic cardiomyopathy

While antibiotic prophylaxis is not recommended in this **moderate risk** group, the ESC guideline states that this may be considered on an individual basis.[19] Specific individual circumstances where this may be appropriate include the presence of complex cardiac risk factors or comorbidities, such as diabetes or immune suppression.[31]

Accordingly, a moderate risk patient's cardiac team may recommend antibiotic prophylaxis prior to 'at-risk' dental procedures. In this situation, the patient should be treated as if they are in the **high risk** group.

The identification and assessment of **high risk** and **moderate risk** patients will require liaison with their cardiac team or general medical practitioner (GMP). The number of patients that fall within the **high risk** group is likely to be small and therefore most dental practices would be expected to have very few of these individuals registered.

Note that if a patient has a cardiac condition or has undergone a cardiac procedure that is not listed above, for example insertion of a stent, they are not considered to be at high or moderate risk of IE and antibiotic prophylaxis is not required.

For advice on prevention of IE and the management of these patients, see Sections 4.2 and 4.4.

* Note that the 2023 ESC guideline[19] refers to this patient group as being at intermediate risk of IE.

4 Advice on the provision of antibiotic prophylaxis against infective endocarditis

4.2 Prevention of infective endocarditis

All patients at **high risk** and **moderate risk** of infective endocarditis should be offered clear and consistent information about prevention and reducing poorer outcomes.[21]

- Ensure that the patient and/or their carer or guardian are aware of their risk of infective endocarditis and provide advice about prevention, including:
  - the importance of maintaining good oral health, including individualised advice on oral hygiene and attending for regular dental check-ups
    - the frequency of recall should be based on an individual oral health risk assessment
  - symptoms that may indicate infective endocarditis and when to seek expert advice;
  - the risks of undergoing invasive procedures, including non-medical procedures such as body piercing or tattooing

  A list of points to cover in your discussion with the patient and a patient information leaflet can be found in Appendices 3 and 4.
- Record that this discussion has taken place in the patient's clinical notes.

4.3 'At-risk' dental procedures

This implementation advice makes two recommendations for antibiotic prophylaxis prior to 'at-risk' dental procedures for patients at high risk of infective endocarditis, applicable to two different groups of dental procedures, (see Tables 4.3 and 4.4).

For all patients at **high risk** of infective endocarditis undergoing an 'at-risk' dental procedure, there is a requirement for shared decision-making that reflects the patient's values and preferences and takes account of any information provided by the patient's cardiac team. The potential benefits and harms of antibiotic prophylaxis should be discussed to allow the patient to make an informed decision about whether prophylaxis is appropriate for their individual situation. Appendix 3 provides more information on points to cover during this discussion.

4 Advice on the provision of antibiotic prophylaxis against infective endocarditis

Table 4.3 Recommendation for extractions and oral surgery procedures

For patients at **high risk** of infective endocarditis, **offer** antibiotic prophylaxis prior to extractions and oral surgery procedures.

Examples of these procedures include:

- Dental extractions
- Incision and drainage of abscess
- All oral surgical procedures
- Periodontal and endodontic surgery
- Placement of dental implants including temporary anchorage devices and mini-implants
- Uncovering implants and implant components that are sub-mucosal

Table 4.4 Recommendation for procedures that involve manipulation of the gingival or periapical region of the teeth

For patients at **high risk** of infective endocarditis, **consider** antibiotic prophylaxis for dental procedures that involve manipulation of the gingival or periapical region of the teeth.

- The consideration of antibiotic prophylaxis for these dental procedures must involve reaching a shared decision with the patient. This will require a discussion about the uncertain risk of infective endocarditis associated with the dental procedure and the potential benefits and harms of antibiotic prophylaxis, and consideration of the patient's individual oral health status. The shared decision must fully reflect the patient's values and preferences and take account of any information provided by their cardiac team. A list of important points to discuss with the patient is available in Appendix 3.

Examples of these procedures include:

- Professional mechanical plaque removal (PMPR);[32] this includes supra- and subgingival scaling
- Full periodontal examinations (including pocket charting)
- Basic periodontal examination (BPE)
- Plaque and bleeding indices
- Subgingival restorations including fixed prosthodontics
- Placement of preformed metal crowns
- Placement of subgingival rubber dam clamps and subgingival matrix bands
- Placement and removal of orthodontic separators and bands
- Endodontic treatment before apical stop has been established

4 Advice on the provision of antibiotic prophylaxis against infective endocarditis

Basis for these recommendations

The ESC guideline[19] defines 'at-risk' dental procedures as dental extractions, oral surgery procedures (including periodontal surgery, implant surgery, and oral biopsies) and procedures that involve manipulation of the gingival or periapical region of the teeth (including scaling and root canal procedures) (Class I recommendation; level of evidence B). This is consistent with the definition of dental procedures for which antibiotic prophylaxis is suggested in the American Heart Association (AHA) guideline.[23]

There is a lack of high certainty evidence to support the definitions from these guidelines. A systematic review of observational studies[33] found statistically significant associations between tooth extraction or oral surgery procedures and increased incidence of infective endocarditis in high risk patients. However, no significant associations were observed with endodontic treatment or scaling.

The certainty of the evidence from this systematic review is low due to the observational nature of the included studies and other methodological limitations. However, given the high morbidity and mortality associated with infective endocarditis, this implementation advice makes two recommendations in favour of antibiotic prophylaxis prior to 'at-risk' dental procedures for patients at high risk of infective endocarditis.

The wording of each recommendation reflects the evidence for the dental procedures described, and, where relevant, patient-specific factors such as oral health status. In all situations, there is a requirement for shared decision-making that reflects the patient's values and preferences**.**

Oral health status

Evidence suggests that patients with good oral health may be at less risk of bleeding during procedures that involve manipulation of the gingival tissues than those with signs and symptoms of gingivitis or unstable periodontitis.[20] Therefore, the oral health status of the patient, as well as their values and preferences and any information provided by their cardiac team, should be taken into account when considering antibiotic prophylaxis for procedures that involve manipulation of the gingival or periapical region of the teeth. This emphasises the importance of providing advice on maintaining good oral health for patients at high risk and moderate risk of infective endocarditis (see Section 4.2 and Appendix 3).

For example, when making a shared decision with a **high risk** patient about antibiotic prophylaxis for a basic periodontal examination (BPE), consider the oral health status of the patient and discuss with them:

- the implications of their oral health status for their risk of IE
- the uncertain risk of IE associated with the procedure
- the potential benefits and harms of antibiotic prophylaxis
- their own values and preferences regarding antibiotic prophylaxis
- any information provided by their cardiac team

4 Advice on the provision of antibiotic prophylaxis against infective endocarditis

The patient can then make an informed decision about whether or not they wish to have antibiotic prophylaxis for the BPE. This process can also be applied to other procedures that involve manipulation of the gingival tissues.

Treatment Planning

When treatment planning for a **high risk** patient who has chosen antibiotic prophylaxis for 'at-risk' dental procedures, consider carrying out multiple 'at-risk' procedures at the same visit (e.g. some periodontal indices, PMPR and subgingival restorations) to reduce the number of instances that the patient will need to take antibiotic prophylaxis.

Note that as patient factors, for example oral health status, experience of treatment and patient preferences, may change, it is likely that the shared decision about antibiotic prophylaxis for 'at-risk' procedures will have to be revisited for each new course of treatment. For dental procedures that are usually part of a routine examination, such as the BPE, the shared decision on prophylaxis should be revisited if these patient factors change.

Antibiotic prophylaxis is **not recommended** for the following procedures or situations:

- infiltration or block local anaesthetic injections in non-infected soft tissues
- supragingival restorations
- removal of sutures
- radiographs
- placement or adjustment of removable orthodontic or prosthodontic appliances
- adjustment of fixed orthodontic appliances which does not involve placement or removal of orthodontic separators and bands.
- following exfoliation of primary teeth
- following trauma to the lips or oral mucosa

For advice on the management of patients at high risk or moderate risk of IE having 'at risk' dental procedures, see Section 4.4 and the flowchart provided in the Executive Summary.

A glossary which further explains the dental terms used in this implementation advice is available in Appendix 8.

4 Advice on the provision of antibiotic prophylaxis against infective endocarditis

4.4 Management of patients at increased risk of infective endocarditis

Table 4.5 Recommendations regarding antibiotic prophylaxis in high and moderate risk patients

For patients at **high risk** of infective endocarditis, **offer** antibiotic prophylaxis prior to extractions and oral surgery procedures (see Section 4.3 for examples of these procedures).

For patients at **high risk** of infective endocarditis, **consider** antibiotic prophylaxis for dental procedures that involve manipulation of the gingival or periapical region of the teeth (see Section 4.3 for examples of these procedures).

- The consideration of antibiotic prophylaxis for these dental procedures must involve reaching a shared decision with the patient. This will require a discussion about the uncertain risk of infective endocarditis associated with the dental procedure and the potential benefits and harms of antibiotic prophylaxis, and consideration of the patient's individual oral health status. The shared decision must fully reflect the patient's values and preferences and take account of any information provided by their cardiac team. A list of important points to discuss with the patient is available in Appendix 3.

For patients at **moderate risk** of infective endocarditis, antibiotic prophylaxis is **not recommended** prior to 'at-risk' dental procedures.

Identification of these patients may require consultation with the patient's cardiac team(s). It is recommended that the dental team determines the patient's risk of IE when they register with the practice, or when they are first diagnosed with a cardiac condition, to ensure that the relevant information is available should they require 'at-risk' dental treatment or have a dental emergency. Re-assessment will only be required if there is a change in the patient's medical history.

Note that some patients who undergo a cardiac procedure are only considered to be at **high risk** of infective endocarditis in the first six months following the procedure (see Table 4.1).

For all patients at increased risk of infective endocarditis who require an 'at-risk' dental procedure (see Section 4.3):

- Determine whether the patient's specific cardiac condition places them at **high risk** or **moderate risk** of infective endocarditis (see Tables 4.1 and 4.2).
  - This may require consultation with the patient's cardiac team(s). A template letter to facilitate this can be found in Appendix 5.
- If a patient is unsure about the nature of their cardiac condition, contact their cardiac team(s) or general medical practitioner (GMP) for further information.

4 Advice on the provision of antibiotic prophylaxis against infective endocarditis

For patients who have a **high risk** cardiac condition (see Section 4.1) and require an 'at-risk' dental procedure (see Section 4.3 and Table 4.5):

- Provide advice about prevention of infective endocarditis (see Section 4.2 and Appendices 3 and 4).
- Explain why antibiotic prophylaxis before 'at-risk' dental procedures is recommended or should be considered for them.
- Ensure that the patient and/or their carer or guardian is aware of the potential benefits and harms of antibiotic prophylaxis (see Section 5.2) to inform a shared decision about whether antibiotic prophylaxis is appropriate for their individual situation.
  - A list of points to cover in your discussion with the patient and a patient information leaflet can be found in Appendices 3 and 4.
- If the patient **chooses to have** antibiotic prophylaxis prior to the procedure, ensure that this, and the discussions around the decision, are recorded in the patient's clinical notes and prescribe an appropriate drug (see Section 5.3).
- If the patient **chooses not to have** antibiotic prophylaxis prior to the procedure, ensure that this decision and the discussions around it, are clearly recorded in the patient's clinical notes.
  - If the procedure is an 'at-risk' dental procedure where prophylaxis is recommended (e.g. extraction, oral surgery), ensure that the patient is aware that their decision may expose them to a higher risk of infective endocarditis.
- Ensure that any episodes of dental infection in patients at **high risk** of infective endocarditis are investigated and treated promptly to reduce the risk of endocarditis developing.

For patients who have a **moderate risk** cardiac condition (see Section 4.1) and require an 'at-risk' dental procedure (see Section 4.3 and Table 4.5):

- Provide advice about prevention of infective endocarditis (see Section 4.2 and Appendices 3 and 4).
- Explain that antibiotic prophylaxis before 'at-risk' dental procedures is not recommended for them as there is no evidence that it will reduce their risk of infective endocarditis and there is a risk of an adverse reaction to the antibiotic prophylaxis.[19]
  - A list of points to cover in your discussion with the patient can be found in Appendix 3.
- If, following this discussion, the patient chooses antibiotic prophylaxis, make a shared decision on whether prophylaxis is appropriate for their individual situation.
  - Consider seeking further advice from their cardiac team if required.
- Patients at **moderate risk** of infective endocarditis do not require antibiotic prophylaxis unless this is already specified by the patient's cardiac team (e.g. due to comorbidities). In this situation, follow the advice for **high risk** patients above.
- Ensure that any episodes of dental infection in patients at **moderate risk** of infective endocarditis are investigated and treated promptly to reduce the risk of endocarditis developing.

A flowchart illustrating the management of these patients is provided in the Executive Summary.

4 Advice on the provision of antibiotic prophylaxis against infective endocarditis

4.5 Management of children at increased risk of infective endocarditis

The clinical management of children with **high risk** or **moderate risk** cardiac conditions is unlikely to be significantly different from that of comparable adult patients. However, be aware that extra consideration is required with regards to consent. Some children will have the capacity to provide valid consent for treatment (Gillick competence[34] or as defined by the Age of Legal Capacity (Scotland) Act 1991[35]), while for other child patients the parent or carer will provide consent on the child's behalf. See Section 3 for more information on obtaining valid consent.

Children with **high risk** or **moderate risk** cardiac conditions are likely to have undergone multiple medical procedures, which may impact on their ability to accept dental treatment. As with any patient who is unable to cooperate (due to young age, a learning disability or where behaviour management techniques or referral for further behavioural support have been unsuccessful), referral to assess suitability for dental treatment under sedation or general anaesthesia should be considered.[36]

Note that children with complex cardiac conditions are likely to have much of their dental care provided in secondary care or in the community/public dental service. If there are concerns regarding appropriate management of these children outwith these services, advice should be sought from a specialist paediatric dentist.

4.6 Management of emergency patients

Identifying whether a patient at increased risk of infective endocarditis has a **high risk** or **moderate risk** cardiac condition when they register with your practice, or when they are first diagnosed, will ensure that the relevant information is available if they require emergency dental treatment. However, it is recognised that some patients at increased risk of infective endocarditis may seek emergency dental care from a dental practice or out-of-hours dental clinic where an assessment of their cardiac condition may not have taken place and where it may not be possible to seek advice from the patient's cardiac team(s).

- Ensure that any episodes of dental infection in patients at increased risk of infective endocarditis are investigated and treated promptly to reduce the risk of endocarditis developing.
- Where treatment of the dental emergency is beyond your competency, seek advice from an appropriate expert based on your clinical judgement and the individual circumstances.
- If a patient with a cardiac condition who is unknown to the practice presents with a dental emergency, and the patient is not able to confirm whether their cardiac condition puts them at increased risk of infective endocarditis, consider seeking prompt advice on the appropriateness of antibiotic prophylaxis from their supervising cardiac team, where possible.
  - Many patients will know what operations they have had or will have clinic letters which can provide relevant information.
  - Where it has not been possible to obtain prompt advice, make a shared decision on antibiotic prophylaxis, based on a discussion with the patient regarding their values and preferences.

Note that antibiotic prophylaxis is not recommended following trauma to the lips or oral mucosa (see Section 4.3).

5 Prescribing advice for antibiotic prophylaxis against infective endocarditis

5.1 Antimicrobial stewardship

Antimicrobial stewardship is essential in UK dental practice to optimise patient outcomes, to prevent the overuse and misuse of antimicrobials and to combat the growing global threat of antimicrobial resistance. Inappropriate or excessive prescribing can contribute to the development of drug-resistant bacteria. In 2024, dentists accounted for approximately 7.7% of all NHS primary care antibiotic prescriptions in Scotland, 3.2% in England, and 5.9% in Wales.[37-39] Data for Northern Ireland is only available for 2022, with antibiotic prescribing in dental care accounting for 5.2% of total antibiotic prescribing in primary care in that period.[40]

While it is unclear whether providing a single prophylactic dose of antibiotics will impact significantly on community antimicrobial resistance, there is some low certainty evidence suggesting there is an increased risk of the individual patient transiently acquiring antibiotic resistant strains.[41]

5.2 Adverse events

Potential harms associated with the use of antibiotics include common side effects (such as nausea, diarrhoea or skin reactions), hypersensitivity (including anaphylaxis) and gut dysbiosis (which can increase the risk of *Clostridioides difficile* infection). Consideration of these potential harms forms a key part of the decision to prescribe and the potential for adverse effects, even from a single prophylactic dose, should be discussed with the patient.

Hypersensitivity/anaphylaxis

Treatment with beta-lactam antibiotics, such as amoxicillin, can result in hypersensitivity reactions but reports of anaphylactic reactions to amoxicillin prophylaxis are extremely rare.[42,43] Amoxicillin prophylaxis should not be prescribed for patients with a history of true penicillin allergy. Note that many reported penicillin allergies are misclassified and true allergy should be distinguished from common side effects like nausea or diarrhoea.

Antibiotic-associated colitis

The use of broad spectrum antibiotics, such as amoxicillin can cause gut dysbiosis and is associated with *Clostridioides difficile*-associated disease. Whilst even a single dose can potentially increase the risk of *Clostridioides difficile* infection (CDI), reports of adverse reactions to amoxicillin prophylaxis appear to be rare.[43*] Antibiotic-associated colitis can be fatal and therefore care should be taken when prescribing these antibiotics to vulnerable groups (e.g. older age, frailty, immunosuppressed), those who have received prolonged or repeated courses of antibiotics and those with a history of gastrointestinal disease, including those using proton pump inhibitor drugs for dyspepsia and gastro-oesophageal reflux diseases. The British National Formulary[44] (BNF; https://bnf.nice.org.uk/) provides more information on prescribing for specific patient groups.

* It should be noted that this finding is based on analysis of reports of adverse reactions to a single 3 g dose of amoxicillin based on data from the Medicines and Healthcare products Regulatory Agency (MHRA) Yellow Card Scheme. There are concerns about the appropriateness of this analysis and the MHRA states that this data should not be used to estimate the frequency of side effects.

5 Prescribing advice for antibiotic prophylaxis against infective endocarditis

Reporting adverse drug reactions

Adverse or unwanted reactions might occur after use of any drug. The Medicines and Healthcare products Regulatory Agency (MHRA; www.mhra.gov.uk) monitors suspected adverse drug reactions through the Yellow Card Scheme (yellowcard.mhra.gov.uk). Healthcare professionals are advised to record and report any adverse drug reactions using the scheme. Patients and carers can also report suspected adverse reactions to the MHRA using the scheme.

5.3 Prescribing antibiotic prophylaxis

Good antimicrobial stewardship principles, such as prescribing only when clinically indicated, using narrow-spectrum agents where possible and accurate assessment of allergy history, apply when prescribing antibiotic prophylaxis. In addition, the potential benefits and harms, including the potential for adverse effects even from a single antibiotic dose, should be discussed with the patient and the indication, choice, and rationale should be documented in the clinical record.

Refer to the SDCEP *Drug Prescribing for Dentistry* guidance (www.sdcepdentalprescribing.nhs.scot/) for more information on antimicrobial stewardship.

Note that if antibiotic prophylaxis is required for planned 'at-risk' procedures, it usually will be the responsibility of the dentist to prescribe this.

When prescribing antibiotic prophylaxis for planned 'at-risk' procedures:

- Provide the patient with a prescription for antibiotic prophylaxis at the appointment prior to the planned procedure unless you hold a supply of antibiotics in your practice.
  - If a patient's cardiac team suggests an alternative prophylaxis regimen, it is acceptable to follow their advice but ensure that the reasons for this are recorded in the patient's clinical notes.
  - For patients who require sequential 'at-risk' dental procedures (see Section 4.3) over a short time period, and it has been agreed that prophylaxis is appropriate, the same antibiotic can be prescribed for each treatment episode. In this situation, the AHA suggests a delay of 10 days between procedures that require antibiotic prophylaxis.[23]
  - For a patient who has received a recent course of antibiotics for a medical or dental infection, it is not necessary to select a drug from a different antibiotic class for the prophylaxis prescription.
  - If the antibiotic regimens included in this implementation advice are unsuitable, contact an expert, such as a consultant microbiologist or community pharmacist, for advice on an alternative drug regimen. The UK Dental Medicines Advisory Service can also be contacted for advice (www.sps.nhs.uk/home/about-sps/get-in-touch/medicines-advice-contact-details/dental-medicines-advice-service/).
- Give advice on possible side effects (e.g. nausea, diarrhoea) and other adverse events (e.g. hypersensitivity, anaphylaxis and antibiotic-related colitis).

5 Prescribing advice for antibiotic prophylaxis against infective endocarditis

- Patients prescribed an antibiotic should be advised to seek urgent medical attention if they develop antibiotic-associated colitis (severe diarrhoea, which can be fatal). The risk of colitis is increased in vulnerable groups (e.g. older age, frailty, immunosuppressed), those who have received prolonged or repeated course of antibiotics and those with a history of gastrointestinal disease.

Arrange for the antibiotic to be taken in the practice 30-60 minutes before the planned procedure is due to commence.

- If you do not hold a supply of antibiotics in your practice, advise the patient to bring the prescribed antibiotic with them to the dental practice on the day of the procedure and ensure that the patient remains in the practice in the interval between taking the antibiotic and the start of treatment.
- Alternatively, if the patient expresses a preference to take the antibiotic at home or at another location outside the practice, and has not previously had an adverse reaction to prophylaxis, it is acceptable to agree to this. Consider advising they contact the practice prior to taking the antibiotic to confirm that the procedure will be going ahead.

The BNF[44] does not currently include information on antibiotic prophylaxis against infective endocarditis in a dental context. The following regimens for adults are based on the 2023 ESC guidelines[19] and expert opinion while the doses for children are based on the 2023 ESC guidelines.[19]

5.3.1 Oral antibiotic prophylaxis regimens

For oral antibiotic prophylaxis, the ESC guideline[19] recommends a 2 g oral dose of amoxicillin for adult patients without a penicillin allergy. Historically in the UK, amoxicillin 3 g oral sachets have been used for prophylaxis prior to dental procedures in adults.[45] However, it should be noted that the 3 g oral sachets are a significantly more expensive product and supply issues have previously been reported in the UK. Both amoxicillin regimens are effective for antibiotic prophylaxis and the choice of regimen should be based on patient and clinician preference, availability and cost-effectiveness.

Clarithromycin or azithromycin are suitable alternatives in penicillin allergy. If these are not suitable, the ESC guideline[19] includes information on other appropriate oral prophylaxis regimens for use in penicillin allergy.

Note that the ESC guideline[19] no longer recommends clindamycin due to the increased risk of adverse events (mainly related to *Clostridioides difficile*-associated infections) associated with this drug. Therefore, clindamycin is not recommended for antibiotic prophylaxis in this implementation advice.

Suitable oral antibiotic prophylaxis regimens are presented in Table 5.1.

Oral antibiotic prophylaxis should be taken 30-60 minutes before the procedure.

5 Prescribing advice for antibiotic prophylaxis against infective endocarditis

Table 5.1 Oral antibiotic prophylaxis regimens

Amoxicillin 2 g is an effective dose for antibiotic prophylaxis in adults, but some patients may prefer to continue taking the 3 g oral sachet. The choice of amoxicillin regimen should be based on patient and clinician preference, availability and cost-effectiveness.

Drug	Adult dose	Child dose
Amoxicillin	2 g (4 x 500 mg capsules) ***or*** 3 g (3 g oral sachet)	50 mg/kg (**maximum dose 2 g**)
In penicillin allergy, a choice of:		
Clarithromycin	500 mg	15 mg/kg (maximum dose 500 mg)
Azithromycin	500 mg	15 mg/kg (maximum dose 500 mg)

Refer to Appendix 1 of the BNF and BNFC for details of drug interactions.

See Section 5.3.3 for details of the contraindications and cautions which should be considered when prescribing antibiotic prophylaxis. For more-detailed information on contraindications, cautions and side-effects, refer to the BNF and BNFC (available at www.bnf.nice.org.uk).

5.3.2 Intravenous antibiotic prophylaxis regimens

These intravenous antibiotic prophylaxis regimens are usually only relevant in a secondary care or hospital setting. Note that prophylaxis can be given by the oral route to a patient undergoing general anaesthesia if the patient can tolerate this. If this is the case, follow the dosing regimens for oral antibiotic prophylaxis.

Suitable intravenous antibiotic prophylaxis regimens are presented in Table 5.2.

Intravenous antibiotic prophylaxis should be given just before the procedure or at induction of anaesthesia.

Table 5.2 Intravenous antibiotic prophylaxis regimens

Drug	Adult dose	Child dose
Amoxicillin	2 g	50 mg/kg (**maximum dose 2 g**)
In penicillin allergy, a choice of:		
Clarithromycin	500 mg	15 mg/kg (maximum dose 500 mg)
Cefazolin	1 g	50 mg/kg (maximum dose 1 g)
Ceftriaxone	1 g	50 mg/kg (maximum dose 1 g)

Refer to Appendix 1 of the BNF and BNFC for details of drug interactions.

5 Prescribing advice for antibiotic prophylaxis against infective endocarditis

See Section 5.3.3 for details of the contraindications and cautions which should be considered when prescribing antibiotic prophylaxis. For more-detailed information on contraindications, cautions and side-effects, refer to the BNF and BNFC (available at www.bnf.nice.org.uk).

5.3.3 Contraindications and cautions

Amoxicillin

Amoxicillin, like other penicillins, can result in hypersensitivity reactions, including rashes and anaphylaxis, and can cause antibiotic-associated colitis, which may be fatal.

Do not give amoxicillin to patients with a history of anaphylaxis, urticaria or rash immediately after penicillin administration as these individuals are at risk of immediate hypersensitivity.

Amoxicillin should also be avoided in patients with milder forms of penicillin allergy, such as non-immediate generalised rash, but does not need to be avoided in patients who only report gastrointestinal side effects following penicillin administration.

Amoxicillin potentially alters the anticoagulant effect of warfarin and therefore the INR of a patient taking warfarin should be monitored.

Azithromycin

Azithromycin can cause abdominal discomfort, diarrhoea, nausea and vomiting in some patients.

Use azithromycin with caution in patients who are predisposed to QT interval prolongation including electrolyte disturbances and those with hepatic impairment or renal impairment.

Cefazolin/ceftriaxone

Cefazolin and ceftriaxone should not be used in patients with a history of immediate or severe hypersensitivity to penicillins, but can usually be safely administered to patients with a history of mild penicillin allergy.

Clarithromycin

Clarithromycin should be used with caution in patients who are predisposed to QT interval prolongation including electrolyte disturbances and those with hepatic impairment or renal impairment.

Do not prescribe clarithromycin in pregnancy.

Do not prescribe clarithromycin to patients taking warfarin or statins.

Clarithromycin is also contraindicated in any patient with a heart transplant taking calcineurin inhibitors (e.g. tacrolimus, ciclosporin).

The SDCEP *Drug Prescribing for Dentistry* guidance,[15] available at www.sdcepdentalprescribing.nhs.scot/ provides information on prescribing in dental practice. For more-detailed information on contraindications, cautions and side-effects, refer to the BNF and BNFC.

Appendix 1 Development of this implementation advice

The Scottish Dental Clinical Effectiveness Programme (SDCEP) is an initiative of the National Dental Advisory Committee (NDAC) and operates within NHS Education for Scotland (NES). The programme's primary aim is to develop guidance that supports dental teams to provide quality patient care.

The Scottish Dental Clinical Effectiveness Programme (SDCEP) is an initiative of the National Dental Advisory Committee (NDAC) and operates within NHS Education for Scotland (NES).

SDCEP was established in 2004 under the direction of the NDAC to give a structured approach to providing clinical guidance for the dental profession. The programme's primary aim is to develop guidance that supports dental teams to provide quality patient care. SDCEP brings together the best available information that is relevant to priority areas in dentistry, and presents guidance on best practice in a form that can be interpreted easily and implemented. The guidance recommendations may be based on a variety of sources of information including research evidence, guidelines, legislation, policies and expert opinion as appropriate to the subject. SDCEP guidance takes a variety of forms to suit the diverse topics being addressed.

SDCEP also develops implementation advice, which clarifies and advises on changes in legislation, professional regulations or other developments relevant to patient care.

Recognising that publication of guidance alone is likely to have a limited influence on practice, SDCEP also contributes to the research and development of interventions to enhance the translation of guidance recommendations into practice through its participation in the TRiaDS (Translation Research in a Dental Setting) collaboration (www.triads.org.uk/).

All of SDCEP's activities are overseen by a steering group that includes representatives of guidance development groups and the dental institutions in Scotland. Current membership of this steering group is available at www.sdcep.org.uk.

SDCEP is funded by NHS Education for Scotland. The views and opinions of NES have not influenced the recommendations made in this implementation advice.

Methodology

This implementation advice was first published in 2018 in response to an amendment to the National Institute for Health and Care Excellence (NICE) Clinical Guideline 64 *Prophylaxis against infective endocarditis* (CG64).[21] The methodology employed for the first edition of this implementation advice, published in 2018, is detailed below. Details of the methodology used to update the implementation advice for this second edition are also provided.

Development of the first edition (2018)

In 2016, NICE made an amendment to Clinical Guideline 64 *Prophylaxis Against Infective Endocarditis* (CG64). In response to this, SDCEP convened a Short-life Working Group to develop advice for the dental team to help clarify and facilitate the implementation of the amended NICE guideline. Re-appraisal of the evidence that underpinned the recommendations of CG64 was not within the scope of this work. Two

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guidelines from the European Society of Cardiology (ESC) and the American Heart Association (AHA) also informed the first edition of the implementation advice.

The resulting implementation advice was based on the recommendations in CG64, clinical guidelines from other professional organisations and a consensus of expert opinion. The prescribing information for adults was based on the antibiotic prophylaxis regimens from the 2006 British Society for Antimicrobial Chemotherapy report (BSAC) while the antibiotic prophylaxis regimens for children were based on the 2015 ESC guideline.

The first edition of the implementation advice was subject to open consultation for a seven-week period. All comments received through the consultation process were reviewed, the feedback was considered by the Working Group, and the advice was amended accordingly prior to publication.

Development of the second edition (2026)

In 2024, NICE carried out an evidence surveillance review and made a further clarification to NICE CG64. This prompted a review of the SDCEP implementation advice. The Short-life Working Group was reconvened and expanded to ensure wider representation of relevant stakeholders. The review of the implementation advice did not reassess the evidence used by the NICE guideline committee or the evidence identified in NICE's 2024 surveillance report.[22] However, recent evidence related to the risk of infective endocarditis following different dental procedures was independently appraised by Cochrane Oral Health and presented to the Short-life Working Group to inform the classification of 'at-risk' dental procedures. Updated guidelines from the European Society of Cardiology (ESC) and the American Heart Association (AHA) also informed the review of the implementation advice.[19,23] Prescribing advice for adults and children was informed by the updated 2023 ESC guideline and adapted for UK practice based on expert opinion.

In addition, the Short-life Working Group heard personal stories from people affected by infective endocarditis, including a patient who developed infective endocarditis and the families of patients who have died of infective endocarditis. The Short-life Working Group would like to express their gratitude and appreciation to those who shared their personal experiences.

Targeted external expert review of the second edition of the implementation advice took place in November 2025. Individuals and organisations with expertise or experience of the topic were asked to comment on the applicability and suitability of the implementation advice to the intended audience. All comments received were considered by the Short-life Working Group, and the advice was amended accordingly prior to publication.

Equality impact assessment

An assessment of the potential impact of this advice on equality target groups was conducted in 2018 and updated for the second edition.

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Conflict of interest

All contributors to SDCEP are required to declare their financial, intellectual and other relevant interests. At each group meeting, participants are asked to confirm whether there are any changes to these. Should any potential conflicts of interest arise, these are discussed and actions for their management agreed. External expert reviewers are also asked to declare any interests. All declarations of interest and decisions about potential conflicts of interest are available on request.

Review and updating

A review of this implementation advice will take place when NICE Clinical Guideline 64 *Prophylaxis against infective endocarditis* is next updated.

Short-life Working Group

The Short-life Working Group included individuals from a range of relevant branches of the dental profession, other healthcare disciplines, including cardiology, cardiac surgery, pharmacy, and microbiology, and two patient representatives.

Andrew Paterson (Chair)	Clinical Senior Lecturer, University of Glasgow; Honorary Consultant in Restorative Dentistry, NHS Greater Glasgow & Clyde
Carly Dixon	Clinical Lecturer in Paediatric Dentistry, University of Manchester; Specialist in Paediatric Dentistry, Manchester University NHS Foundation Trust
Elaine Cook	Vice President, Faculty of Forensic and Legal Medicine, Royal College of Physicians
Paul Cooney	General Dental Practitioner, Hamilton
Alexander Crighton	Consultant in Oral Medicine, Newcastle Dental Hospital, Newcastle upon Tyne NHS Foundation Trust
Iona Donnelly	Patient Representative
Ian Dunn	General Dental Practitioner and Specialist Periodontist, Liverpool; Council member, British Society of Periodontology and Implant Dentistry
Fiona Ellwood	Executive Lead, British Society of Dental Nurses
Paul Forsyth	Cardiology Consultant Pharmacist, NHS Golden Jubilee, Glasgow
Abdul Haleem	General Dental Practitioner and Dental Practice Advisor, Glasgow
Mostafa Hassaan	General Dental Practitioner and Deputy CDO Wales
Andreas Hoschtitzky	Consultant Cardiac Surgeon, Guy's and St. Thomas' NHS Foundation Trust; President of British Congenital Cardiac Association
Rhiannon Jones	President, British Society of Dental Hygiene and Therapy

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Anup Karki	Consultant in Dental Public Health, Cardiff
Leonard Maguire	General Dental Practitioner, Portadown
Bridget McCann	Patient Representative
Narain Moorjani	Consultant Cardiac Surgeon, Cambridge; Past President, Society for Cardiothoracic Surgery
Lochana Nanayakkara	Consultant in Restorative Dentistry, Barts Health NHS Trust, London
Rakhee Patel	Senior Clinical Lecturer and Honorary Consultant in Dental Public Health, King's College London
Helen Patterson	Consultant in Special Care Dentistry, Glasgow; President of British Society of Special Care Dentistry
Carol Philip	Lead Antimicrobial Management Team Pharmacist, NHS Lothian
Fiona Price	Medical Microbiologist, Manchester University NHS Foundation Trust
Simone Ruzario	President-elect, British Society of Dental Hygiene and Therapy
Lee Savarrio	Consultant in Restorative Dentistry; Dental Director and Postgraduate Dental Dean, NHS Education for Scotland
Rana Sayeed	Consultant Cardiac Surgeon, Oxford; Representative of the Society for Cardiothoracic Surgery
Dominik Schlosshan	Consultant Cardiologist, Leeds General Infirmary; President Elect, British Heart Valve Society
Brian Stevenson	Consultant in Restorative Dentistry, Dundee Dental Hospital and School
Michael Stewart	Consultant Cardiologist, South Tees Hospitals NHS Foundation Trust
Neil Swanson	Consultant Cardiologist, South Tees Hospitals NHS Foundation Trust; Vice President (Clinical Standards and Guidelines), British Cardiovascular Society
Mina Vaidyanathan	Consultant in Paediatric Dentistry, Guys and St. Thomas' NHS Foundation Trust; Chair of the Consultants in Paediatric Dentistry Cardiac Clinical Excellence Network
Melanie Wilson	Consultant in Oral Microbiology, Cardiff
Alison Wright	Consultant in Oral Surgery, Dundee Dental Hospital and School

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Acknowledgements

The short-life working group would like to thank Anne-Marie Glenny, Professor of Health Sciences, and Tanya Walsh, Professor of Healthcare Evaluation, from the University of Manchester/Cochrane Oral Health for their contribution to the evidence appraisal related to the classification of 'at-risk' dental procedures.

The Short-life Working Group would like to express their gratitude and appreciation to those who shared personal stories about how infective endocarditis has affected them and their families.

SDCEP would like to thank all external expert reviewers for their valuable feedback.

Programme Development Team

SDCEP's Programme Development Team (PDT) operates within NHS Education for Scotland and is responsible for the methodology used for the development of implementation advice and guidance. Working with members of the short-life working group, the team facilitates all aspects of the development of the advice. The following PDT members were directly involved in the development of the second edition of this implementation advice.

Jan Clarkson	Programme Director, SDCEP; Associate Postgraduate Dental Dean, NHS Education for Scotland; Professor of Clinical Effectiveness, University of Dundee
Samantha Rutherford	Programme Lead (Guidance), SDCEP, NHS Education for Scotland
Laura Beaton	Specialist Research Lead, Translation Research in a Dental Setting (TRiaDS), NHS Education for Scotland
Michele West	Specialist Research Lead, SDCEP, NHS Education for Scotland
Margaret Mooney	Senior Administrative Officer, NHS Education for Scotland
Jenny Wilson	Administrative Officer, NHS Education for Scotland

Appendix 2 ESC recommendations for high risk patients

The recommendations related to antibiotic prophylaxis in **high risk** patients with cardiovascular diseases undergoing dental procedures from the 2023 European Society of Cardiology guideline are presented below.
Note that the wording of each recommendation reflects the level of evidence and/or consensus and the class of recommendation.

Recommendation	Class of recommendation*	Level of evidence¥
Antibiotic prophylaxis **is recommended** in patients with a previous episode of infective endocarditis	Class I	B
Antibiotic prophylaxis **is recommended** in patients with surgically implanted prosthetic valves and with any material used for surgical cardiac valve repair	Class I	C
Antibiotic prophylaxis **is recommended** in patients with transcatheter implanted aortic and pulmonary valvular prostheses	Class I	C
Antibiotic prophylaxis **is recommended** in patients with untreated cyanotic congenital heart disease (CHD), and patients treated with surgery or transcatheter procedures with post-operative palliative shunts, conduits or other prostheses. After surgical repair, in the absence of residual defects or valve prostheses, antibiotic prophylaxis is recommended only for the first 6 months after the procedure	Class I	C
Antibiotic prophylaxis **is recommended** in patients with ventricular assist devices	Class I	C
Antibiotic prophylaxis **should be considered** in patients with transcatheter mitral and tricuspid valve repair. Patients with septal defect closure devices, left atrial appendage closure devices, vascular grafts, vena cava filters, and central venous system ventriculo-atrial shunts are considered within this risk category in the first 6 months after implantation.	Class IIa	C
Antibiotic prophylaxis **may be considered** in recipients of heart transplant	Class IIb	C

* **Class of Recommendation**
Class I: evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective;
Class II: Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure;
Class IIa: Weight of evidence/opinion is in favour of usefulness/efficacy;
Class IIb: Usefulness/efficacy is less well established by evidence/opinion.

¥ **Level of evidence**
Level of evidence B: Data derived from a single randomised clinical trial or large non-randomised studies
Level of evidence C: Consensus of opinion of the experts and/or small studies, retrospective studies, registries

Reproduced from the 2023 *ESC Guidelines for the management of endocarditis*.[19]

Appendix 3 Points to cover during discussion with patient about antibiotic prophylaxis

It is important that patients are not discouraged from undergoing dental treatment.

For patients at **high risk** and **moderate risk** of infective endocarditis (see Section 4.1):

- Advise the patient that due to their heart condition/previous episode of infective endocarditis, they have an increased risk of developing infective endocarditis following an 'at-risk' dental procedure.
  - Explain that infective endocarditis is a very rare but serious infection of the lining of the heart, often involving the heart valves, caused mainly by bacteria which enter the bloodstream from outside the body (bacteraemia).
  - Explain that if the patient develops infective endocarditis, they are also at increased risk of developing complications and have an increased risk of morbidity and mortality.

- Explain that having an 'at-risk' dental procedure, such as an extraction, may increase the chances of bacteria entering the bloodstream.
  - The tables below provide estimates of the risk of developing infective endocarditis after an 'at-risk' dental procedure in the absence of antibiotic prophylaxis for different patient groups and for specific 'at-risk' dental procedures (i.e. extractions and oral surgery) in high risk patients.

Estimated risk of developing infective endocarditis after an 'at-risk' dental procedure in the absence of antibiotic prophylaxis[31]

Patient group	Low/unknown risk	Moderate risk	High risk
Estimated risk of IE	1 in 333,000	1 in 50,000	1 in 1,000

Estimated risk of developing infective endocarditis after extractions and oral surgery procedures in high risk patients in the absence of antibiotic prophylaxis[31]

Dental procedure	Extraction	Oral surgery
Estimated risk of IE	1 in 100	1 in 40

The figure below may help you to explain risk to patients.

Risk	1 in 10	1 in 100	1 in 1000	1 in 10,000	1 in 100,000
Frequency	Someone in your family	Someone in a street	Someone in a village	Someone in a small town	Someone in a large town
Illustration					

Adapted from Risk Language and Dialects, Calman and Royston, BMJ 1997; 315:939

- Explain that everyday activities, such as toothbrushing, flossing and chewing can also cause transient bacteraemias and stress the importance of good oral hygiene to reduce the risk of this.

- Give advice on prevention of infective endocarditis to all high and moderate risk patients.

Appendix 3 Points to cover during discussion with patient about antibiotic prophylaxis

- Explain the importance of maintaining good oral health to prevent infective endocarditis.
  - Emphasise that good oral hygiene is the best way to prevent oral diseases that could require treatment with 'at-risk' dental procedures and will also reduce the chance of oral bacteria getting into the bloodstream during everyday activities.
  - Provide personalised oral hygiene advice and instruction to assist and encourage the patient to improve their oral hygiene skills.
  - Advise the patient to reduce the frequency of sugary snacks/drinks to prevent tooth decay.
  - Highlight the importance of regular dental check-ups to ensure that any dental disease is treated before 'at-risk' dental procedures are required.
- Explain that undergoing invasive procedures, including non-medical procedures such as body piercing or tattooing may also increase their risk of infective endocarditis.

The potential benefits and harms of antibiotic prophylaxis against infective endocarditis should be discussed with the patient to facilitate shared decision making.

- For **high risk** patients, explain that antibiotic prophylaxis before 'at-risk' dental procedures is recommended or should be considered for them, depending on the dental procedure.
  - There is evidence that some dental procedures (i.e. extractions and oral surgery procedures) may significantly increase their risk of infective endocarditis and antibiotic prophylaxis should be **offered** for these procedures.
  - It is unclear whether dental procedures that that involve manipulation of the gingival (i.e. gums) or periapical region of a tooth (i.e. root tip) will increase their risk of infective endocarditis and antibiotic prophylaxis should be **considered** for these procedures. This must involve reaching a shared decision with the patient and consideration of their oral health status.
  - Antibiotic prophylaxis does not fully eliminate the risk of infective endocarditis.
  - Antibiotics can cause side effects, such as nausea, diarrhoea and allergic reactions and, in rare cases, anaphylaxis and antibiotic-related colitis which can be fatal.
  - It may also be helpful to discuss the issues surrounding antibiotic resistance (see Section 5.1).
- For **moderate risk** patients, explain that antibiotic prophylaxis before 'at-risk' dental procedures is not recommended for them.
  - There is no evidence that antibiotic prophylaxis will reduce their risk of infective endocarditis.
  - Antibiotic prophylaxis does not fully eliminate the risk of infective endocarditis.
  - Antibiotics can cause side effects, such as nausea, diarrhoea and allergic reactions and, in rare cases, anaphylaxis and antibiotic-related colitis which can be fatal.
  - It may also be helpful to discuss the issues surrounding antibiotic resistance (see Section 5.1).
- Advise all high and moderate risk patients to contact their general medical practitioner as soon as possible if they notice any of the following symptoms of infective endocarditis, particularly if they occur together as a flu-like illness:
  - a high temperature (fever) of 38°C or above
  - sweats or chills, especially at night

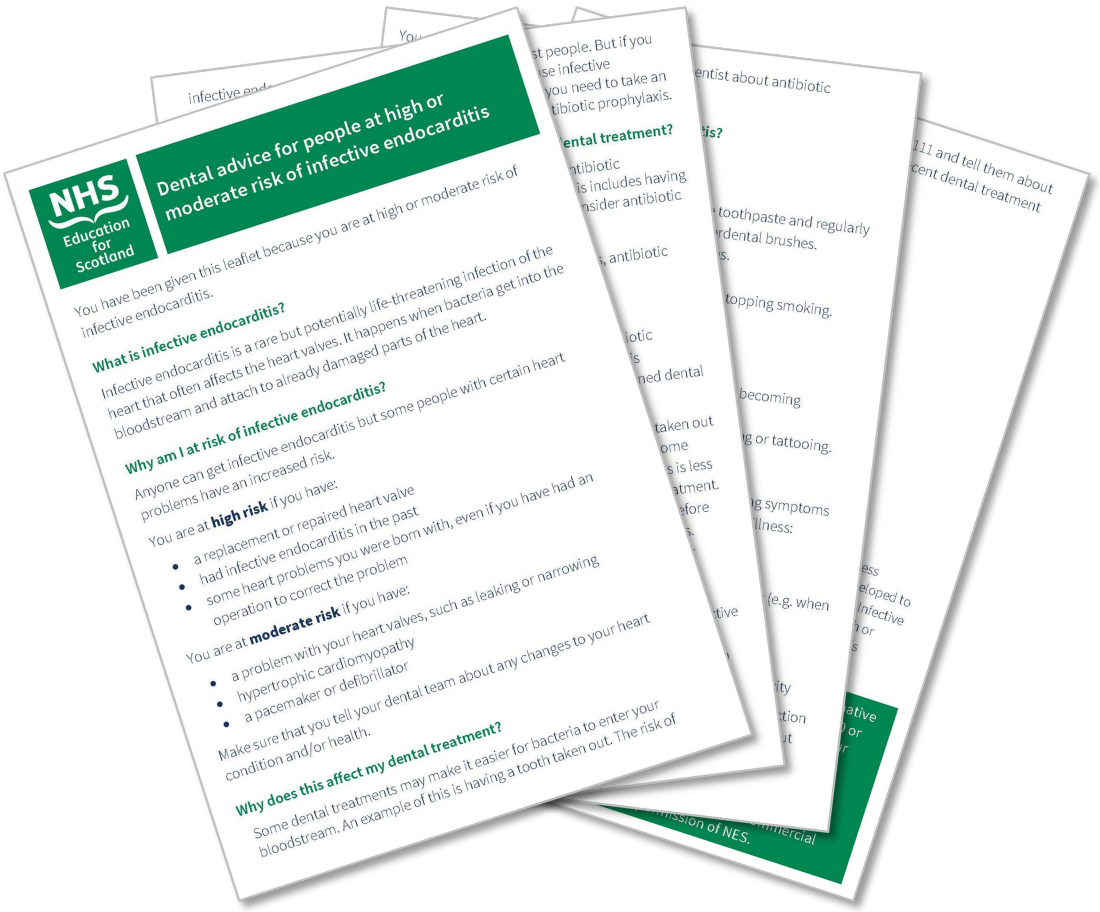
Appendix 3 Points to cover during discussion with patient about antibiotic prophylaxis

  - breathlessness, especially during normal physical activity
  - poor appetite or unexplained weight loss
  - tiredness (fatigue)
  - muscle, joint or back pain (unrelated to recent physical activity)
- Emphasise that these symptoms are more likely to be caused by a less serious type of infection but should be investigated.
- Ensure that the patient knows to tell any medical professional they seek advice from about any recent dental treatment they may have had.

- Ensure that patients prescribed antibiotic prophylaxis are aware of the potential for hypersensitivity, anaphylaxis or antibiotic-associated colitis and that they should seek urgent medical attention if they later develop colitis (severe diarrhoea), which can be fatal.
- Record all discussions with the patient in their clinical notes.

Appendix 4 Patient information

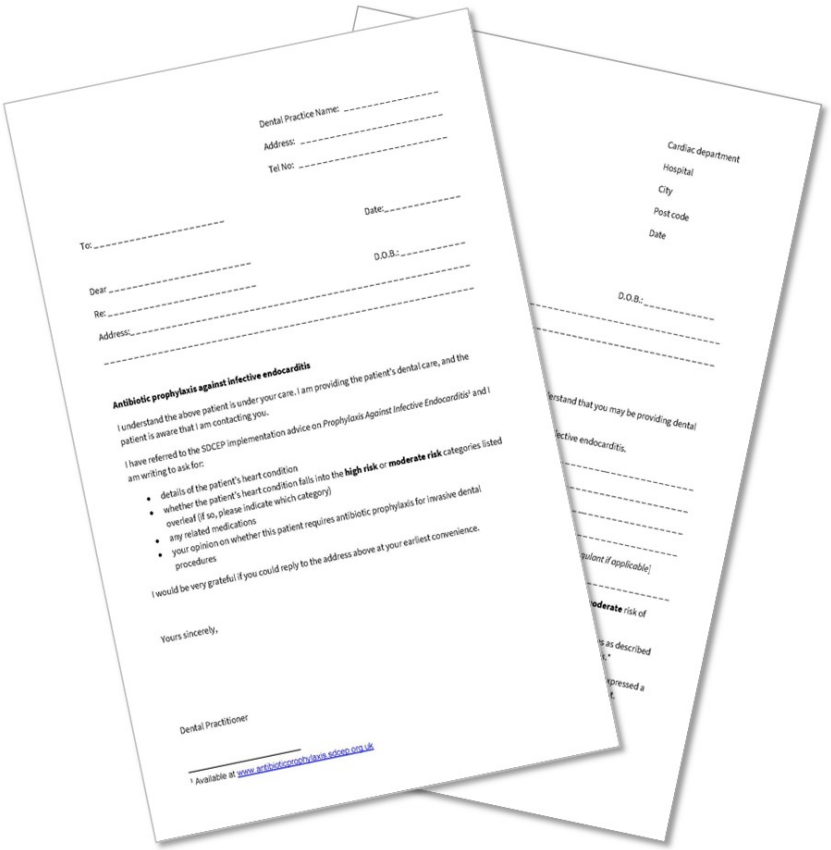
A patient information leaflet that provides advice for people at high or moderate risk of infective endocarditis is available to view and download from www.antibioticprophylaxis.sdcep.org.uk.



Appendix 5 Templates

Letters

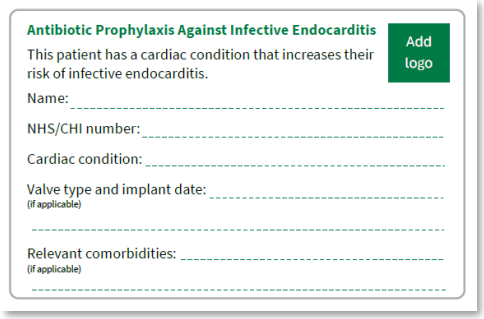
Template letters to facilitate communication between dental teams and cardiology/cardiac surgery teams are available to download from www.antibioticprophylaxis.sdcep.org.uk. These templates can be adapted for local use.

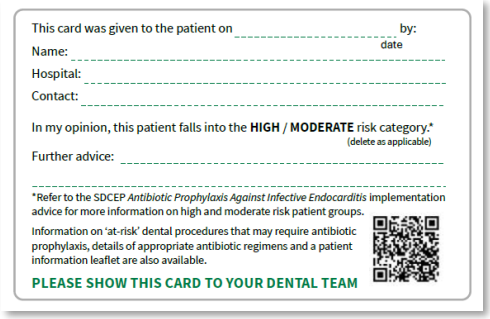

Dental Practice Name:
Address:
Tel No:
To:
Date:
Dear
D.O.B.:
Re:
Address:
Antibiotic prophylaxis against infective endocarditis
I understand the above patient is under your care. I am providing the patient's dental care, and the patient is aware that I am contacting you.
I have referred to the SDCEP implementation advice on Prophylaxis Against Infective Endocarditis[1] and I am writing to ask for:
- details of the patient's heart condition
- whether the patient's heart condition falls into the **high risk** or **moderate risk** categories listed overleaf (if so, please indicate which category)
- any related medications
- your opinion on whether this patient requires antibiotic prophylaxis for invasive dental procedures

I would be very grateful if you could reply to the address above at your earliest convenience.
Yours sincerely,
Dental Practitioner
[1] Available at www.antibioticprophylaxis.sdcep.org.uk
Cardiac department
Hospital
City
Post code
Date
D.O.B.:

Alert card

An example of an alert card that cardiology/cardiac surgery teams can give to patients with high or moderate risk cardiac conditions is available to download from www.antibioticprophylaxis.sdcep.org.uk. This example can be customised or adapted for local use.


Antibiotic Prophylaxis Against Infective Endocarditis
This patient has a cardiac condition that increases their risk of infective endocarditis.
Add logo
Name:
NHS/CHI number:
Cardiac condition:
Valve type and implant date:
(if applicable)
Relevant comorbidities:
(if applicable)


This card was given to the patient on _____ by:
date
Name:
Hospital:
Contact:
In my opinion, this patient falls into the **HIGH** / **MODERATE** risk category.*
(delete as applicable)
Further advice:
*Refer to the SDCEP *Antibiotic Prophylaxis Against Infective Endocarditis* implementation advice for more information on high and moderate risk patient groups.
Information on 'at-risk' dental procedures that may require antibiotic prophylaxis, details of appropriate antibiotic regimens and a patient information leaflet are also available.
PLEASE SHOW THIS CARD TO YOUR DENTAL TEAM

Appendix 6 Advice for cardiology and cardiac surgery teams

The National Institute for Health and Care Excellence (NICE) Clinical Guideline 64 (CG64) *Prophylaxis against infective endocarditis'*[21] states:

'Antibiotic prophylaxis against infective endocarditis is not recommended routinely for people undergoing dental procedures'.

NICE recognises that there is a sub-group of individuals at high risk of infective endocarditis (IE) who may benefit from antibiotic prophylaxis when undergoing dental procedures. NICE CG64 directs users to this SDCEP implementation advice for information on antibiotic prophylaxis for people at high risk of infective endocarditis undergoing dental procedures.

Refer to Section 1 for more information on the background to this implementation advice.

Patients at risk of infective endocarditis

The 2023 European Society of Cardiology (ESC) guideline[19] identifies several categories of **high risk** patients for whom antibiotic prophylaxis is recommended or should be considered.

The ESC guideline also lists a group of **moderate risk** patients for whom antibiotic prophylaxis is not recommended.

Refer to Section 4.1 and Appendix 2 for more information on these patient groups.

Prevention of infective endocarditis

All patients at **high risk** and **moderate risk** of infective endocarditis should be given clear and consistent information about prevention of infective endocarditis and reducing poorer outcomes, including:

- the importance of maintaining good oral health
- symptoms that may indicate infective endocarditis and when to seek expert advice
- the risks of undergoing invasive procedures, including non-medical procedures such as body piercing or tattooing.

Refer to Section 4.2 for more information on prevention of infective endocarditis.

'At-risk' dental procedures

Not all dental procedures in patients at **high risk** of infective endocarditis require antibiotic cover. Antibiotic prophylaxis is recommended for extractions and oral surgery procedures and should be considered for dental procedures that involve manipulation of the gingival or periapical region of the teeth.

Refer to Section 4.3 for more information on these recommendations and the dental procedures that fall into each of these groups.

Dental teams will make a shared decision on antibiotic prophylaxis with the patient, that involves:

Appendix 6 Advice for cardiology and cardiac surgery teams

- consideration of the IE risk associated with the dental procedure
- the potential benefits and harms of antibiotic prophylaxis
- the patient's oral health status
- the patient's values and preferences
- any information provided by their cardiac team

For further explanation of the dental terms used in this implementation advice, see Appendix 8.

What should cardiology and cardiac surgery teams do?

To support the implementation of NICE CG64, it would be helpful for cardiology and cardiac surgery teams to discuss antibiotic prophylaxis against infective endocarditis with their patients and make a shared decision on whether this is required for dental treatment.

Note that if dental teams are unable to identify whether a patient has a **high risk** or **moderate risk** of infective endocarditis, they are advised to contact the patient's cardiology or cardiac surgery team to confirm the nature of the patient's cardiac condition and whether antibiotic prophylaxis is recommended prior to 'at-risk' dental procedures.

In addition, some patients with a **moderate risk** cardiac condition, for whom antibiotic prophylaxis is not recommended, may request antibiotic prophylaxis and their dentist may contact you for advice.

For all patients at **high risk** or **moderate risk** of infective endocarditis:

- Discuss the risk of infective endocarditis with the patient while they are in your direct care to make a shared decision about whether antibiotic prophylaxis prior to dental treatment is right for them.
  - Highlight the importance of maintaining good oral health, the symptoms that may indicate infective endocarditis and when patients should seek expert advice (refer to Section 4.2 for more information)

- Advise the patient to tell their dentist about their heart condition and any discussion that they have had with you about antibiotic prophylaxis.
  - It may be helpful to include this information, including your shared decision about antibiotic prophylaxis, in a written form, either as a letter or an alert card (refer to Appendix 5 for examples). This may be sufficient to allow the patient's dental team to carry out dental treatment without needing to contact you for advice.

A leaflet which provides dental advice for patients at increased risk of infective endocarditis is available (see Appendix 4).

Appendix 7 Glossary of cardiac terms

Explanations of the cardiac terms used in this implementation advice are provided below.

Cardiac term	Explanation and, where relevant, infective endocarditis risk
Aortic regurgitation/ incompetence (AR)	Leaking aortic valve that is associated with a diastolic cardiac murmur. **Moderate** risk of infective endocarditis
Aortic stenosis (AS)	Narrowed aortic valve that is associated with a systolic cardiac murmur. **Moderate** risk of infective endocarditis
Atrial appendage closure device	A medical implant used to block off the heart's left atrial appendage in atrial fibrillation patients to prevent blood clots. **Low** risk of infective endocarditis. (N.B. **High** risk of infective endocarditis in the first six months after implantation)
Atrial septal defect (ASD)	Hole connecting venous chambers of heart that is associated with a quiet or no cardiac murmur. **Low** risk of infective endocarditis
Cardiovascular implanted electronic device (CIED)	Cardiac devices such as pacemakers or defibrillators. **Moderate** risk of infective endocarditis (related to device leads)
Central venous system ventriculo-atrial shunt	A medical device that diverts excess cerebro-spinal fluid from ventricles in the brain to the right atrium of the heart. Used, for example, in patients with hydrocephalus **Low** risk of infective endocarditis. (N.B. **High** risk of infective endocarditis in the first six months after implantation)
Congenital valve abnormalities including bicuspid aortic valve disease (ACHD – adult congenital heart disease)	Heart valve problems present at birth. The most common is when the aortic valve forms with only two leaflets instead of three (i.e. bicuspid aortic valve). Frequently associated with a cardiac murmur. **Moderate** risk of infective endocarditis. **High** risk of infective endocarditis if repair or replacement of the valve using artificial material has occurred.
Cyanotic congenital heart disease (CHD)	Complex heart disease present at birth. An abnormal flow of blood leads to mixing of oxygenated and deoxygenated blood that causes central cyanosis (i.e. bluish discolouration of mucous membranes). **High** risk of infective endocarditis
Hypertrophic cardiomyopathy (HCM)	Abnormal thickening of the heart muscle due to genetic abnormality. Can cause breathlessness and heart rhythm abnormalities and can be associated with a cardiac murmur. **Moderate** risk of infective endocarditis.

Appendix 7 Glossary of cardiac terms

Cardiac term	Explanation and, where relevant, infective endocarditis risk
Mitral regurgitation/ incompetence (MR)	Leaking mitral valve that is associated with a systolic cardiac murmur. **Moderate** risk of infective endocarditis.
Mitral stenosis (MS)	Narrowed mitral valve that is associated with a diastolic cardiac murmur, which can be hard to hear. **Moderate** risk of infective endocarditis.
Mitral valve prolapse or "floppy" or "Barlow" mitral valve (MVP)	These are the most common causes of leaking/regurgitant mitral valves. **Moderate** risk of infective endocarditis.
Non-rheumatic degenerative valve disease	The most common cause of heart valve disease. Typically caused by age-related degeneration of the valve or prolapse (often associated with calcification) and usually associated with a cardiac murmur. **Moderate** risk of infective endocarditis.
Palliative shunts, conduits or other prostheses	Surgical channels created to correct abnormal blood flow around the heart, to relieve symptoms in advanced or incurable structural heart disease. Variable association with cardiac murmur. **High** risk of infective endocarditis.
Pulmonary regurgitation (PR)	Leaking pulmonary valve. **Low** risk of infective endocarditis.
Pulmonary stenosis (PS)	Narrowed pulmonary valve. **Low** risk of infective endocarditis.
Pulmonary valvular prosthesis	An artificial replacement of the pulmonary valve of the heart. **High** risk of infective endocarditis (due to presence of prosthetic material).
QT interval prolongation including electrolyte disturbances	An abnormal ECG finding indicating delayed recovery time when the heart prepares for the next heartbeat. May occur due to genetic variants, drugs or abnormal electrolyte states. No cardiac murmur. **Low** risk of infective endocarditis.
Rheumatic heart disease (RHD)	Rheumatic fever-related inflammation of the heart and valves leading to damage to the valves that may only become evident many years later. Usually associated with a cardiac murmur. **Moderate** risk of infective endocarditis.
Septal defect closure device	An artificial device that closes off an abnormal connection/ "hole in the heart." No cardiac murmur. **Low** risk of infective endocarditis. (N.B. **High** risk of infective endocarditis in the first six months after implantation)

Appendix 7 Glossary of cardiac terms

Cardiac term	Explanation and, where relevant, infective endocarditis risk
Transcatheter implanted aortic valve	A replacement aortic heart valve implanted by keyhole approach, typically from the groin. **High** risk of infective endocarditis (due to presence of prosthetic material).
Transcatheter procedures	Procedures performed through peripheral blood vessels to change the structure of the heart or heart valves.
Tricuspid regurgitation (TR)	Leaking tricuspid valve. **Low** risk of infective endocarditis.
Vascular grafts	Artificial material implanted into the major blood vessels, for example during aortic aneurysm repairs. **Low** risk of infective endocarditis. (N.B. **High** risk of infective endocarditis in the first six months after implantation)
Vena cava filters	Sieve-like artificial structures implanted in the inferior vena cava that are designed to prevent recurrent embolisation of deep vein clots to heart and lungs. No cardiac murmur. **Low** risk of infective endocarditis. (N.B. **High** risk of infective endocarditis in the first six months after implantation)
Ventricular assist device	Pump mechanisms implanted into a failing heart that may be used pre-heart transplant. **High** risk of infective endocarditis.
Ventricular septal defect (VSD)	Hole between pumping chambers of heart that is associated with a systolic cardiac murmur. **Low** risk of infective endocarditis. (N.B. **High** risk of infective endocarditis in the first six months if any prosthetic material used for closure)
Viridans Group Streptococcal Infective Endocarditis (VGS IE)	A common bacterial cause of infective endocarditis that may originate from the oral cavity.

Appendix 8 Glossary of dental terms

Explanations of the dental terms used in this implementation advice to assist non-dental users are provided below.

Dental term	Explanation
Apical stop	A barrier that creates a seal at the tip (apex) of the tooth canal during root canal treatment.
Basic periodontal examination (BPE)	Examination of the gums around teeth using a ball-ended probe to assess health or disease. Gums which resist the probe are noted to be healthy. Where the gum bleeds or the probe slides beneath the gumline, gum inflammation or gum disease respectively is present.
Dental implant	A titanium alloy screw surgically inserted into the jawbone to replace a missing tooth or teeth, or to provide better retention for a prosthesis.
Dento-gingival junction	The area where the teeth meet the gumline.
Endodontics	Branch of dentistry focused on diagnosis and treatment of diseases associated with the dental pulp (e.g. root canal treatment).
Matrix band	A band usually made of stainless steel or plastic that is wrapped around a tooth during the restorative process to provide a wall against which to pack the restorative (filling) material.
Oral mucosa	Soft tissue lining of the mouth composed of epithelium and connective tissue.
Oral surgery	A dental speciality that involves both simple and more complex surgical procedures related to the mouth, teeth, gums, jaws and lips (e.g. biopsies, surgical tooth extraction, dental implant placement).
Orthodontic appliance	A device used to move or tilt teeth to align and correct the bite. Can also be used as part of a wider treatment plan affecting the jaw bones. Can be fixed (i.e. removal only possible by the orthodontic team) or removable (i.e. can be removed by the patient).
Orthodontic separators and bands	Separators are often elastic materials that are placed between the teeth to temporarily move them and create space for orthodontists to fit (metal) orthodontic bands, which are part of orthodontic appliances.
Periapical	Describes the area around the tooth apex (Note: periapical as a noun is also a type of dental x-ray of the tooth and supporting bone).
Peri-implant mucosa	The soft tissue lining that forms around a dental implant.
Periodontal	A term that describes the supporting structures of a tooth.

Appendix 8 Glossary of dental terms

Dental term	Explanation
Plaque and bleeding indices	A scoring system to record how many surfaces of a tooth present with plaque biofilm and how many surfaces of the gum present with bleeding with gentle probing (which indicates inflammation).
Professional mechanical plaque removal (PMPR)	The process to control and remove dental plaque biofilm and calculus (hard calcified deposits) from the tooth crown and root surface during periodontal care. PMPR was previously described by terms including scale and polish, supra- and subgingival scaling, supragingival mechanical biofilm control, root planing, root surface debridement, scaling and curettage.
Pocket charting	An assessment of the extent of gum disease by probing around the gums throughout the mouth with a blunt probe. This can cause bleeding of the gums. Pocket charting allows a dental professional to assess and record gum health and disease over time to determine if gum disease is being controlled or not.
Preformed metal crowns	A crown constructed from stainless steel for molar teeth. Commonly used in deciduous (baby) teeth in children.
Prosthodontic appliances	A dental prosthesis that is used to replace teeth and supporting structures. These can be fixed (i.e. cannot be removed by the patient) and supported by the remaining dentition or a dental implant (e.g. crown or bridge) or removable (e.g. denture).
Rubber dam	A thin rubber sheet, held in place over a tooth or teeth using a clamp, that is used to isolate the tooth or teeth from the rest of the mouth for certain dental treatments. This prevents contamination of the tooth and protects the patient's airway.
Rubber dam clamps	A metal holder that secures rubber dam over the tooth being treated. Usually sit above the gum but can be placed at gum level or just below the gum in some cases.
Subgingival restorations	Dental fillings, crowns and bridgework which are prepared and placed beneath the gumline.
Supragingival restorations	Dental fillings, crowns and bridgework which are prepared and finished above the gumline.
Temporary anchorage device (TAD)	Usually a small titanium alloy screw that is surgically inserted into the jaw bone to prevent unwanted tooth movement during orthodontic treatment.

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Scottish Dental
Clinical Effectiveness Programme

The Scottish Dental Clinical Effectiveness Programme (SDCEP) is an initiative of the National Dental Advisory Committee (NDAC) and operates within NHS Education for Scotland. The Programme provides user-friendly, evidence-based guidance on topics identified as priorities for oral health care.

SDCEP guidance supports improvements in patient care by bringing together, in a structured manner, the best available information that is relevant to the topic, and presenting this information in a form that can be interpreted easily and implemented.

SDCEP also develops implementation advice, which clarifies and advises on changes in legislation, professional regulations or other developments relevant to patient care.

The second edition of *Antibiotic Prophylaxis Against Infective Endocarditis* has been developed to assist dental teams to implement dentally relevant recommendations from NICE Clinical Guideline 64 *Prophylaxis against infective endocarditis*. This implementation advice aims to support the dental team to identify those patients at high or moderate risk of infective endocarditis, identify the patients for whom antibiotic prophylaxis is recommended or should be considered, provide information on prevention of infective endocarditis to these patients and identify which dental procedures require antibiotic cover.

The advice in this document is applicable to dental teams working in a primary care setting and to those working in secondary care. Cardiology and cardiac surgery teams, as well as patients and their carers, where appropriate, may also find the information in this document of relevance.

The implementation advice is also presented as a dedicated website, available at www.antibioticprophylaxis.sdcep.org.uk.

Scottish Dental Clinical Effectiveness Programme
Dundee Dental Education Centre, Frankland Building, Small's Wynd, Dundee DD1 4HN

Email: **scottishdental.cep@nes.scot.nhs.uk**
Website: **www.sdcep.org.uk**