Oral and Dental Care for Adults with Congenital Heart Disease

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1. Introduction

Poor oral health is associated with risks to maintaining good cardiac health. It is imperative that adults, requiring cardiac surgery or with congenital heart disease, are treated regularly and safely in the appropriate dental setting to avoid unnecessary systemic risks of infection and/or bleeding associated with poorly maintained dentitions. Some adults with congenital heart disease are predisposed to developing infective endocarditis when having invasive dental procedures. Patients who have congenital heart disease, whether under current Cardiology care or not, still need to be able to easily access dental care in a setting which meets their individual needs. Providing appropriate and timely dental treatment requires multi-disciplinary working between the patient, dental teams and their medical team, including the general medical practitioner, cardiologist and cardiac surgeon.

Dental care should focus on evidence-based prevention and high quality dental treatment to ensure patients experience minimal treatment needs.

1.1 Infective Endocarditis

Infective endocarditis (IE) is an inflammation of the endocardium, particularly affecting the heart valves and caused mainly by bacteria but occasionally other infectious agents including fungi, which are present in the bloodstream[1]. Dental and oral infections or wounds can permit micro-organisms to enter the bloodstream easily, causing bacteraemia. Heart valves, already damaged or abnormal, are more likely to become infected by these micro-organisms.
In a recent Japanese survey studying the epidemiology of IE, the oral viridans streptococci was identified as a causative organism in 26% of cases[2]. However, in a systematic review over five decades, this study concluded there has been a reduction in streptococcal-associated IE compared to Staphylococcus aureus related IE, with an increase in incidence of IE with age, which was noted in another study as 43.8% of people over 65 years[3]. There was also an increasing male to female ratio[3, 4].

IE occurs in about 5-10 people per 100,000 per annum[5]. It is a rare but serious infection, which can be life-threatening. IE can occur in the general population, but there is a substantially increased risk for people who have:

- *Heart valve problems/damage or an artificial heart valve are more likely to become infected e.g. surgery to a heart valve*
- *Certain congenital heart defects*
- *Hypertrophic cardiomyopathy*
- *Had a previous episode of infective endocarditis*
- *Been intravenous drug users, including heroin; or who share dirty or contaminated needles*
- *Immunosuppression*

2. Aims

This care pathway aims:

- To outline a generic care pathway which describes the expedient and safe dental care of patients in the South West England and South Wales Congenital Heart Disease Network (CHD Network) who are waiting for or who have undergone completed cardiac surgery and who are at high risk of developing infective endocarditis.
- To promote preventive oral care; to reduce oral infection risk; to prevent the deterioration of oral health for this patient group; and to provide appropriate advice and support for dental and medical professionals managing this patient group
- To provide a framework of key principles to assist planning and provision of dental care services for this particular patient group.
- To provide examples of documentation which might be modified for use by organisations across the CHD Network.

3. Scope

All health care professionals caring for this patient group need to have a good understanding and appreciation of the importance of good oral health, to ensure the best possible patient outcomes.
It requires multi-disciplinary working with their medical team, including the general medical practitioner, cardiologist and cardiac surgical team, involved in the patients overall care.
This pathway considers adults requiring cardiac surgery and those that are at increased risk of IE. This includes patients who have had cardiac surgery and require regular dental follow-up or have congenital heart defect.

Cardiac surgical procedures considered include:

- Aortic valve repair/replacement (AVR)
- Mitral valve repair/replacement (MV)
- Tricuspid valve repair/replacement
- Pulmonary valve repair/replacement
- Major aortic surgery
- Transcatheter Aortic Valve Implantation (TAVI)
- Congenital Heart Defect repair

3.1 Oral health and prevention of IE

Good oral and dental hygiene is thought to be important in the prevention of IE. People with an increased risk of IE in whom there are concurrent dental problems, such as dental abscesses or gum disease, should not go untreated. In a study by Lockhart et al. (2009) investigating poor oral hygiene as a risk factor for bacteraemia, they concluded people with poor oral hygiene are 4-8 times more likely to develop a bacteraemia with organisms that cause IE, following tooth brushing, than those with better standards of oral hygiene[6].

As poor dental health may contribute to endocarditis risk, dental procedures are often performed before cardiac surgical procedures, to reduce the risk of developing IE[7-9]. However, there are "no studies which have reliably quantified the magnitude of bacteraemia after extraction compared to toothbrushing" and "it is unknown as to whether or not there is a threshold below which the number of bacteria present are unable to cause endocarditis"[5]. Evidence that links dental extractions to the development of IE has been termed "largely circumstantial"[8,9]. Treatment of abscessed or infected teeth before other cardiac operations (e.g. coronary artery bypass grafting or heart transplantation) has also been performed to reduce the risk of postoperative infection or graft rejection but evidence to support a reduced risk of postoperative infection in these patients is unclear[10].

Dental extraction of abscessed or infected teeth before cardiac surgery is often performed to decrease peri-operative infection and late endocarditis. The prevalence of adverse outcomes should advise clinicians to evaluate individualised risk of anaesthesia and surgical procedures in cardiac surgery patients but evidence to support dental extraction before cardiac surgery is limited[11].

When dental extractions were undertaken concomitantly to cardiac surgery, instead of pre-operatively, a small study found no difference in the incidence of prosthetic valve endocarditis or other cardiac complications post-operatively, with significantly lower than those for the conventional group, although further research is needed[10].

3.2 NICE guidelines – Antibiotic prophylaxis

In 2015, NICE updated the 2008 guidance on the use of prophylaxis against IE (Appendix 1). This was triggered by a recent study suggesting the incidence of IE may have been affected by the guidance because there has been an increase in incidence[12].
A further update by NICE in 2016, stated 'antibiotic prophylaxis is not recommended **routinely** for people undergoing dental procedures' and encourages seeking cardiology opinions and considering the patient's preferences and then applying clinical judgement [1]. However, "a direct causal relationship between dental procedures and IE has never been proven" [3].

The risks and costs of antibiotic prophylaxis need to be considered. For people at high risk of IE, a recent study found antibiotic prophylaxis would only have to prevent 3 cases

every 2 years to be cost effective[13]. In over 34 years of adverse drug reporting for antibiotic prophylaxis in the UK, no fatal reactions to amoxicillin 3g were reported[14]. However, there were 13 fatal reactions per million prescriptions for clindamycin 600mg, most due to Clostridium difficile infection. This warrants more careful discussion with patients before considering pre-administration of clindamycin[14].
However, even the use of amoxicillin for antibiotic prophylaxis is not 100% effective at reducing the frequency of bacteraemia and clindamycin may not be particularly effective[5].

The Scottish Dental and Clinical Effectiveness Programme (SDCEP) recently published guidance[18] for dental treatment and infective endocarditis in August 2018. There are no studies to help inform decision making, especially due to the rarity of the condition, which advocates multi-disciplinary management of high risk cases, with consideration of risks and benefits of treatment.

4. Objectives

- For medical, dental and cardiac teams, to identify people, at high risk of developing infective endocarditis, who would benefit from early referral to appropriate oral healthcare
- To support the delivery of safe, high quality, patient-centred care, which encourages a system of robust and transparent quality assurance and the appropriate use of resources and encourages the use of a variety of service providers across dental and medical services, including general dental practices (GDS), general medical practices, community dental services (CDS), hospital dental services (HDS) and cardiac teams in the CHD Network areas.
- To develop clinical guidelines for provision of safe and appropriate dental care for adults with congenital heart disease and/or at high risk of developing infective endocarditis and to support General Dental Practitioners engaging in the care pathway.

5. Criteria

The majority of dental treatment for patients should be delivered, wherever possible and safe to do so, within the General Dental Service (GDS). It is therefore important that NHS Commissioners are supported in providing access to dental care for this patient group.
The Community Dental Service (CDS) and/or Hospital Dental Service (HDS) can offer care to patients, who because of their current condition, would not be suitable for treatment in the GDS.

Dental treatment is provided with appropriate liaison with the patient's cardiology team and local pathways may be established to facilitate this.

When a patient is diagnosed with structural heart defects, the general medical practitioner (GMP) or cardiology team should ensure the patient is given oral health promotion and dental advice, including the need for a dental pre-assessment. Where a cardiac intervention is deemed urgent then there should be access to urgent dental assessment and care for that patient. Local pathways should be developed to ensure this.

5.1 Referral eligibility

There are a variety of clinical circumstances that may indicate the need for dental care, including those:

- With a diagnosis of a structural cardiac defect, including congenital cardiac defect, valve replacement or repair either in a hospital or community setting.
- Under the care of cardiology team and requiring urgent dental treatment
- At high risk of developing IE or who have a previous history of I.E..
- As above but transitioning from dental care with Community Dental Services to General Dental Services (often children aged 12 and above).
- Under the care of the this CHD Network

It is proposed the diagnosing GMP or cardiologist should give a “Postcard” to the patient indicating the need to visit the dentist, details of how to access dental services and a summary of instructions for dental care (Appendix 2)
Additionally, the medical and cardiac surgery pre-assessment team can give this information to patients awaiting cardiac surgery and information leaflets on infective endocarditis (Appendix 3).

The care pathway for cardiology patients should be arranged with local cardiology teams for implementation (Appendix 4).

6. Managing Dental Referrals

Any dental referral should describe the reason for referral, and:

- Describe the underlying cardiac diagnosis and indicate the relative risk (ASA)
- Provide details of any surgery proposed including timeframe and risk of I.E.
- Make the dental team aware of dental issues the cardiology or medical teams consider important to address prior to cardiac surgery
- Indicate the need, or otherwise, for antibiotic prophylaxis
- Provide a list of prescribed medications

6.1 Non-urgent referrals of cardiac out-patients

Patients should be referred initially to GDS for dental pre-assessment, prior to cardiac surgery or future dental care, by their GMP or cardiologist, including those with:

- Congenital Heart disease
- Heart valve problems or an artificial heart valve
- Hypertrophic cardiomyopathy
- A previous episode of infective endocarditis

Access to primary care NHS dental services in the CHD Network area can be challenging. However, the number of people in this group of conditions is small and Primary Care Organisations should be supported in ensuring access to dental care in a suitable setting.

Patients unsuitable for management in GDS for dental treatment include:

- People with an unstable cardiac condition (ASA III+)
- Where a shared care approach across medical and dental specialties is required for safe management
- The individual dental practitioner is not confident managing the patient. Patients who are ASA I or ASA II should be managed in GDS.
- Those with additional needs such as learning disability or dental anxiety requiring management with conscious sedation.

It is important to direct these patients to accessible dental care in the Community Dental Services in their area for dental assessment and management, through a central triage point or through direct referral to the appropriate dental specialist via a locally agreed process.

6.2 Urgent Referrals of cardiac out-patients

In cases where patients need to be assessed urgently (e.g. imminent cardiac surgery scheduled) or have dental pain and/or infection, without a dental practitioner, who need a dental pre-assessment, it is important to direct these patients to Community Dental Services in their area, through a central triage point or direct to the locally agreed dental specialist who can not only arrange urgent care but also inform the central triage system of the referral.

6.3 Referrals of cardiac in-patients

Referrals are dependent on whether the patient can leave the ward for dental assessment or requires assessment on the ward. Each hospital will have access to Oral Surgery colleagues, although the scope of treatment in such departments is limited and therefore locally agreed mechanisms for assessment of cardiac in-patients should be developed and supported to provide wider dental care to in-patients where indicated. Patients with a diagnosis of infective endocarditis should have a dental assessment within 72 hours.

7. Dental care for patients under cardiology care

7.1 Prevention planning

Patients should have a comprehensive prevention plan to facilitate good oral health. Good preventive treatment planning, early in the patient's diagnosis, will reduce the prevalence of dental disease and reduce the resultant risk of oral infection and periodontal disease.
All interventions and recommendations should be based on evidence-based prevention as described in 'Delivering Better Oral Health: An evidence-based toolkit for prevention'[16].
Prevention advice and interventions can be provided by dentists and DCPs utilising a skill-mix approach.

7.2 Dental Pre-assessment

All patients within the CHD network; undergoing cardiac valve surgery or CHD repair are recommended to have a dental assessment prior to their cardiac surgery. A thorough clinical examination, including appropriate radiographs, must be undertaken.
Discussion between the dental and cardiology teams should be undertaken to establish individual risk and an appropriate dental management strategy. The aim is to ensure safe delivery of dental care, in the patient's best interests and removing dental foci of infection.

7.3 Treatment provided

The relevant dental service will provide any dental treatment necessary to make the patient dentally stable, including restorations, periodontal treatment, fixed and removable prosthodontics, root canal treatment and extractions, depending on the time scale available. Treatment options may involve some compromise in urgent cases.

7.4 Treatment planning in patients with cardiac disease

The following sections will be developed, using evidence-based data, to provide the CHD Network website with information accessible for general dental practitioners within the network area, on how to plan and treat patients requiring cardiac surgery including:

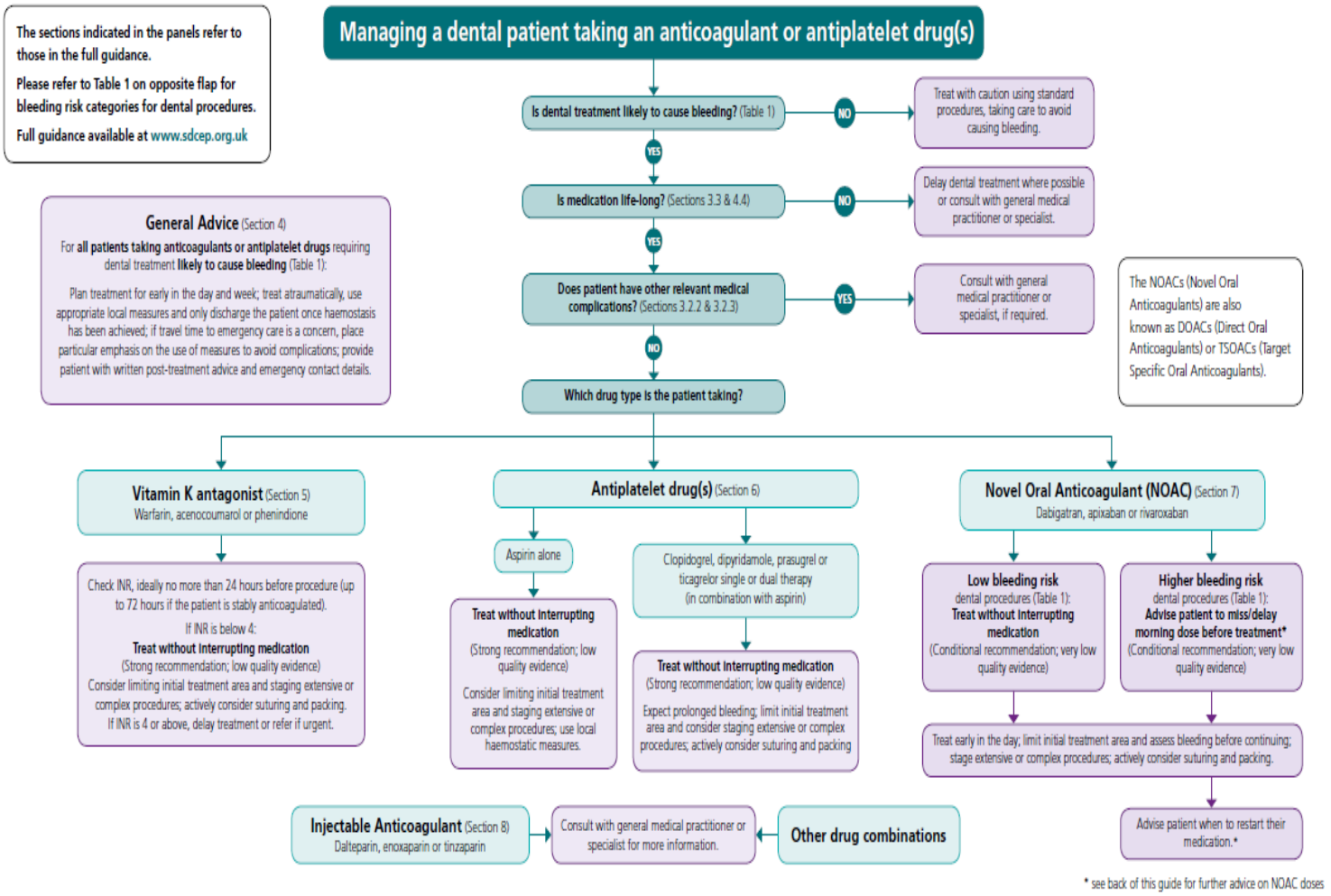
7.4.1 Patients on Anticoagulants

SDCEP have produced guidelines on the management of patients on anticoagulants requiring dental treatment on the following link: http://www.sdcep.org.uk/wp-content/uploads/2015/09/SDCEP-Anticoagulants-Guidance.pdf.
Liaise with the local Special Care Dentistry Consultant or Specialist, Oral and Maxillofacial Department, GMP or cardiologist, if you are concerned about dental treatment planning for patients on anticoagulant or antiplatelet medication. Before prescribing drugs, drug interactions should be checked in the BNF, to ensure there are no interactions with their anticoagulant or antiplatelet medications.
The dental procedure bleeding risk and algorithm below (P11) have been developed by the Scottish Dental Clinical Effectiveness Programme[18] for assisting clinical decision making for patients taking anticoagulant or antiplatelet medication.
It is downloadable at the following link: http://www.sdcep.org.uk/wp-content/uploads/2015/09/SDCEP-Anticoagulants-Quick-Reference-Guide.pdf

Table 1

Dental procedures that are **unlikely to cause bleeding**	Dental procedures that are **likely to cause bleeding**	
	Low risk of post-operative bleeding complications	**Higher risk of post-operative bleeding complications**
Local anaesthesia by infiltration, intraligamentary or mental nerve block Local anaesthesia by inferior dental block or other regional nerve blocks† Basic periodontal examination (BPE) Supragingival removal of plaque, calculus and stain Direct or indirect restorations with supragingival margins Endodontics - orthograde Impressions and other prosthetics procedures Fitting and adjustment of orthodontic appliances	Simple extractions (1-3 teeth, with restricted wound size) Incision and drainage of intra-oral swellings Detailed six point full periodontal examination Root surface instrumentation (RSI) and subgingival scaling Direct or indirect restorations with subgingival margins	Complex extractions, adjacent extractions that will cause a large wound or more than 3 extractions at once Flap raising procedures: • Elective surgical extractions • Periodontal surgery • Preprosthetic surgery • Periradicular surgery • Crown lengthening • Dental implant surgery Gingival recontouring Biopsies

Table 2



7.4.2 Local anaesthesia

When using local anaesthetic with epinephrine, for pre-operative or hospitalised cardiac patients, the recommendation is to limit the amount of lidocaine 2% with epinephrine to 2 2.2ml cartridges as a maximum dosage[17]. An aspirating syringe must be used to avoid intravascular injection. There is no evidence to suggest an inferior dental block poses a significant bleeding risk for people on anticoagulants[18] and due consideration should be given to use of infiltration and supra-crestal techniques.

7.4.3 Restorative treatment

Permanent restoration of active carious lesions should be performed, depending on time available before cardiac surgery. Stabilization of the dentition with temporary restorations can be undertaken, if cardiac surgery is imminent. Teeth with treatable periapical lesions should have endodontic treatment. If insufficient time, intra-canal temporisation with non-setting calcium hydroxide paste is recommended[17].

7.4.4 Periodontal treatment

- Chronic periodontitis, without signs or symptoms of infection should be observed and scaling and oral hygiene instruction provided.
- Teeth with advanced periodontal disease (pocket depth >6mm and/or attachment loss more than half the root (Grade 2/3 mobility) require removal prior to surgery[17].

7.4.5 Extractions and surgical procedures

Potential dental foci of infection require extraction including[17]:

- Residual root fragments
- Teeth with periapical lesions, if endodontic treatment is not possible
- Teeth with unfavourable prognosis

If the patient is taking anticoagulants or antiplatelets, the bleeding risk needs to be considered as low or high risk as per **Table 1**, and managed accordingly **Table 2**.

If taking Novel Oral Anticoagulants (NOACs), the following adjustments are recommended by SDCEP for dental procedures of higher risk of bleeding[18]:

NOAC	Usual drug schedule	Morning dose (pre-treatment)	Post-treatment dose
Apixaban or Dabigatran	Twice daily	Miss morning dose	Usual time in evening*
Rivaroxaban	Once daily; morning	Delay morning dose	4 hours after haemostasis achieved
	Once daily; evening	Not applicable	Usual time in evening*

*As long as no earlier than 4 hours after haemostasis has been achieved. The patient should continue with their usual drug schedule thereafter.

7.4.6 Antibiotic prophylaxis

For invasive dental procedures, dental defence organisations recommend the dental team:

- Are aware of and understand NICE guidelines and SDCEP supporting advice.
- Enquire if their trust or hospital has a policy regarding prescription for antibiotic prophylaxis
- Provide a full explanation for the treatment being provided and options for treatment

Dental Protection, the dental indemnity organisation, recommends that in both primary and secondary dental care, the dentist writes a prescription for antibiotic prophylaxis, on the recommendation of a cardiologist or physician, on the basis of a **written request from the consultant** including:

- The identity of the patient
- The antibiotic and dosage to prescribe
- The timing of administration
- The route of administration

Changes in guidance for antibiotic prophylaxis have been published recently, and dental practitioners should comply with their locally agreed cardiology and dental policies and refer to SDCEP (2018) guidance on antimicrobial prophylaxis.

Antibiotic prophylaxis should be considered on a case-by-case basis. It should be performed 60 minutes before dental procedures with a high probability of bacteraemia, including manipulation of gingival tissue, manipulation of periapical regions of teeth and perforation of the oral mucosa.

SDCEP (2018) guidelines recommend patients attend the practice 60 minutes prior to appointment to take their antibiotic prophylaxis and remain in the practice once taken. However, if they wish to take the antibiotic at home, and they have not previously had an adverse reaction, this can be permitted, once they confirm with the practice prior to taking antibiotic, their procedure is going ahead[19].
If the patient has taken the antibiotic in the previous 6 weeks for medical or dental infection, select a drug from a different class. If amoxicillin or clindamycin are unsuitable regimes, contact a consultant microbiologist or community pharmacist for advice on an alternate drug regime[19]. Such cases should be referred to local special care dental services. For patients who require sequential invasive procedures in a short time period, the same antibiotic may be used. It is recommended that SDCEP (2018) guidance is used for reference.

SDCEP (2018) dental guidelines highlighted invasive dental procedures, which would require antibiotic prophylaxis for high-risk patients. However, it is not an exhaustive list and the need for antibiotic prophylaxis will require clinical judgement with regard to the planned dental treatment:

Invasive dental procedures	Non-invasive dental procedures
• Placement of matrix bands • Placement of sub-gingival rubber dam clamps • Sub-gingival restorations including fixed prosthodontics • Endodontic treatment before apical stop has been established • Preformed metal crowns (PMC/SSCs) • Full periodontal examinations (including pocket charting in diseased tissues) • Root surface instrumentation/sub-gingival scaling • Incision and drainage of abscess • Dental extractions • Surgery involving elevation of a muco-periosteal flap or muco-gingival area • Placement of dental implants including temporary anchorage devices, mini-implants • Uncovering implant sub-structures	• Infiltration or block local anaesthetic injections in non-infected soft tissues • BPE screening • Supra-gingival scale and polish • Supra-gingival restorations • Supra-gingival orthodontic bands and separators • Removal of sutures • Radiographs • Placement or adjustment of orthodontic or removable prosthodontic appliances
N.B. In addition, antibiotic prophylaxis is not recommended following exfoliation of primary teeth or trauma to the lips or oral mucosa.	

7.5 Pre-assessment report for cardiac/cardiology team

Once dental treatment is completed, the dental team should complete a letter to the referring practitioner, to avoid delaying their cardiac surgery. A sample report is in Appendix 6.
The information should include:

- The current state of the patients oral/dental health
- Any acute or chronic issues
- Proposed treatment to achieve better oral/dental health on understanding the medical team's needs
- A realistic timescale for dental treatment to be undertaken
- Possible future dental concerns
- Advice regarding post cardiac treatment dental maintenance
- Details of proposed dental treatment the patient refused to consent to
- Any other concerns about their dental health important to share with medical team

7.6 Conscious sedation or general anaesthesia.

Some patient groups, for instance some people with a learning disability, movement disorder or with pronounced dental anxiety, may need to receive dental care with the aid of conscious sedation or general anaesthesia. It is therefore important that access to these treatment modalities is available across the CHD Network.

8. Service user involvement

As part of the multi-disciplinary care pathway, patients will need to consent to referral to appropriate dental services.

For evaluation purposes, consultation with patient representatives within the CHD Network and patient satisfaction surveys will be necessary to ensure regular continuing development and improvement of this care pathway.

9. Evaluation

The care pathway will need to be developed with dental leads, cardiology leads and nurse specialists to facilitate its use in the CHD Network, to improve its efficacy and its continued development. The Clinical Governance Group within the CHD Network would oversee this. Referrals to dental services will need to be monitored by both dental and cardiac teams for auditing purposes.

Training of general dental surgeons and general medical practitioners on managing and referring patients having or having had cardiac surgery will need to be implemented, especially in relation to dental treatment planning, especially if limited time frame available before cardiac surgery.

The involvement of patients through the use of PROMS and PREMS should be encouraged to inform pathway evaluation and development.

10. References

1. NICE Guideline [CG64] (2016) Prophylaxis against infective endocarditis: antimicrobial prophylaxis against infective endocarditis in adults and children undergoing interventional procedures: Update. https://www.nice.org.uk/guidance/cg64/chapter/Recommendations

2. Nakatani S., Mitsutake K., Ohara T., Kokubo Y., Yamamoto H., Hanai S. Et al. 2013. Recent picture of infective endocarditis in Japan – lessons from cardiac disease registration. Circ. J.; 77(6):1558-1564

3. Chen P., Tung Y., Wu P., Wu LS, Lin YS, Chang CJ, King S., Chu PH. 2015. Dental Procedures and risk of infective endocarditis. Medicine; 94(43): 1.6

4. Slipczuk L., Codolosa J.N., Davila C.D., Romero-Corral A., Yun J., Pressman G.S., Figueredo V.M. 2013. Infective endocarditis epidemiology over five decades: a systematic review. PLOS ONE; 8(12): e82665

5. Dayer M., Thornhill M. 2017. Is antibiotic prophylaxis to prevent infective endocarditis worthwhile? J Infection and Chemotherapy: 1-7

6. Lockhart P.B.,Brennan M.T., Thornhill M., Michalowicz B.S., Noll J., Bahrani-Mougeot F.K. et al. 2009. Poor oral hygiene as a risk factor for infective endocarditis-related bacteraemia. JADA; 140: 1238-1244.

7. Mylonakis E, Calderwood SB. (2001) Infective endocarditis in adults. *N Engl J Med*; 345:1318–30.

8. Bonow RO, Carabello BA, Kanu C, et al. (2006) ACC/AHA 2006 guidelines for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (writing committee to revise the 1998 guidelines for the management of patients with valvular heart disease): Developed in collaboration with the society of cardiovascular anesthesiologists: endorsed by the Society for Cardiovascular Angiography and Interventions and the Society of Thoracic Surgeons. *Circulation*; 114:e84–231.

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

10. Lam D., Wright K., Archer B. (2013) Is it safe to perform **dental** and **cardiac** valve surgeries concomitantly? *J Oral Maxillofac Surg.* Jun;71(6):1000-4. doi: 10.1016/j.joms.2013.01.003. Epub 2013 Mar 26.

11. Smith M.M., Barbara D.W., Mauermann W.J., Viozzi C.F., Dearani J.A., Grim K.J. (2014) Morbidity and mortality associated with dental extraction before cardiac operation. *Ann*

Thorac Surg. Mar;97(3):838-44. doi: 10.1016/j.athoracsur.2013.10.034. Epub 2013 Dec 17.

12. Dayer M., Jones S., Prendergast B., Baddour L.M., Lockhart P.B., Thornhill M.H. (2015) Incidence of infective endocarditis in England, 2000–13: a secular trend, interrupted time-series analysis. *Lancet*; 385, 9974: 1219–1228.

13. Franklin M., Wailoo A., Dayer M.J., Jones S., Prendergast B., Baddour L.M. et al. 2016. The cost effectiveness of antibiotic prophylaxis for patients at risk of infective endocarditis. *Circulation*; 134: 1568-1578

14. Thornhill M.H., Dayer M.J., Prendergast B., Baddour L.M., Jones S., Lockhart P.B. 2015; Incidence and nature of adverse reactions to antibiotics used as endocarditis prophylaxis. *J Antimicrobial Chemotherap*; 70: 2382-2388

15. Welsh Health Survey 2015: Health status, illnesses, and other conditions (2016) http://gov.wales/docs/statistics/2016/160622-welsh-health-survey-2015-health-status-illnesses-other-conditions-en.pdf (Accessed: 23/6/16).

16. Department of Health (BASCD). 2014. Delivering Better Oral Health. An Evidence-based toolkit for Prevention. British Association for the Study of Community Dentistry. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/367563/DBOHv32014OCTMainDocument_3.pdf (Accessed 23.7.2016).

17. Souza A.F., Rocha A.L., Castro W.H., Gelape C.L., Nunes M.C.P., Oliveira S.R., Travassos D.V., Silva T.A. (2017) Dental management for patients undergoing heart valve surgery. *J Card Surg*; 32: 627-632.

18. Scottish Dental Clinical Effectiveness Programme. (2015) Management of Dental Patients Taking Anticoagulants or Antiplatelet Drugs. http://www.sdcep.org.uk/wp-content/uploads/2015/09/SDCEP-Anticoagulants-Guidance.pdf (Accessed 4.1.2018)

19. Scottish Dental Clinical Effectiveness Programme. (2018) Antibiotic Prophylaxis against Infective Endocarditis. http://www.sdcep.org.uk/wp-content/uploads/2018/08/SDCEP-Antibiotic-Prophylaxis-Implementation-Advice.pdf (Accessed September 2018)

11. Appendices

Appendix 1: NICE guidance recommendations for antibiotic prophylaxis

1. Healthcare professionals should regard people with the following cardiac conditions as being at risk of developing IE:

- acquired valvular heart disease with stenosis or regurgitation
- hypertrophic cardiomyopathy
- previous infective endocarditis
- structural congenital heart disease, including surgically corrected or palliated structural conditions, but excluding isolated atrial septal defect, fully repaired ventricular septal defect or fully repaired patent ductus arteriosus, and closure devices that are judged to be endothelialised
- valve replacement or repair

2. Healthcare professionals should offer people at risk of infective endocarditis clear and consistent information about prevention, including:
    - the benefits and risks of antibiotic prophylaxis, and an explanation of why antibiotic prophylaxis is no longer routinely recommended
    - 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
3. Antibiotic prophylaxis against infective endocarditis is not recommended for all people undergoing dental procedures.
4. Chlorhexidine mouthwash should not be offered as prophylaxis against infective endocarditis to people at risk of infective endocarditis undergoing dental procedures
5. Any episodes of infection in people at risk of infective endocarditis should be investigated and treated promptly to reduce the risk of endocarditis developing.

Appendix 2: Sample Patient "Postcard"

IMPORTANT

Patient Name & Address:
Cardiologist/Physician Name & Contact Details:

Abscesses or gum infections can spread to your heart or heart valves through your blood causing infections. It is important you have regular dental check-ups and any infected teeth are removed, before you have cardiac surgery. You require antibiotic cover prior to invasive dental treatment, because of:

Artificial / prosthetic heart valves or prosthetic material used for heart valve repair	
Previous infective endocarditis	
Unrepaired congenital heart defects (CHD)	
Repaired CHD with defect or within six months after surgery	

The antibiotic and dosage recommended orally is:
.....
This needs to be given ..... minutes prior to invasive dental treatment.

If you have a dentist, you should book an appointment as soon as possible before any cardiac surgery and show this card. If you do not have a dentist, you can contact NHS General Dental Practice Access**:**
Aneurin-Bevan UHB: 01633-744387 **Cardiff & Vale UHB:** 02920 444500
Cwm Taf HB: 01443-680166 or 01685-351325 **Hywel Dda:** 01267 229692
Abertawe Bro Morgannwg UHB: Bridgend: 01656 754400 Neath Port Talbot: 01792 326500
Swansea: 01792 601800

Practical Oral Care

	Notes
1. Tooth brushing	Use a medium, small headed brush, to brush teeth and gums, at least twice daily. Just before bedtime and one other time during the day. Use 1450ppm sodium fluoride toothpaste. Spit out excess toothpaste, do not rinse.
2. Aqueous alcohol-free chlorhexidine gluconate mouthwash 0.2%	Recommended for short term use, if tooth brushing is inadequate. Rinse twice daily, with 10ml for 1 minute at an alternative time to tooth brushing.
3. Fluoride mouthwash 0.05% sodium fluoride	Use mouthwash additionally, at an alternate time to tooth brushing. Ask your dentist if you need high fluoride toothpaste prescribed or fluoride varnish applications.
4. Dietary advice	Try to choose healthy meal and snacks. Sugary food and drinks can decay your teeth. Have them at mealtimes only and avoid at night and in between meals.

Appendix 3: Sample Infective Endocarditis & Oral Health information leaflet

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which have a high risk of developing infective endocarditis:

- Artificial or prosthetic heart valves or prosthetic material used in valve repair
- Previously had infective endocarditis
- Unrepaired congenital heart defects (CHD)
- Repaired CHD with defect or within six months after surgery

For further advice, please contact your Cardiology team or Congenital Heart Disease Unit.

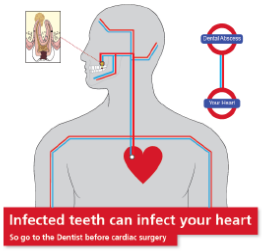
Are you looking for a dentist?
You can contact NHS General Dental Practice Access:
Aneurin-Bevan UHB: 01633-744387
Cardiff & Vale UHB: 02920 444500
Cwm Taf HB: 01443-680166
Hywel Dda HB: 01267 229692
Abertawe Bro Morgannwg UHB:
Bridgend: 01656 754400
Neath Port Talbot: 01792 326500
Swansea: 01792 601800

Further information available at:
British Heart Federation: www.bhf.org.uk

Managed Clinical Network
Special Care Dentistry/Cardiff & Vale University Health Board Cardiac Directorate

Infective Endocarditis & Oral Health: What you need to know

It's all connected!



2

You have been given this leaflet as you are, or may be at risk of 'infective endocarditis'.

What is infective endocarditis?
This is an infection of the inside of the heart or heart valves. It is caused by bacteria or fungi, which get into the blood stream and can grow inside your heart.

Am I at risk?
Your cardiologist or heart specialist will decide whether you are at risk.

What are the symptoms?
Infective endocarditis can develop either as:

1. *Slowly developing infection:*

This can occur over weeks or months and can be vague.
You may feel:

- Generally unwell
- Aches and joint pains
- Tired
- Loss of appetite, weight loss
- High temperature, shivering, night sweats

Colds or flu can give the same symptoms.

3

It is important to arrange to see your doctor if these symptoms carry on longer than a week, to check your heart.
2. *Rapidly developing infection:*
You can become very unwell over a few days. You should go see your doctor or attend your nearest hospital immediately.

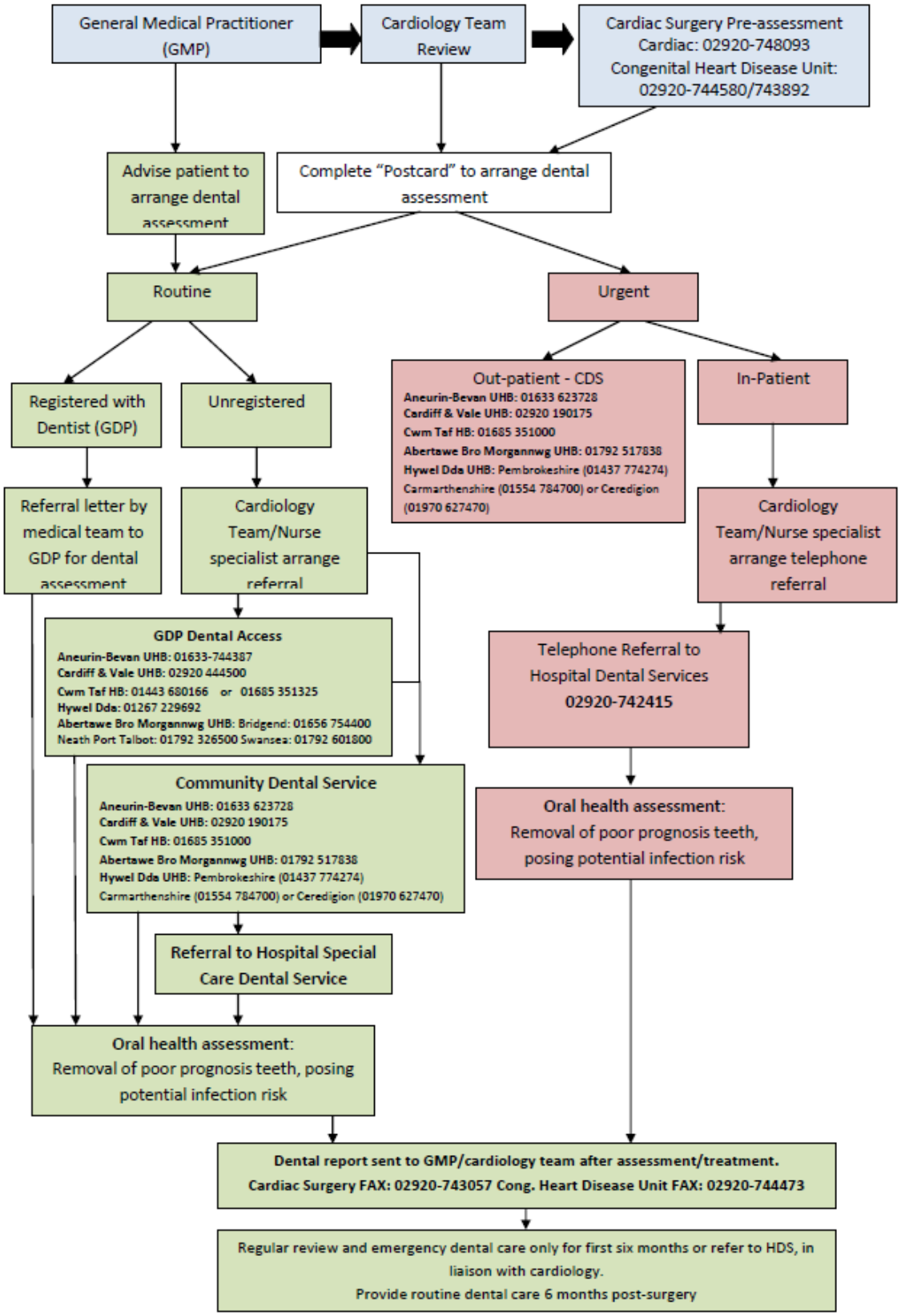
What can I do to reduce my risk?
Sometimes bacteria can get into the blood from infections in the mouth. You can keep your mouth healthy by:

- Brushing teeth and gums twice daily, using 1450 ppm fluoridated toothpaste and a medium, small headed toothbrush
- Avoiding sugary foods and drinks in between meals and at night time
- Having regular 6-12 monthly dental visits

Do I need antibiotic cover before dental care?
Antibiotic cover is not recommended routinely before dental procedures.
Your heart specialist/ cardiologist, will provide a 'postcard' which will let your dentist know if antibiotics are needed, if you have the following conditions,

MCN SCD SE Wales: Infective Endocarditis: What you need to know

Appendix 4: Example Dental Care pathway for Adults requiring Cardiac Surgery (in this example South Wales)



Appendix 5: SDCEP recommendations for Antibiotic Prophylaxis against Infective Endocarditis

The BNF[14] does not currently include information on antibiotic prophylaxis against infective endocarditis in a dental context. The following regimens[a] for adults are based on the 2006 British Society for Antimicrobial Chemotherapy report[28] while the doses for children are based on the 2015 ESC guidelines.[18]

If antibiotic prophylaxis is required, an appropriate oral regimen is:

Amoxicillin, 3 g Oral Powder Sachet*

Give: 3 g (1 sachet) 60 minutes before procedure

(3 g prophylactic dose)

Dose for children:

Amoxicillin Oral Suspension*, 250 mg/5 ml or 3 g Oral Powder Sachet*

6 months – 17 years	50 mg/kg; maximum dose 3 g (prophylactic dose)

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

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

*Sugar-free preparation is available.

In patients who are allergic to penicillin, an appropriate oral regimen is:

Clindamycin Capsules, 300 mg

Give: 600 mg (2 capsules) 60 minutes before procedure

(600 mg prophylactic dose)

Dose for children*:

6 months – 17 years	20 mg/kg; maximum dose 600 mg (prophylactic dose)

NB: Advise patient that capsules should be swallowed with a glass of water.
Do not prescribe clindamycin to patients with diarrhoeal states.
Be aware that clindamycin can cause the side-effect of antibiotic-associated colitis, which may be fatal.

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

*As clindamycin is not available as an oral suspension, it may not be possible to give the appropriate dose for some child weight ranges. Azithromycin oral suspension is a suitable alternative in this situation.

Appendix 6: Dental assessment report

Re: Patient Details:

Date:.....

Thank you for referring this patient for a pre-operative dental assessment, prior to cardiac surgery.

I have examined the patient, both clinically and radiographically, and:

- ☐ Appropriate oral condition for surgery. No dental treatment is required
- ☐ Potential oral focus infection evident. Dental treatment required.

Dental findings and treatment required include:

- ☐ This treatment plan is completed / can be completed (circle appropriate) by DATE:.....
- ☐ The patient refused this course of dental treatment

Details of refused treatment and future dental concerns:

I would appreciate your advice, after completion of their cardiac surgery, on any precautions necessary for their post-operative dental care.

Yours sincerely,

DENTIST SIGNATURE.....

CONTACT TELEPHONE.....

PRACTICE STAMP: